INSTRUCTIONAL EXPLANATION STRATEGIES:

A CASE STUDY OF TEACHING STRATEGIES IN AN ASSOCIATE DEGREE PROGRAMME IN HONG KONG

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ABSTRACT

This research study aimed to investigate teachers' strategies for instructional explanations as a scaffolding approach for supporting conceptual understanding of new knowledge in response to the learning attitudes of community college students in Hong Kong. Adopting an interpretivist research paradigm, a single embedded case study using qualitative methods was implemented. Naturalistic data collected from interviewing the participants, recording actual teaching situations and class observation were coded, analyzed and triangulated. The findings explore the ways college teachers explain new knowledge, reveal the roles of explanations in instructional process and explain the rationales behind the strategies in relation to their perspectives in teaching and about this particular group of students. This study identified various types of instructional explanation strategies and three different explanatory approaches, namely familiarization, visualization and contextualization, which support understanding of different types of declarative, procedural and conceptual knowledge. Instructional explanations are the most prominent scaffolding strategies exercised in content-based lessons. College teachers made use of various tools and strategies to explain new concepts and those explanation strategies were intentionally catered to facilitate students' understanding. These approaches reflected teachers' experiences, beliefs and their perspectives on the learning background of Hong Kong students, their attitudes to learning and their perceived needs in the transition years of the college life. Despite this, instructional explanations were still overlooked as a vital and essential strategies even though participants put much of the time in class providing explanations.

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DEDICATION

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CHAPTER 1 INTRODUCTION

1.1 Background of the study

This thesis focuses on the strategies used by college teachers to deliver explanations while teaching to support the understanding and learning of a group of Hong Kong students who are pursuing a 'second chance' to be accepted into a university undergraduate programme.

Education reform in Hong Kong since the year 2000 has resulted in many higher education (hereafter HE) providers setting up community colleges which offer sub-degree programmes that cater for students whose examination results are not high enough for them to get into university. This group of students are frequently – and unjustifiably – labelled 'losers' in Hong Kong society. This label is often applied to describe students who have failed public examinations, and is used by local newspapers, the writers of education-related articles produced by various organizations and public documents such as Education Convergence (2000), Fēng xìnzi (2012) and Chiu (2015).

Many community college students, even those who have been given another opportunity to obtain a place in a university, still see themselves as being 'losers'. In a study which examines the self-evaluations of 52 community college students in Hong Kong, Wong (2013) reports that all participants saw the academic outcomes of failing to get into university owing to their poor public examination results as failure, and almost all of them attributed their failures to "laziness and incapability" (p.5). Apart from these attributes, the learning attitude developed by students throughout their school years in the education system and in the context of the wider Chinese culture may also affect their self-perception and the way that they learn. In 1.3, a detailed discussion is provided on the cultural and systemic background of Hong Kong students, which demonstrates the kinds of barriers college teachers may experience when teaching their students.

Since community colleges are self-financing, the main competitive task for colleges is attracting students to enrol in their programmes. Their key selling point is the percentage of students who end up obtaining university offers. Preparing students to compete for the limited number of university places is a major mission for college teachers, and a key expectation from the management of these colleges. Therefore, their quality of programmes and high tuition fees have often been the subject of public concern (Wong, 2015a) despite the fact that community colleges are set up to cater to this group of 'second chance' students and provide an alternative path through which they can enter university. Wong (2015b) also found that students and their parents, those in the middle class in particular, felt ashamed about studying in community colleges as they saw these institutions as being inferior to universities.

Facing pressure from stakeholders, pressure from society and the pressure of teaching a group of students with low self-esteem and potentially with various difficulties in learning, college teachers have tremendous challenges to overcome. This study gives us a closer look at what strategies the college teachers use to help students learn in classroom context.

As a teacher for over twenty years, I have witnessed a lot of grievances expressed by students and other teachers. Teachers expressed that they reported frustration about how their students did not fully understand what they said. I felt that one possible reason is the way teachers explained. Indeed, in numerous casual discussions and in more formal feedback given in official evaluations in my twenty years of teaching experience, the college students expressed that when they understood what teachers said, they regained interest in learning and self-confidence. While paying a lot of effort to developing my explanations in teaching, I realized that explanations are not simply about talking but involve many strategies and considerations. I was interested to find out more about instructional explanations, to explore the roles of explanation strategies in the classroom and to understand how the strategies support teaching and learning from both practical and theoretical perspectives.

Hativa (2000) said that “most students cannot learn effectively by only listening” (p.108), as the presence of knowledge does not guarantee understanding, and is thus not ‘true learning’. Student understanding of subject knowledge is thus the primary teaching goal. Given my belief that the ways in which teachers explain new knowledge to support understanding are of utmost importance to effective teaching and learning, the major direction of this research is to explore various strategies of instructional explanation.

1.2 Thesis objectives

This study has one major objective: to explore how instructional explanation affects learning in content-based community college classrooms. This objective will be addressed in two ways: First, the study will investigate how college teachers explain new knowledge in lessons, explore the role of explanation strategies in scaffolding the learning process and examine how explanations support acquisition of knowledge. Second, the study will seek to discover whether the strategies are implemented in response to teachers’ perceptions of students’ academic abilities and attitudes as well as the learning culture in Hong Kong, and how teachers in HE help ‘second chance’ students in Hong Kong through the process of teaching. Using a case study approach, the study invited eight college teachers to share their thoughts and experience and visited their classrooms to observe and record their teaching practices.

1.3 Research context – the learning culture in Hong Kong

It may sound harsh, but often, students in Hong Kong are labelled as ‘sheep’ or “blind followers” (Chan & Chong, 2012, p.53). This label is given in response to their perceived preference for following instructions and memorizing model answers given by teachers, without employing critical thinking. Studies have pointed out that there are two factors affecting the learning attitudes of Hong Kong students. First, the exam-driven study culture in Hong Kong is responsible for a perceived ‘unhealthy’ teaching and learning culture (Berry, 2011). Secondly, traditional Chinese culture instils strong values in contemporary Hong Kong Chinese people in terms of parental attitudes in particular, which affects the attitudes of students in academic learning and their cognitive development in critical thinking and creativity, as Ho (1994) summarizes,

> [Chinese] children are socialized to respect, not to question, the authority of parents and teachers; to regard the written word as the authoritative source of knowledge and wisdom; to stress the need for memorization and repeated practice in the learning process; to believe that diligence holds the key to good academic performance – a route to personal success, which would, in turn, bring glory to the family name. in short, the motto is: Study hard and be rewarded in the future. (p.363)

1.3.1 *The exam-oriented education system*

When reviewing the Hong Kong education system, the Organization for Economic Co-operation and Development reported that "the education system of Hong Kong was exam-driven" (Choi, 1999, p.405). This is a direct result of the strong examination system in Hong Kong. There have been many public examinations in Hong Kong, and a brief history of these is now provided.

Between 1962 and 1977, when Hong Kong was a British colony, Primary Six (age 10-12) students were obliged to take the Secondary School Entrance Examination. This was then replaced by the Hong Kong Academic Aptitude Test (abbrev. HKAAT, 1978-2000) in 1978 – the year that the nine-year compulsory government-funded education system was launched. Based on the results of these examinations, students were ranked and then allocated to secondary schools of different 'bands' in their residential district areas. In 1981, when the first group of students who took the HKAAT reached Secondary Three level, the government introduced the Junior Secondary Education Assessment examination (abbrev. JSEA, 1981-1987). Only those who passed the JSEA could continue their studies into the fourth year of secondary school (i.e.

Secondary Four) in a government-funded or subsidized school. Before they reached the end of their seven-year secondary school education, students had to undergo two more public examinations: the Hong Kong Certificate of Education Examination (abbrev. HKCEE, 1974-2011) in Secondary Five and the Hong Kong Advanced Level Examination (abbrev. HKALE, 1979-2012) in their seventh year.

The HKCEE and HKALE were perceived as very important ‘gates’ through which students had to pass in order to enjoy a prosperous and happy life, as Hong Kong people believed – and still believe – that entering university is a ‘ticket’ to a high-paying job. Over a period of more than thirty years, studying for these two examinations was an indispensable part of life for many local people. From 1978 to 2008, over four million candidates participated in the HKCEE, while over 750,000 students took the HKALE between 1980 and 2008.

Beginning in the 2009-2010 school year, the old British structure was changed to the American system. This is known as the ‘3-3-4 scheme’, standing for three years of junior secondary, three years of higher secondary and four years of undergraduate study. Both the HKCEE and HKALE exams have now been replaced by a single examination called the Hong Kong Diploma Secondary Education Examination (HKDSE). However, with the long history of having an exam-oriented education system, the learning environment in Hong Kong is still highly exam-driven.

The revamped public examination system has not changed the situation that Hong Kong had very few university places available. In the A-level era, only 40 per cent of A-level students were able to get into government-funded undergraduate degree programmes in local universities each year. This situation persists today: in 2018, there were 57,649 school students entering the HKDSE examination (Hong Kong Examinations and Assessment Authority, 2019) but only 18,367 students enrolled in the first-year undergraduate programmes across all eight local universities (University Grants Committee, 2019).

The results of these exams not only affect the students' ability to get into university. Their exam results also affect their options in the local job market. For example, the minimum requirement for employment with all Hong Kong disciplined services, including the police force, fire services and customs, as well as for many jobs in the private sector is Level 2 in five subjects including English and Chinese Language in HKDSE or five passes in the HKCEE. As these examinations represented such an important milestone, they created – and still create to this day – tremendous pressure on students. The next section examines the learning situation and students' attitudes toward examinations.

1.3.2 *Influences on teaching and learning in the exam-driven environment*

Given the pressures of the examination system, it is quite understandable why the learning process in many Hong Kong schools is focused on preparing for tests and examinations, and how most of "the curriculum, teaching methods, and student study methods are focused on the next major assessment hurdles" (Biggs, 1996, p.5).

In order to prepare students for these 'big exams' and to establish and maintain a good reputation with wider society, many schools in Hong Kong carry out various kinds of testing and examinations throughout their curricula. This is due to the fact that schools in Hong Kong are assigned different bands (which essentially represent the prestige of a school). This banding is assigned based on the overall academic performance of students and the public examination results of that school's students. In order to create the impression that the school is producing elite students, schools often go to considerable lengths to prepare their students to achieve outstanding results. Even the media become involved. Each year, when the public examination results are released, the students receiving the best grades are interviewed by television channels and the names of their schools are announced. In this febrile atmosphere, many parents become eager to send their children to these schools, not to develop their intellectual thinking, but because they believe these schools will train their children to achieve outstanding scores in public examinations.

However, assessment-oriented curricula often make it more difficult for students in the long run, as they actually obstruct thinking and learning. Students in primary and secondary schools normally need to sit through two mid-term tests and one end-of-term examination every semester, as well as mini-tests every week and mock exams before public examinations. A survey carried out by the Hong Kong Federation of Youth Groups in 1998 revealed that "on average, secondary school students have three tests per week" (Pong & Chow 2002, p.143). Even though some studies show that Hong Kong students are not purely rote learners, and have a higher level of learning conception (Tang & Biggs, 1996), when faced with tight schedules which include rigorous school timetables, assignment deadlines, dictation assessment, tests and examinations, there is no 'room' for students to achieve deep learning – it is more a process of managing the heavy workload of mechanical homework and 'surviving' the many assessment exercises.

Mechanical homework is a preferred method adopted by many schools to help children prepare for these exams. However, a study of young Hong Kong students and their involvement with homework has shown that owing to short attention spans and immature study skills, "young school children do not benefit academically from heavy homework involvement" (Tam, 2009, p.224). According to Tam (2009), students "complained that homework merely required mechanical effort in writing and copying without due attention [being] given to enhancing thinking skills or developing knowledge" (p.214).

While students are generally not given enough time to develop their critical thinking skills, teachers also find it a challenge to not provide mechanical training to prepare students for their examinations. One problem may be Hong Kong's relatively large class sizes. A Shanghai education official, Mr Mao Fang, said in a newspaper report that, "when I met with Hong Kong teachers, I was shocked by the huge number of students they had to teach, and the tremendous workload in preparing for education and curriculum reforms. It's impossible for teachers to practise innovative teaching methods, like project-based learning, in [these] circumstances" (Chan, 2004, p.1).

Preparing teaching materials, handling huge numbers of students' assignments and catering for frequent changes of curricula, teachers do not have much time to take extra courses or workshops to enhance their teaching skills. Even equipped with the knowledge of using innovative teaching methods, facing a large number of students in each class, teachers may find it difficult to use interactive activities with each student and allow everyone to give feedback. Consequently, teaching may rely heavily on a transmissive approach with teachers transferring well-structured information based on the defined curriculum and materials to the recipients (Kember, 1997).

In addition, Hong Kong students have developed a very selective learning attitude, with students sometimes encouraging teachers to focus only on the examination syllabus and drills for the examinations. Choi (1999) points out that "what is examined becomes what is taught" (p.412), and since students only focus on the examination syllabus, they end up not spending time on points that will not be tested in the examinations.

> The parts of a teaching syllabus which are not examined in public examinations are generally not closely followed in the classroom. In fact, students sometimes stop their teacher from teaching certain topics or materials which are not in the syllabus. (Choi, 1999, p. 412)

This exam-oriented attitude poses negative influences on students. Pong and Chow (2002) carried out a small-scale study of examination experiences in the context of Hong Kong secondary schools. Through the written descriptions of the participants, they found that most of the experiences indicated "negative aspects of the examination system and its excessive pressures on students and their teachers" (Pong & Chow, 2002, p.148). Their study shows that students often see studying hard for exams as a fulfilment of parental wishes and a way to avoid punishment, or a competition with their peers; and that the pressure of assessments distorts students' sincere wish to learn and makes them heavily rely on memorizing stock phrases.

Although the Hong Kong examination authority has, over the years, received a lot of criticism about the exam pressure posed on students, the education policies have not minimized the effects of this exam culture. Taking the Territory-wide System Assessment (TSA), as an example, the assessment poses much pressure on students because students are given extra drilling practice, homework and lessons for preparing the assessment. Criticisms of the negative effects of assessment policies have been overwhelmingly voiced out in the society, and in 2015, over 40,000 parents joined a campaign to ask for an end to the TSA. Even though the Government emphasizes that the TSA is on a voluntary basis for collecting data about students' standard "for the purposes of school improvement in learning and teaching" (Hong Kong Examination and Assessment Authority, 2017, p.1); the schools responded to it as a ranking exercise, and thus "it is beyond the capability of an examining body to change a culture and the socio-economic factors that help to create that culture" (Choi, 1999, pp.412-413).

1.3.3 *Chinese culture*

Confucius was a Chinese philosopher whose values and beliefs on morality, social justice and relationships, developed in 551–479 BC, "have touched virtually every aspect of Chinese civilization and culture and profoundly influenced the Chinese conception of the individual and of human beings", and "have become the core set of values that guide the Chinese people in their own lives today" (Suleski, 2008, p.253). The teachings of Confucius are deeply embedded in most Asian societies and affect the everyday lives of all Chinese people. In Confucianism, the most important virtue, and the one that has the strongest influence on modern Chinese society is filial piety (*xiào* 孝). This is regarded as the primary virtue and is placed above all others (Chinese proverb: *Bǎi shàn yǐ xiào wèi xiān* 百善以孝為先). It is the first virtue children learn from their parents, and it governs relationships and justice in society, including the legal system. Filial piety also strongly impacts on the learning habits of Chinese students, as explored in the next paragraph.

According to the Classic of Filial Piety (*Xiào jīng* 孝經), Confucius said that filial piety "is the root of (all) virtue, and (the stem) out of which grows (all moral) teaching" (Confucius, BC 200-350). Filial piety refers to the ways in which people should treat their parents and the moral conduct they must follow in order to meet their parents' expectations. The result of this culture is that children are presented with an enormous barrier, which prevents them from expressing their opinions and making individual judgments. Ng (2001) criticizes the negative impact of filial piety on the intellectual development of Chinese children:

> Dependence of the child on the parents is encouraged, and breaking the will of the child, so as to obtain complete obedience, is considered desirable. There is less interest in encouraging the child's expression of opinion, autonomy and independence. (Ng, 2001, p.29)

This traditional virtue hinders not only the creativity of Chinese students but also their attitude to the development of critical thinking. The attitudes generated from the concept of filial piety have led to significant negative effects on education (Hwang, 1999). Having been taught to obey, following instructions becomes a habit in people's conduct of daily activities and in their contact with the world. Thinking skills are therefore neglected and underdeveloped.

Although filial piety is said to be "not authoritarian but a manifestation of affection or love" (Cheung & Kwan, 2012, p.18), the expectation of 'not being rebellious' is highly associated with obedience to parents, who represent authority. In Chinese families, children are taught to obey their parents and all senior family members because "obedience to authority is regarded as a kind of virtue" (Chan & Chong, 2012, p.52). In schools, they are trained to obey their teachers as teachers hold the same responsibility and status as parents. Although the status of teachers in modern society is no longer equivalent to parents, teachers are still respected and honoured, and seen as figures whom students should not challenge (Chan & Chong, 2012). Obedience to teachers is thus usually strictly observed in the learning environment.

1.3.4 *The concept of 'face'*

The concept of 'face' is another hugely important and significant pillar of Chinese society, and one which also prevents Hong Kong students from developing critical thinking skills. 'Face' (*Miànzi* 面子) is a crucial way in which Chinese people display their social status to different social networks. 'Face' is a symbol of prestige, a way of projecting a successful self-image into other people's minds regarding someone's knowledge level and all-rounded abilities (Hwang, 1987). The concept of 'face' is "not only seen among the older generation but [is] also manifested by Chinese college students" (Hwang, 1987, p.962). In this regard, Hong Kong Chinese students are often afraid of making mistakes or having their peers find out they cannot make sense of new information or lack the ability to figure out questions being asked in the lesson. Hong Kong students commonly find giving incorrect answers or asking questions in front of their peers to be a 'face-losing' experience, which would directly injure their self-esteem. They also avoid expressing opinions, challenging their teachers or criticizing their peers in classroom (Flowerdew, 1998). Therefore, in order to save face, they avoid taking risks – they do not express their ideas or seek help in class.

> Chinese people fear losing face due to failure. Students generally prefer to follow instructions in order to do things in a proper way; this tendency suffocates their ambition to attempt new ideas and to explore new knowledge. (Chan & Chong, 2012, p.53)

Chinese people "consider decisions first from the perspective of their family and the effects their decision will have on parents and relatives" (Suleski, 2008, p. 281). In fact, following the instructions of their seniors, fulfilling their parents' expectations and retaining a good family reputation are both the essence of filial piety and ways to preserve the face of one's parents and family. Given this cultural background, whether or not children properly learn and acquire knowledge at school is often less of a priority for parents. What parents frequently want most of all is to see their children praised for their lamblike discipline and good academic results and ultimately enter prestigious schools and universities – this gives them 'face' in front of their relatives and friends.

1.3.5 *Hong Kong students as passive and rote learners*

The emphasis on obedience, and the concepts of filial piety and 'face' are deeply rooted in Hong Kong society and have enormous effects on people's relationships and attitudes to learning. Confucius may have said that "study without thought is labour lost; thought without study is dangerous" (Creel, 1951, p.145), but the domination of filial piety and 'face' has a greater effect on the ideology of Hong Kong society. Growing up in this environment, children learn to conform when dealing with their parents and authority figures. Research has provided strong evidence that the emphasis on filial piety and the virtue of obedience creates "a passive, uncritical, and uncreative learning orientation" (Leung, Wong, Wong & McBride-Chang, 2010, p.653).

Marton, Watkins and Tang (1997) suggest that Chinese culture and a teaching practice focusing on memorization are the root of Hong Kong's rote learning style. The problem is that when students learn by rote, they may not understand every item even though they are able to recite every item. Willingham (2009) suggests that students may still gain understanding if the new knowledge is connected to their existing knowledge. However, this may only be a shallow understanding. They may be able to understand the information in the context provided but they are not capable of "apply[ing] the knowledge in many different contexts, to talk about it in different ways, to imagine how the system as a whole" (Willingham, 2009, p.95).

Students need sufficient background knowledge to carry out complicated critical thinking and reasoning. Clearly at the junior level, students may not have enough background knowledge to transfer new information to the world. However, at higher secondary levels, when provided with the appropriate teaching approaches, students may be able to engage in deep learning. However, as discussed earlier, Hong Kong secondary students focus most of their time and effort on catching up with examination syllabi and keeping up with the many assessments; and once they realize that their revision, drilling practice and 'understanding' are sufficient enough to obtain the desired exam results, they stop. Under these circumstances, students have virtually no need to develop their deep learning and critical thinking skills.

When entering HE studies, these students can face tremendous difficulties. Webster and Yang (2012) studied the academic transition of Hong Kong Chinese first-year university students via a survey involving ten faculties in a university in Hong Kong in order to understand their experiences and perceptions of teaching and learning. Though, from the 1192 respondents, the study indicates that the difficulties students experienced in teaching and learning did not have a direct correlation with their perception of the courses or their approaches to learning, over 50 per cent of students expressed that they experienced difficulties in teaching and learning during the transition from secondary to university level. They noted that in the primary and secondary studies, Hong Kong students learn through memorizing and repeated drilling. During their transition to a HE level, teachers should help them transform their rote-learning habits into and become independent learners.

Another difficulty the Hong Kong students face is the use of English, a second language, as the medium of instruction in HE classrooms. EMI (English-medium instruction) is a common instructional practice in local HE where English is used to teach academic subjects. However, although students have been taking English language classes since a young age, studying subject content in English is challenging because there is "a gap between the content-specific English needed for English-medium courses and the English for general purposes taught in foreign language classes" (Zhao & Dixon, 2017, p.2).

A study of undergraduate students' experiences with English-medium HE in Hong Kong reveals that many students felt that understanding English was a great challenge, given "their inability to understand a plethora of new technical vocabulary" (Evans & Morrison, 2011, p.154). In another questionnaire survey involving 606 undergraduate students in a local university, Tsui and Ngo (2017) found that though students acknowledged the value and impact of English language proficiency on institutional and occupational dimensions, "they were worried that their academic results, motivation to learn, learning atmosphere and in-class discussion could be diminished" (p.69) in EMI (English-medium instruction) classrooms owing to their non-native English proficiency.

Owing to the reform of the education system in the late 1990s, as of January 1998, the number of EMI schools was cut down to 114 secondary schools – about 25 per cent of the total number of schools in Hong Kong. The other 75 per cent of schools became Chinese medium-of-instruction (CMI) schools (Choi, 2005). Since all the EMI schools are in the Band 1 category, students at these schools normally receive satisfactory academic results and enter undergraduate programmes directly after finishing secondary school. With regard to this study, this indicates that the majority of the students being taught at this college were educated in a Chinese learning environment before being admitted to this college, where English is used in every classroom. The change of medium of instruction, which means using a second language as a dominant teaching and learning vehicle, imposed challenges on students to bridge the gap of their second language proficiency and the required language level for learning (Johnson & Swain, 1994), and probably inhibited students' participation and teacher-student interaction (Lo & Macaro, 2012).

As they are allied with universities, the sub-degree programmes provided by Hong Kong's community colleges aim to prepare students for undergraduate programmes. The colleges' curriculum design and style of teaching match the HE learning environment, with students expected to learn deep and to develop critical thinking skills. These college students face the same pressures and difficulties as the first-year university students. However, on top of the background influences discussed above, the impact of having failed in their public examination may have affected their confidence in learning. The unsatisfactory outcome of their secondary school years may also indicate some other learning difficulties that may be present in this group of students.

The goals of HE are to "offer students well-developed thinking skills and a well-founded basis for self-directed, independent learning via the process of teaching" (Hativa, 2000, p.38). However, students do not share the HE goals including conceptual understanding development and critical thinking, as they simply aim to walk through the exam-oriented path to get a degree (Evans & Abbott, 1998). Therefore, helping these students adapt to HE curricula and teaching styles, allowing them to become more independent, and at the same time equipping them for university programmes in the comparatively short period of two years present a number of challenges. Research on community college teaching provides an opportunity to reveal the challenges college teachers face when teaching this specific group of students, the tactics they use to support student learning, and a window into how these tactics benefit the development of effective teaching strategies in HE.

1.4 Significance of this study

When teachers introduce new concepts to students, they reshape the way the concepts are presented in order to aid understanding. This is most commonly done by giving explanations. In other words, the ways teachers explain new concepts can determine their students' understanding of these concepts. Good explanations provide clear directions and connections which guide students through the process of understanding. Though explanation is hardly something new to the teaching profession, as Price and Nelson (2014) say – "one of the hallmarks of an effective teacher is being skilled at giving clear explanations" (p.57). These explanations in classroom teaching have received relatively little attention in pedagogical and instructional literature, and are rarely discussed in teacher training and HE research.

Based on the above assumption and the lack of studies focusing on teaching strategies for instructional explanation purposes, the study of explanation strategies is highly significant to understanding the skills of effective teaching. Knowing how teachers provide explanations, therefore, is very important in the context of this study. Instructional explanations normally refer to explanations given in the spoken form, but this study proposes that strategies of explanations are not restricted to the use of language but involve other teaching activities. These activities are called 'instructional explanation strategies' in this study.

This study provides valuable insights into the current teaching practices of college teachers in Hong Kong in the context of the intertwined relationship between their teaching strategies and students' learning attitudes; specifically how explanation strategies help build student understanding, support student learning, and reflect how teachers respond to perceptions of student learning. More importantly, it intends to fill the missing link between practice and theory, explaining how instructional explanation strategies are used as a pedagogical support and as a means for the construction of knowledge.

This study may inform changes to their teaching practices, in terms of the strategies used to give explanations and the support given to students attempting to understand new concepts in the classroom. It also provides meaningful points which can be used for teacher training. Adding to the pedagogical and teaching skills training curriculum, the need to consider students' conceptual understanding when delivering knowledge on a subject could become part of the teacher training process for both existing teachers and teacher trainees. Since teaching requires a great deal of explanation, a study of explanation may help teachers become more aware of the ways in which they explain subject knowledge and plan their lessons. Effective strategies to explain new concepts are particularly important as Bruner (1960) points out:

> [g]ood teaching that emphasizes the structure of a subject is probably even more valuable for the less able student than for the gifted one, for it is the former rather than the latter who is most easily thrown off the track by poor teaching". (p.9)

The target group of students for this study is the group that has been arguably 'thrown off the track' of the Hong Kong education system. This study, therefore, will be highly beneficial to existing community college teachers and individuals preparing to teach sub-degree programmes, and will provide them with greater understanding and awareness of teaching strategies used for this particular group of students.

1.5 Research questions

RQ1: How do the teaching strategies used during instructional explanations reflect the way the college teachers respond to their perceptions of teaching and students' learning in Hong Kong?

a. What are the college teachers' perceptions of teaching and students' learning in Hong Kong?

b. How do these perceptions affect their teaching strategies?

c. To what extent do college teachers recognize instructional explanations as one of the significant scaffolding and teaching strategies?

RQ2: How is new knowledge explained in content-based lessons in community college in Hong Kong?

a. What kinds of knowledge do college teachers explain in classes?

b. What strategies do the teachers use to explain these types of knowledge in practice?

RQ3: How do instructional explanation strategies scaffold and support knowledge understanding in college classrooms?

a. Are there any common approaches shared by instructional explanation strategies that explain how instructional explanations support understanding and the learning of new knowledge?

b. How do these approaches relate to those instructional explanation strategies, different knowledge types and the subject areas in this study?

c. What is the role of instructional explanations in terms of scaffolding new knowledge in content-based lessons?

1.6 Thesis structure

This study is organized into the following chapters:

Chapter 2 – Literature Review

Beginning with a general discussion about dimensions of learning (2.2), the review moves on to the meanings of explanation and the development of a more in-depth definition of explanation strategies for instructional purposes since the concept of explanations in classroom teaching has not been well defined and are under-researched (2.3). Next, reviews on the constructivism learning paradigm in terms of schema theory (2.4), zone of proximal development (ZPD) and scaffolding (2.5) are given. Before concluding the chapter (2.7), several examples of studies on explanations in pedagogical research are discussed (2.6).

Chapter 3 – Methodology

This chapter provides the theoretical underpinning of the study, methods of data collection and analysis, and considerations given to trustworthiness, ethical issues and limitations. It begins by setting up the educational research paradigm (3.2) of the current study through philosophical considerations on ontology (what is reality?) and epistemology (how is knowledge learned?). Following the developed research paradigm comes a discussion of the case study methodology, and the identification of the type of case study adopted in this research project (3.3). After this, a detailed account of data collection methods and procedures in responding to the research questions are described (3.4) and methods of data analysis are presented (3.5). Other considerations regarding trustworthiness and ethical concerns are discussed in the rest of the chapter (3.6, 3.7).

Chapter 4 – Findings

Starting from reporting teachers' perceptions on their students from the interview data (4.2), not only can we understand the kind of education environment the college teachers faced, but also reflect on what the previous studies claimed about the characteristics of Hong Kong students. The chapter identifies causes that contributed to the specific types of learning attitudes from the college teachers' point of views (4.3), as well as how the college teachers situated themselves in their classrooms to help their students (4.4). Types of knowledge and explanation strategies to support understanding and learning were identified from interview data and video data, each of which is presented in 4.5 and 4.6. Afterward, findings revealing the role of instructional explanation strategies and their interactions with other scaffolding strategies in classroom teaching are discussed (4.7).

Chapter 5 – Discussion and analysis

This chapter moves onto the answers to the research questions. 5.2 is the answer to RQ3 that provides the backgrounding of the major research focus. In 5.3, a detailed elaboration of instructional explanation strategies is presented in terms of their pedagogical functions and their relationship with different knowledge types in response to RQ1. To answer RQ2 regarding how these strategies support understanding, in 5.4, three explanatory approaches and their relation to knowledge types, strategies and subject areas were identified and discussed in 5.4.

Chapter 6 – Conclusion

The conclusion puts together a summary of the answers to the research question (6.2) and an evaluation of the current study, its contribution to academic knowledge and practical pedagogical concerns (6.3), its implications for different stakeholders (6.4), its limitations (6.5), and insights for further research (6.6).

CHAPTER 2 LITERATURE REVIEW

2.1 Introduction

Shelly, Gunter and Gunter (2012) note that "all teaching strategies have learning theories and education research embedded with the instructional framework" (p.244). This study proposes that giving explanations is an important classroom teaching activity, and instructional explanations support the understanding of new knowledge. Hence, the teaching strategies used by teachers to provide explanations may determine the quality of learning. In this chapter, key areas from the literature are reviewed and discussed in an effort to establish the scope of study and the theoretical connections between relevant learning theories and explanation as an instructional strategy.

In general, a learning theory "considers the conditions which give rise to learning [the cause] and the learning itself [the effect]" (De Cecco, 1968, p.8), while in education research, theories of learning play an essential role in helping researchers recognize if learning has taken place (De Cecco, 1968). In other words, learning theories provide directions and frameworks for education researchers and teachers to develop pedagogical approaches and to find out if, or to what extent, those approaches could support learning of new knowledge in different conditions. The ultimate goal of pedagogical research is, therefore, to identify effective strategies for learning. This also implies that to understand if any teaching strategies give rise to learning, recognizing the meaning of learning is necessary for both framing education research and the development of measuring mechanisms that could be used to assess if learning happens.

As effective teaching relies on how well teaching strategies match the way we learn different types of knowledge (Flanagan, 1998), there is a need to look at what learning means in terms of not only the types of knowledge but also elements involved in the process of learning. Therefore, I start with giving brief definitions of learning and several concepts relevant to the dimensions of learning from the literatures. Afterward, through a detailed discussion on the meanings and features of explanations in several disciplines and their relation to classroom teaching, the definition of explanations for instructional purposes is developed. In constructivism, providing assistance to support learning and understanding is the central idea of scaffolding (Wood, Bruner, Ross, 1976). Based on this proposition, the chapter also discusses the meaning and development of schema within a constructivist paradigm, and then consider the notion of zone of proximal development and scaffolding, and how explanations act as a specific scaffolding strategy on construction of knowledge and learning support.

Apart from providing definitions and discussions on the key research concepts, the major purpose of this chapter is to build up a narrative to show that explanations are essential in teaching for understanding and cognitive development, and to establish a clear conceptual framework for instructional explanations. Going through the functions and strategies of scaffolding confirms again that explanations are vital to supporting understanding and developing conceptual knowledge.

2.2 Learning and teaching

Stumpf and DeLuca (1994) propose that learning "is the acquired knowledge and skill that we retain – consciously and unconsciously – that changes our behaviours" (p.6) whereas Illeris (2007) defines learning as "any process that in living organisms leads to permanent capacity change and which is not solely due to biological maturation or ageing" (p.3). The definitions above indicate that the criteria that contribute to learning involve changes of behaviour or in condition over an extended duration of time, with learning content which can be knowledge and skills, and learning processes.

The critical criterion that determines if learning has taken place is the notion of *change*. If learning makes something of a learner change, *change* is the effect or the outcome of learning. Therefore, *change* is the evidence of learning – no change, no learning. That also means to affirm if an individual has learned, the change has to be identified. According to Illeris (2007), the change happens in a human's brain that affects mental, physical and social behaviours, which is not an isolated reaction inside an individual body psychologically and neurologically but closely connects with the environment. However, as Phillips and Soltis (2004) point out that there is no way for educators to look inside the learners' heads to find out any specific changes from learning, but the changes could be reflected in behavioural change and thus "learning is a change of behaviour" (p.94). Behaviour change is not restricted to immediate observable behaviours such as being able to swim but any behaviour that one could not do before; for example, showing concern for other people after learning the concept of kindness through observation or being able to explain a newly learned concept.

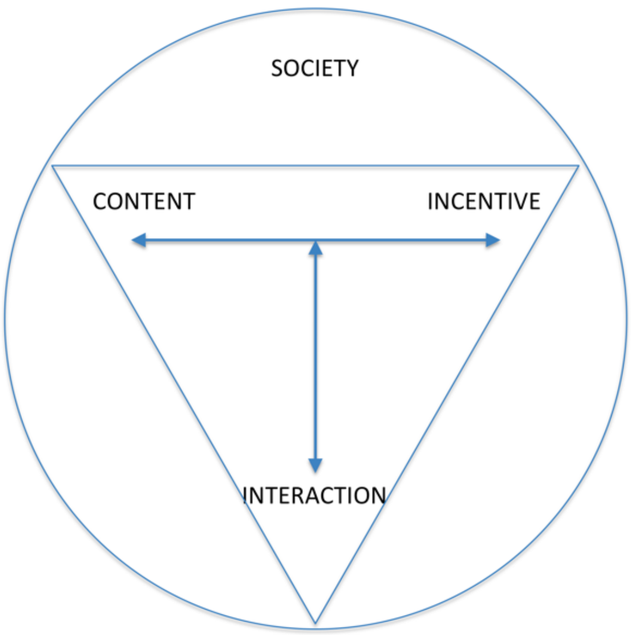
Referring to the definitions of learning above, the behavioural change has to be retained and permanent. However, Illeris (2007) said that permanent capacity "implies a change that is permanent to some extent or other, for examples, until it is overlaid by new learning, or is gradually forgotten because the organism no longer uses it" (p.3). In this case, what Illeris (2007) refers to is not permanent because permanent means "in all time" (Green, 1886, p.55), and if there is a limited duration of time, it is not permanent. Since learning involves mental process, there is hardly evidence to prove if one has learned something permanently because "there is no kind of mental action whose permanence we can affirm" (Monck, 1874, p.53). Stumpf and DeLuca (1994) use the word 'retain' instead and believe that learning without practice and doing things cannot be treated as real learning, which includes memorization for school examinations as very limited information is used or remembered by learners after leaving school. However, I would argue that there is an unclear duration of time for judging if one has learned.

> Some authorities (e.g. Kimble, 1961) insist that only durable changes qualify as learning, but since there is no consensus about what durable means (a few milliseconds? A second? A minute? A week? A year?), adding durability to the definition does not seem to help … The key issue in learning is whether a change in behaviour occurred, not how long it lasted. The fact that you no longer remember all of those Spanish verbs you learned in high school doesn't mean that you didn't learn them. (Chance, 2013, p.22)

Chance's argument alerts us to the question of realism in considering learning. The notion of realism will be returned to in Chapter 3, but it is not the principal focus of the literature review here. If the definition of learning includes a condition of durable or even permanent change in institutional learning contexts, it would make learning an impossible task to accomplish and effectively measure because even though students could do well in any assessment, there is no way for teachers to assess if the learned knowledge would be permanently retained. In addition, teachers cannot tell if there is no change from learning even though a student could not explain a concept well or fail in a test because changes are not always observable and measurable. In reality, instead of seeking to identify permanent change of behaviour, educators normally affirm learning through students' achievement of specific learning outcomes in different kinds of assessment activities.

While behavioural change is the effect of learning, there is a process that brings us to this outcome. Learning, according to Illeris (2007) is a social and interactive process, as illustrated in Figure 2.1, which involves interaction between the learners and their environment, and the process of acquisition of the content is also driven by learners' incentive within a social context.

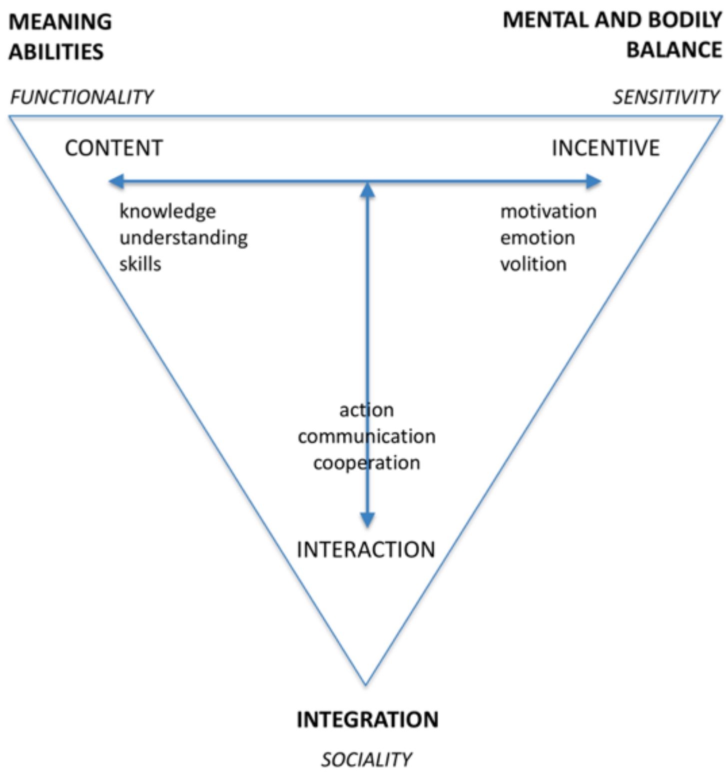
Figure 2.1 The three dimensions of learning



(Illeris, 2007, p.23)

To illustrate further with Figure 2.2, Illeris (2007) explains that, first of all, learners interact with both the close social context, such as a classroom, where social interaction exists, and the general societal context in which the close social context is established and constructed.

Figure 2.2 Learning as competence development



(Illeris, 2007, p.23)

Then, in the individual acquisition level, the dimension of incentive refers to learners' emotional energy including, for example, motivation, interest or needs from personal desire or from outer forces. At the other end of the acquisition level is situated the content element in learning as learning is about "someone learning something" (Illeris, 2007, p.24), and that knowledge, understanding and skills are the three essential elements in this part of learning. The three dimensions interplay with each other such that the environment influences learners' incentives and the type of learning content while the content could affect the incentive of the learners, and the level of incentive would also influence the acquisition of learning content. Those dimensions not only represent the elements and their interconnections involved in the learning process but also the competence developed through the process. Through the content, incentive and interaction dimensions, learners develop abilities and meanings for effectively functioning in different situations so as to cope with different challenges in life, sensitivity to balance learners' mental needs from seeking new knowledge or skills, and abilities to engage in social interaction and integrate into different social contexts.

Going back to the definition of learning, learning is a process in which an individual interacts with the social environment and this interaction generates the need to seek new knowledge, understanding and skills in order to develop meaning of things in the world and abilities to integrate oneself in the society. The kinds of development are end products of learning that represent some kinds of change in behaviours. In spite of the fact that change of learners' behaviours is the desired result in learning and the goal of educators, this present study does not examine or assess changes but pays attention to the learning process. This study sees the role of teachers as a means of interaction between students and the world in the classroom context, and in particular, focuses on instructional support in the content dimension - "what the learners can do, know and understand – and through this we attempt to develop meaning, i.e. a coherent understanding of the different matters in existence" (Illeris, 2007, p.25) - in consideration of students' incentive as well as the social environment in which they situate. In the following sections, four concepts from the three dimensions of learning that I consider as the most influential in this study are to be discussed. These elements are motivation (incentive dimension), knowledge (content dimension), understanding (content dimension) and knowledge of teaching (interaction dimension).

2.2.1 Motivation

Motivation plays a major role in the incentive dimension of learning (Illeris, 2007) as it concerns activation and intention of learning behaviour, meaning "the inherent tendency to seek out novelty and challenges, to extend and exercise one's capacities, to explore and to learn" (Ryan & Deci, 2000a, p.70). Motivation reflects a person's choices and actions that are driven by reinforcement, needs or goals, explaining why people invest in learning activities (Brophy, 2010). Self-determination theory, which focuses primarily on understanding types of motivation in relation to human behaviour and its interaction between social factors and psychological needs, suggests that motivation can be driven intrinsically and extrinsically (Ryan & Deci, 2017).

Intrinsic motivation refers to the self-determined form of motivation with which people gain psychological satisfaction when engaging themselves in activities with autonomy and competence (Levesque, Copeland, Pattie & Deci, 2011). This type of motivation derives autonomously from a person's interest, enjoyment and affection on an activity (Deci, 1975; Hidi, 2000). Piaget (1896-1980) said that "the impetus for everything lies in interest, affective motivation" (Bringuier, 1980, p.50). When people engage in activities motivated intrinsically, they gain the enjoyment that "makes one feel good, relaxed, happy, contented and joyful" (Locke & Schattke, 2018, p.4) while learning, developing and expanding their capacities (Ryan & Deci, 2000b).

Extrinsic motivation involves external factors, instrumental considerations and controlled attributes. Extrinsic motivation is driven by factors such as rewards, punishment, authoritative demands, tests and examinations, and competitive learning environments (Daskalovska, Gudeva & Ivanovska, 2012). It becomes instrumental when learning is for practical purposes, such as "getting a better job, earning more money, entering a better college or graduate school, and so on" (Oxford, 1996, p.3). People motivated extrinsically value the external rewards and desired consequences more than their psychological needs and enjoyment. These extrinsic factors and outcomes are normally associated with people who take control of those factors in a regulated environment, and the motivated behaviours are thus controlled (Ryan & Deci, 2000a; Reeve, 2009). Therefore, extrinsic motivation is controlling when parents or teachers assert their authoritarian power and pressure on students to achieve an intended outcome "by introducing incentives, consequences, rewards, directives, deadlines, commands, or threats of punishments" (Reeve, 2009, p.149).

Motivation is influenced by teaching approaches (Brophy, 2010) and parents' value imposing on children (Jacobs & Eccles, 2000). Students studying in a controlling environment or having controlling parents generally have less initiative, learn less effectively and are less intrinsically motivated because extrinsic rewards may undermine intrinsic motivation (Ryan & Deci, 2000a, 2000b). Students who lack intrinsic motivation and are extrinsically motivated incline to use surface approach as learning is seen a process of transmitting information from the materials to their head and major aims of learning is to handle the school assessments, and on the contrary, students motivated intrinsically tend to learn deep, to gain understanding of new information and see learning as a construction of knowledge about reality (Snow & Jackson, 1994; Hoffman, 2015). To facilitate students' learning, Ur (1996) recommends teachers to invest much effort to promote intrinsic motivation through arousing of interest in classrooms. The strategies she suggests are providing clear objectives, choosing wide range of topics, using eye-catching and relevant visual materials, creating tension and challenge through games, using activities that relate to students' personal experience, inviting students' contribution of ideas, role playing, and making use of entertainment such as dramatic presentations or movies. These strategies evoke students' different senses and bring positive effects on learning, as stated by Beard and Wilson (2005):

> Enhancing and awakening the senses and linking them to the learning activities can create more powerful learning. Sensory stimulation alters moods and emotions and can increase learning. The more sense we stimulate in an activity the more memorable the learning experience will become because it increases and reinforces the neural connections in our brains. (p.8)

In a study of motivation of Hong Kong students in HE, Kember (2016) interviewed 82 students from undergraduate, community college and taught postgraduate programmes. He found that owing to the Confucian tradition, family, though imposing much pressure, is the primary motivating force of students, while pursuing societal achievement, i.e. getting a better job, is a major motivation for them. Moving through a highly selective education system since kindergarten, and failing to get into university, students in the community college generally showed fear of failure in study. Though career goal was not explicitly mentioned among community college participants, students demonstrated their career motivation through orientation of the learning subjects, indicating that they were motivated heavily by a career prospect perspective that they thought HE degree would bring in the future.

Kember's (2016) study reveals that the curriculum design and the teaching approaches were critical in terms of students' interest in a subject. Promoting understanding through relating new knowledge and theories to daily life, current social issues, authentic contexts, organizing class activities, and building up close teacher-student and student-student relationships would motivate them to learning. On the contrary, students were found to be demotivated when teachers used examples that were not relevant to local context, did not explain abstract theoretical concepts clearly and used didactic teaching approaches with little interaction with students. Moreover, their incentive in learning reduced when studying in courses and handling assessment tasks that required students to rote learn.

However, Kember's study does not provide numerical data so clear weight of evidence of how many students shared each individual perspective and the distribution of participants' viewpoints across three groups of students is not found. Moreover, even though community college, undergraduate and postgraduate are classified as HE, students in these three groups represent different age groups and background resulting in different learning motivation. Ho and Kember's (2018) study shows that the learning needs, goals, expectations as well as job exposure and maturity of postgraduate and undergraduate students were different. Thus, they had different motives and were motivated in different ways. For example, the postgraduate students were motivated in class discussion in which they valued the shared knowledge and experiences whereas undergraduate students were reluctant to participate in class discussion as they lacked professional and occupational knowledge to contribute ideas, and they expected their teachers to deliver information directly. Despite the fact that Kember's study was not specifically on community college students, it provides references for understanding learning motivation of students in HE in the local context.

2.2.2 *Understanding*

According to Chernyakov (2002), "meaning belongs to the structure of understanding-interpretation" and "interpretation is the working out of the possibilities projected in understanding and thereby the development of meaning" (p.189). There are a number of different definitions of understanding. Piaget (1973) mentions that understanding is about discovery and reconstruction of rediscovery, and a person who achieves understanding is "capable of production and creativity and not simply repetition" (p.20). Nickerson (1985) said that "understanding is an active process" (p.234) in which prior knowledge and new information are connected and integrated. Halford (1993) believes that understanding refers to cognitive representation or mental models of concepts, tasks or phenomena. He points out that these mental models are transferable to different situations, and understanding involves the ability to transfer these models, then use them to generate inferences and make sense of things in order to support the development of problem-solving skills and organize information.

These definitions suggest that understanding is not a rigid mental structure, but rather a dynamic but connected network of knowledge. When understanding occurs, a new piece of knowledge links up with this network. When this process is completed, i.e. when something is understood, it means that this network has expanded. Therefore, understanding is not purely an ability to make sense of individual pieces of knowledge; rather it is a network of knowledge and is also a kind of knowledge (Van Camp, 2014).

Simply put, before new knowledge can be interpreted and then constructed, a person needs to achieve a certain level of understanding. The level of understanding depends on how much existing knowledge is stored in a person's memory (Nickerson, 1985), and how well the new knowledge connects with the existing knowledge (Newton, 2000). For example, we may expect a college student to master the structure and functional units of a cell, but we may expect a primary student to understand only that a cell is a small unit of a body. Therefore, even if a teacher tries to teach a primary school student to understand the detailed structure of a human cell, the student may not have a broad enough knowledge base to make sense of the information given (see

2.4). From this point of view, true learning requires that students make sense of new information through bridging old and new knowledge with support from their teachers since learning without understanding is simply rote learning (Petty, 2004).

Although definitions of understanding will always be debatable, there are practical ways to help teachers assess understanding. Wiggins and McTighe (2005) suggest that to demonstrate understanding, students should be able to explain what they have learned, interpret received information, put learned knowledge and skills into practice, use different perspectives to see a subject from various angles, be able to empathize with the people involved in the situation, and reflect on their own lives. Newton (2000) suggests that asking questions, asking students to draw concept maps, solve problems and talk through ways to handle a task are all methods to help assess student understanding.

Understanding cannot be directly transferred from teachers to students because it is a mental process that occurs in the minds of the learners, but understanding can be achieved through receiving support (Newton, 2000). Teachers, therefore, when taking students on their learning journey, should not simply deliver information but rather support their understanding; something which "requires the connecting of acts, the relating of newly acquired information to what is already knowledge, the weaving of bits of knowledge into an integrated and cohesive whole" (Nickerson, 1985, p.234). As Newton (2000) puts it, "understanding is a significant part of the quality of learning, providing support for understanding is a significant part of the quality of teaching" (p.2), and given that "explanation supports understanding" (p.48), studying the explanatory strategies that teachers use to support understanding will provide more insight into what makes effective teaching and learning.

2.2.3 *Knowledge*

This study attempts to discover how explanations given by teachers support understanding and the learning of new knowledge in college classrooms. Therefore, it is important to define and clarify the scope of knowledge considered by this study. The word 'knowledge' carries with it a number of complicated meanings. Philosophically, knowledge is conceptually related to reality, proposition, facts and truth, as well as the idea of knowing and belief (Butchvarov, 1970). Knowledge is also defined differently in different academic areas, as it needs to match with the specifications of these areas (Jakus, Milutinović, Omerović, & Tomažicč, 2013). For example, knowledge of a language is not only about its linguistic elements, such as vocabulary and grammar, but also the ability to master the usage of language in different communicative activities (Saville-Troike, 2006). In the area of computer literacy, knowledge involves the "knowledge and understanding of computers and their use" (Loveland, 2012, p.116).

Byrnes (1999) suggests that there are three types of knowledge: declarative knowledge deals with 'what', procedural knowledge deals with 'how' and conceptual knowledge is about 'why'. Declarative knowledge encompasses factual information and descriptions of things including methods, and procedural sequences (Wickramasinghe & von Lubitz, 2007). Learning declarative knowledge involve the ability to remember a piece of fact, a concept, a list of steps, a definition, a principle and so on (Tileston & Darling, 2009).

Procedural knowledge is about knowing how to do something that requires "in motor or manual skills and in cognitive or mental skills" (Wickramasinghe & von Lubitz, 2007, p.26). Procedural knowledge involving motor skills can be implicit, meaning that people can perform a skill through repeated and routinized practice without consciously knowing and understanding what and why (Lawson, 2013). When understanding is acquired after the development of skills, procedural knowledge is possible to come before declarative knowledge (Robertson, 2017). However, in contexts where procedural knowledge requires understanding of and making reference to concepts in a cognitive sense, learning should start with knowledge in its declarative form (Lawson, 2013; Robertson, 2017).

Learning declarative knowledge "does not imply understanding" (Jonassen, Beissner & Yacci, 1993, p.3). When students merely memorize information without connecting it to prior knowledge in order to make sense of it, they are not obtaining understanding. Meanwhile, since declarative knowledge focuses only on available methods rather than how those methods are used (Pintrich, McKeachie & Lin, 1990), teaching skills and processes declaratively does not guarantee procedural learning. Estep (2005) argues that when teaching procedural knowledge, many people would transform it into declarative knowledge and deliver this knowledge in the form of a lecture but being able to do something requires acquisition of the knowledge and skills that have been routinized, through exposure, practice and experience. For instance, telling learners how to drive a car does not mean they can drive. Similarly, knowing a rule in a foreign language but not being able to use it represents declarative knowledge about something but not procedural knowledge about how to do something, i.e. not necessarily how to use the language in context. Likewise, students may follow instructions and complete a chemistry experiment, but they may not understand what the chemical substances are, or why the experiment's procedures are designed in this way, or even why the chemicals react as they do during the experiment.

As mentioned earlier, understanding is essential for the development of knowledge and thus quality learning. Declarative knowledge is the basis for students wishing to expand their knowledge, as understanding declarative knowledge must come before acquiring procedural and conceptual knowledge – students often need to develop procedural knowledge for their tasks; while conceptual knowledge "enables [students] to recognize objects and events and to make inferences about their properties" (Goldstein, 2015, p.246).

Conceptual knowledge represents understanding, comprehension and the association of declarative and procedural knowledge (Byrnes, 1999, 2001) and it requires the integration of both new and pre-existing knowledge (Lynch & Smith, 2011).

> Conceptual knowledge is more than just the storage of declarative knowledge; it is also an understanding of a concept's operational structure within itself and between associated concepts. (Tennyson & Cocchiarella, 1986, p.41)

Conceptual knowledge “exists in the form of concepts” (Goldstein, 2015, p.246) and thus, concepts existing in declarative form are “the main basis of knowledge” (Richardson, 1998, p.67). A concept is defined as “an abstraction that represents objects, experiences or ideas having similar properties” (Lefrançois, 1991, p.85) while Merrill, Tennyson and Posey (1992) share the same idea and classify concepts in instructional contexts into object concepts, symbol concepts and event concepts.

Object concepts, as the name suggests, refer to concrete objects existing in reality. These concepts, for instance, different kinds of animals and natural structures, could be expressed through paintings, photos, models or could be understood by showing the object itself. Symbol concepts are the representations of objects and events, which are inclusive of words, numbers and symbols that symbolize realistic or hypothetical objects and events, as well as the relationships of them. For examples, the words adjective, sentence and thesis statement are symbolic concepts in language learning whereas odd numbers, Beta, calculus and formula are those in mathematics. Event concepts are inclusive of events such as birthday party, digestion, photosynthesis, acceleration and marriage and are described as the “interactions of objects, either living or inorganic, in a particular way and in a particular period of time” (Merrill, Tennyson & Posey, 1992, p.8).

Concepts allow people to distinguish things and ideas in the outside world. In many ways, concepts govern the way people see the world. In classroom learning, students pick up new concepts – the meanings of words, terms, and theories for example. These concepts form students’ declarative knowledge base, help them achieve higher levels of cognitive development and build procedural knowledge to gain various skills like problem solving, strategic planning and public speaking. They do this through recognizing and associating these new concepts with other concepts and prior knowledge (Hayes-Roth, Klahr & Mostow, 1981; Anderson, 1996; Anderson, 2005). Conceptual learning is essential to creating knowledge in all fields. For example, Roth (1990) states that understanding concepts in science is particularly important, as concepts “are the heart of science” (p.141), and scientific studies and developments rely on conceptual networks that help describe and explain the world.

Since “[l]earning and thinking are incorporated into a broad concept of cognition, and students are seen as creating or constructing their own knowledge and skills” (Nuthall, 1997, p.682), to attain conceptual knowledge, students not only need declarative knowledge, such as facts, labels or concepts; but they also need the ability to connect this declarative knowledge to existing knowledge, relate it the world around them and construct a new mental model. In classroom context, teachers become the primary figures who support students to make these connections happen through teaching activities, and one major factor that determines the effectiveness of making such connections is their pedagogical skills back up by their knowledge of teaching.

2.2.4 *Knowledge of teaching*

The interaction dimension concerns the interaction between learners and the environment, and in the form of individual perception of the world, knowledge transmitting from one to others, gaining and sharing experiences, imitating others’ behaviours, participating in goal-directed activities such as learning in school (Illeris, 2007). Since “teachers were the principal agents of instruction” (Bruner, 1960, p.15), teachers take up a key role in this dimension to conduct, direct and facilitate the interaction between students’ mental energy in learning and the learning content (Illeris, 2018).

Illeris’s model of learning indicates the kinds of knowledge that a teacher needs to implement the interaction process, and knowledge of content, knowledge about students’ incentive aspects and knowledge for performing the interaction process, i.e. the knowledge of teaching. The implementation of three areas of knowledge refers to the ability to integrate students’ understanding of learning, subject knowledge and the diversity of students’ learning styles, which Stoll, Fink and Earl (2003) call *pedagogical understanding*.

Shulman (1986) believes that effective teaching requires not only comprehensive subject knowledge (*subject matter knowledge*) and knowledge of the curriculum and teaching materials (*curricular knowledge*), but also *pedagogical content knowledge* (PCK) which means the knowledge for teaching.

> … the key to distinguishing the knowledge base of teaching lies at the intersection of content and pedagogy, in the capacity of a teacher to transform the content knowledge he or she possesses into forms that are pedagogically powerful and yet adaptive to the variations in ability and background presented by the students. (Shulman, 1987, p.15)

In this regard, using appropriate instructional explanations forms part of PCK. PCK emphasizes the significant relationship between subject content and pedagogical strategies in teaching (Andrews, 2003) since the knowledge of subject matter, the ways of presenting the subject by using effective illustration, explanations, example and so on; as well as program design for particular level of students and use of hardware materials such as course books and equipment provided for teaching, are indispensable to any teaching profession (Shulman, 1987). To provide effective explanations, teachers are required to master well the connection between content and pedagogical skills in terms of instructional explanation since explanation strategies correlate closely with subject matter knowledge (Wragg & Brown, 1993).

Turner-Bisset (1999) proposes that PCK is not one single category but is inclusive of a set of knowledge not only about subject, curriculum, pedagogy and education but also *knowledge of learners* and *knowledge of self*. Knowing about the learners implies the concern for learners' age, interests, behaviour, needs, abilities, relationships with others and existing knowledge. Knowing the learners would allow teachers to adopt and use adequate teaching strategies, materials and activities that match students' needs, interests and level of learning. Meanwhile, teachers should also require knowledge of themselves, such as their roles, images, identities and beliefs, and have the ability to evaluate and reflect on their own practice because

> teachers' practical knowledge is deeply embedded in their beliefs, values, understandings and attitudes. Thus, teaching should be described not only on

> the basis of teachers' aptitudes and knowledge base but also on the basis of their beliefs, perceptions, and assumptions regarding teaching and learning. (Hativa, 2000, p.37)

Richards and Lockhart (1996) state that teachers' beliefs are based upon their teaching experience, expected institutional practices, personal preference and their perceptions of teaching and learning principles that constitute their perceived roles leading to different approaches and skills they apply in classroom management, lesson planning, instructional strategies, motivational approaches and assessment design. Owing to the diversification of individual experiences and perceptions, teachers describe their roles in many different ways. Cross (1991), in her study on teachers' perceptions of their role in HE among 2800 college teachers, found that teaching facts and principles of subject matter, developing higher-order thinking, preparing students for their future jobs, supporting student development and personal growth and developing students' basic learning skills are the six primary roles. Richards and Lockhart (1996) summarize the general views of teachers' roles as planner, manager, quality controller, group organizer, facilitator, motivator, 'empowerer' and team member, and remark that these roles shift and overlap at different stages of a lesson. No matter what labels teachers used to describe their roles, they should be equipped with knowledge and ability to shift between different roles in different learning situations (Vermunt, 2011) so that they could employ themselves well in these intertwining while engaging, connecting and managing the interaction, content and incentive dimension of learning.

2.2.5 ***Conceptions and approaches of teaching***

In the discussion of learning and teaching in higher education, Light and Cox (2001) emphasize that student "learning is not simply a cognitive or intellectual grappling with new ideas, concepts and frameworks but also a personal and emotional engagement with the situation" (p.29). University teaching should extend its primary goals from students' critical thinking and cognitive development to self-reflection and self-actualization involving students' physical, behavioural, social and mental well-being (Bryan, 2015). In other words, teaching in HE is not about transmission of information, but a complex connection of verbal information such as facts and principles, intellectual skills such as the ability to discriminate different concepts, cognitive strategies to manage mental processes in learning, attitudes affecting students' motivation and behaviour, and the motor skills required in the learning process such as handling laboratory equipment (Nicholls, 2002). Involving students in the teaching process is thus the principal consideration in HE classrooms. Even teachers who have been equipped with the knowledge of teaching, teachers with different conceptions of teaching may adopt different approaches. Approaches, such as teacher-centred and student-centred, engaging different levels of student involvement in the pedagogical process would interfere with teaching effectiveness and learning outcomes.

Synthesizing from thirteen HE research studies on conceptions of teaching, Kember (1997) finds that conceptions of teaching in university contexts can be categorized into five dimensions under teacher-centred and student-centred orientations as shown in Table 2.1.

Table 2.1 Dimensions of conceptual of teaching adopted from Kember (1997)

	Teacher-centred / Content-oriented					**Student-centred / Learning-oriented**	
Dimensions	**Imparting information**	**Transmitting structured knowledge**		**Teacher students interaction**		**Facilitating understanding**	**Conceptual change**
Teacher	Presenter	Presenter		Presenter and tutor		Facilitator	Change agent/developer
Teaching	Transfer of information	Transfer of well-structured information		Interactive process		Process of helping students to learn	Development of person and conceptions
Student	Passive recipient	Recipient	⇨	Participant	⇨	Teacher responsible for student's learning	Teacher responsible for student development
Content	Defined by curriculum	Teacher needs to order and structure materials		Defined by teacher		Constructed by students within teacher's framework	Constructed by students but conceptions can be changed
Knowledge	Possessed by teacher	Possessed by teacher		Discovered by students but within teachers' framework		Constructed by students	Socially constructed

Under teacher-centred/content-oriented orientation, teaching is a transmission process in which teachers present subject content to students. On the other hand, when teachers have a student-centred/learning oriented conception of teaching, students are the focus of teaching and teaching is a process of supporting student learning and cognitive development, not just giving direct instruction. In between these two orientations is the transitional state where interactions between teacher and students are equally important (Kember, 1997).

Biggs and Tang (2011) remind that how teachers think about teaching affects how effectively they teach. They discuss the three levels of teaching thinking skills and recommend level 3 approach, as defined below, in university teaching to achieve deep learning. According to Biggs and Tang, Level 1 refers to teachers who blame students for not learning well, citing their attitude, abilities, motivation or knowledge proficiency (lack of) as negative features. Level 2 shifts the focus from students to teachers, concerning what teachers do to manage and transmit information. Teachers at this second level may use many teaching techniques but this, according to Biggs and Tang, can only show that the teachers are equipped with a battery of teaching competencies, which does not guarantee teaching effectiveness. Level 3 addresses the ways teaching activities support students' learning and understanding with a student-centred approach to teaching. These three levels reflect the role of a teacher to provide information (Level 1), to present knowledge and explain concepts and principles (Level 2) or to engage students in learning activities to achieve the intended learning outcome through deep learning (Level 3).

The above-mentioned conceptions and levels of teaching imply that when applying teachers' knowledge in the classroom learning context, teachers' perceptions of their roles and the pedagogical knowledge may affect their choice of teaching approaches. Constructivism, which will be discussed in 2.5, is considered to be beneficial due to the active involvement of students and their engagement in the construction of subject knowledge (Phillips, 1995). A student-centred approach fits well with the constructivist model that students construct knowledge rather than receive or assimilate messages delivered by teachers (Piaget, 1960; Good & Brophy, 1990). This approach also represents a shifting of the attention from teachers to students as well as a shifting of focus from teaching to learning (Roger, 1983; Barr & Tagg, 1995).

The spectrum from pure teacher-directed mode to a student-centered approach involves a gradual reduction of the amount of instruction given by the teacher. Rather than directly transmitting knowledge from teachers to students, students' involvement in the learning process becomes the main concern. Students no longer listen to their teachers passively and seek to memorize the given subject knowledge; instead, they actively participate in constructing the target knowledge and concepts themselves. Good and Brophy (1995) express this as follows: "constructivist models are models of learning that emphasize students' development of new knowledge through active construction processes that link new knowledge to prior knowledge" (p.180). Constructivists believe that knowledge should be constructed through learners' personal experiences and their own cognitive activities.

Even though using student-centred orientations to teaching is suggested to be a constructivist approach which brings effective learning results in HE classrooms, I would argue, first of all, that adopting a student-centred approach as one single orientation in classrooms with novice learners with various backgrounds and proficiency levels may not be the best suggestion. Margison and Strobel (2008), for example, when clarifying constructivism pedagogy, state "although lectures, for example, are often dismissed as non-constructivist teaching approaches, they are valuable instructional tools when used in proper context" (p.75). Similarly, Hollingsworth and Ybarra (2009) conclude from an extensive review of studies on teaching methods that "teacher-centered direct instruction is more effective and efficient, especially for struggling students" (p.11). Although, in constructivism, knowledge is best learned when it is constructed by students, some information still needs to be delivered from outside sources. Margison and Strobel (2008) elaborate this idea with the example that 'smoking can cause cancer' "is socially rather than individually constructed" (p.76). Since students cannot personally experience 'smoking can cause cancer' unless they know someone who has got cancer from cigarette smoking, this piece of knowledge can only be acquired via outside sources such as medical research studies. Vygotsky (1978) also sees knowledge acquisition as social constructivism where a teacher still has the most important role in generating classroom activities which guide students to acquire subject knowledge. In other words, students cannot just construct or discover this kind of knowledge from their personal experience. Teachers, therefore, become an essential channel to facilitate this kind of socially constructed knowledge via direct teaching.

Secondly, teacher-centered and student-centered are not two distinct dimensions but on a spectrum from imparting information to facilitating conceptual change. Classroom teaching is fluid and with different goals and tasks, and teachers should play skillfully on the spectrum shifting their roles and teaching approaches at different stages of a learning process. Therefore, teachers a using teacher-centred approach does not mean they are level 1, as categorized by Biggs and Tang (2011), that they would blame students and promote surface learning.

Construction of knowledge is a protracted process which requires learners to have a certain level of declarative knowledge before they can take the active role to construct conceptual one. Giving direct instruction is "indispensable for achieving content mastery and overlearning of fundamental facts, rules, and action sequences" (Borich, 2007, p.229). Margison and Strobel (2008) distinguish four 'challenges' which they claim should be introduced to help students evolve their new knowledge acquisition from individual preconceptions and pre-perceptions in any teaching approaches. These include factual knowledge such as chemical reactions, evidence knowledge such as psychological states of mind, pragmatic challenges that "provide a valid source of cognitive dissonance" (p.79) and social challenges that focus on learners' experiences as well as societal discourse.

When introducing HE students to a new subject area or a topic, adopting teacher-centred approaches when presenting factual and declarative concepts is one of the possible steps for building up students' abilities toward the student-centred approach and construction of conceptual understanding. An effective student-centred approach should not be defined by one single dimension as shown in Table 2.1, but it implies effective and appropriate adoption of different teaching practices and changing teacher roles across different dimensions based upon the types of knowledge and the needs of students at different stages of the learning process since “effective teaching and learning requires flexibility by the lecturer, and this in turn necessitates the use of variety of styles” (Nicholls, 2002, p.10).

The Constructivist view of teaching and learning emphasizes interaction between teachers and students as “learning is a social and collaborative activity where people create meaning through their interactions with one another” (Schreiber & Valle, 2013, p.396). Studying teacher-student interaction through conversation analysis, a linguistics approach which explores “interactional life in real time” (Antaki, 2008, p.432), is a common research direction that reveals the details of language choices and communication features of teachers and students, understanding how teachers present knowledge and interact with students. In second language (L2) learning classrooms, in particular, teacher-student interactions provide the primary source of analysis for language, which is the major medium of instruction and also the learning object.

> … language has a unique dual role in the L2 classroom in that it is both the vehicle and object, both the process and product, of the instruction. In other forms of classroom education (such as in history or engineering), language is only the vehicle of the teaching. (Seedhouse, 2004, p.184)

Conversation analysis is undeniably significant as it uncovers human action by the mean of language (Seedhouse, 2004) as it reflects participants’ identities, social relationships, attitudes as well as how knowledge is verbally presented to scaffold students through the learning process (Cazden, 2001). However, this present study focuses on the features of teaching strategies from education and pedagogical perspectives and sees language as one of the vehicles which performs the function of giving explanations in content-based classrooms. Inquiries about teachers’ and students’ interactions in terms of the use of verbal explanations through linguistical approaches is not the central question for this particular study.

Furthermore, Edwards and Mercer (2012) argue that even though language is the primary medium for classroom teaching and learning, and a tool for the construction of thinking, discourse analysis focuses on linguistic structures instead of educational and cognitive processes which involve both linguistic and non-linguistic activities. I believe that classroom interaction is not limited to verbal communication but involves participants' attention, facial responses and actions. Malamah-Thomas (1987) suggests that though actions and reactions do not represent communication without interaction, and though language is the primary communication channel between teachers and students, "language is not the only means of communicating the pedagogic message of the classroom" (p.18) while using demonstration, drawing pictures, employing charts and diagrams, using body gestures or other different resources are also means of communication in classroom interaction that support learning. Though I agree that "instructional explanations aim to communicate aspects of subject matter knowledge, their success lies further on the effectiveness of the communication itself" (Larreamendy-Joerns & Muñoz, 2010, p.23), I do not see that interaction and strategies to give instructional explanation should be restricted to spoken or written modes of communication. In the following section, a new definition of instructional explanation strategies will be developed for this particular study.

2.3 Defining instructional explanation strategies

In the search of a definition of explanation, the meaning of explanation is found far more complicated than that of the dictionary-type meaning and involves different concepts in different academic areas. At the same time, finding a definition of explanation for instructional that satisfies this study has proved difficult, not to say elusive. Instructional explanations do not simply mean 'talking about the information to be learned' but a lot more. In order to define instructional explanation, a long discussion on the various meanings of explanations in several academic areas will be provided. From these meanings, definitions of instructional explanations will be devised.

An explanation is a statement that provides “a reason or justification given for an action or belief” (The New Oxford Dictionary of English, 2001, p.647); or “is used to make something clear or easy to understand by describing or giving information about it” (Cambridge International Dictionary of English, 1995, p.482). These dictionary definitions identify the two major qualities of explanations: causality and description. When explanations are given to provide reasons for an event or a situation, the explanations deal with ‘why’ questions and provide information about a causal relationship. On the other hand, when explanations provide details, definitions and/or illustrations on a topic, instead of giving reasons for the act of explaining, they are descriptive and relate to the ‘other’ questions: ‘what’, ‘where’, ‘when’, ‘who’ and ‘how’. Brown and Atkin (1998) provide a typology of explanations named interpretive explanation, descriptive explanation and reason-giving explanation. These three types of explanation support understanding of questions on what, how and why respectively.

In classroom teaching and learning contexts, explanations generally refer to talk given by teachers or students in different classroom activities in order to facilitate and support learning and understanding. In considering the use of explanations for instructional purposes, Leinhardt (2001) provides a detailed discussion including the purposes, functions and models of instructional explanations. She distinguishes instructional explanations from explanations that are used in social communication exchanges (common explanations), in scholastic inquiries of different academic fields (disciplinary explanations) and when people explain to themselves for the purposes of establishing, revising and improving understanding or memory (self-explanations). When used by teachers, according to Leinhardt, instructional explanations are designed to teach, to communicate subject knowledge to the students, to respond to implicit or explicit questions, to demonstrate proper metacognitive behaviour, to structure subject content, to deliver information, to support learning, understanding and using information, concepts and procedures. Teachers are required to have the abilities to identify, unpacked and examined learning queries with strong subject and pedagogical knowledge (Leinhardt, 2001, 2010). She develops a model of instructional explanation (see Appendix 1) as a representation of a system of teaching goals:

> The model is comprised of a system of the goals that, when met, produce an explanation. Those goals include the following: (a) establishing a significant query or problem, (b) having a useful set of examples available, (c) having appropriate representations available, (d) attaching the new information that is generated to prior knowledge of the same sort, (e) completing the explanation by identifying core principles, (f) identifying the conditions of use, and (g) resolving the nature of errors (Leinhardt, 2001, p.344).

Leinhardt (2001) explains that instructional explanations should be authentic that cater to students' personal experiences such as planning the cost of gasoline usage in a family trip when teaching mathematics. Moreover, using several appropriate examples when giving explanation is critical for learning in order to connect new information with prior knowledge, to identify and clarify mistakes, queries and misunderstanding, to illustrate the application of a principle or theory, to demonstrate the faulty application of concepts, to lead students to see better the questions they were looking at in a discussion. In addition, making use of representations such as drawings, diagrams, charts, computer simulations, metaphors and analogies, as categorized by Leindardt, is also essential to connect with explanations being developed.

Leinhardt (2001) has brought to light through theoretical discussion the significance of instructional explanations with their functions and goals. However, although she suggests several criteria for the choice of examples and representations, the suggestions are rather generic and only build upon explanations given in the spoken form. Questions such as 'What kinds of examples and representation are used for explanations?', 'How do these examples and representations support connection of prior knowledge?' or 'How do these examples support understanding?' are still the missing pieces.

Surprisingly, not only is there little attention given to instructional explanations in theoretical discussion, but also instructional explanation is a topic that is also scarcely discussed in guidebooks on pedagogical skills. Even if this topic is mentioned, description and guidance on it are limited. For example, Sage (2000) simply lists out that understanding of concepts, cause and effect, procedures, processes, purposes and relationships are supported by explanations but she does not provide any suggestions about 'how to explain'. Among the limited library collections of teaching guidebooks that give credit to the significance of explanations in terms of instructional strategies, Price and Nelson (2014) provide relatively more discussion on the skills of giving explanation. They point out that being able to give clear explanations is one of the keys to effective teaching. They provide a list of components of clear explanations as summarized in Table 2.2 and several lists of suggestions on implementing skills, such as presenting information without using idioms and in smaller part, checking understanding frequently, using visual aids and body gestures to enhance the effectiveness of explanations when responding to students with diversity of learning abilities, language proficiency and cultural background.

Table 2.2 The components of explanations, as suggested by Price and Nelson (2014, p.57)

Components	Descriptions
Paraphrasing	Using different words in phrases and sentences
Definitions	Explaining the meaning of a word or term
Descriptions	Discussing the attributes of something, such as what it looks or sounds like
Elaborations	Providing more details and more information
Synonyms or antonyms	Discussing other words that mean the same or the opposite
Characteristics or attributes	Talking about the special qualities, features or properties that make the thing what it is
Examples and non-examples	Presenting instances of what something is and what it is not
Connections to prior knowledge / personal experience	Talking about how the thing is related to something the students already know about
Comparisons	Discussing what it is like or not like, similes and metaphors
Categories	Talking about what the thing is an example of, or discussing the "bigger picture"

The components listed in Table 2.2 suggest some techniques that can be used when giving verbal explanations. For example, when telling students about the meaning of a word, teachers can use different words or phrases that are familiar to students, provide a robust definition of the word, describe the meaning of the word in detail, provide greater information or further examples, use similes and metaphors and so on. Similarly, Stahl and Nagy (2009) suggest that word meanings can be explained by using synonyms and antonyms, asking students to rewrite definitions, providing examples and non-examples, and contrasting the meanings of new and related words.

For Price and Nelson (2014), "explanations are what the teacher says about the information to be learned" (p.57). Although they also mention the use of visual aids to support explanations, they simply treat explanations as the act of 'telling'. However, I would argue that telling, which I later refer to as spoken explanation, is only one strategy through which explanations can be given. There are more strategies that can help explain new concepts in the classroom. One component of this study involves finding out what strategies are actually used by college teachers.

This research studies the nature of teaching strategies that carry the function of giving explanations and classifies these strategies as instructional explanation strategies which include but are not restricted to verbal communication. To generate a new definition of instructional explanation strategies for this particular study, I will now briefly discuss several types of explanations given in fields where the concept of explanations has been clearly and specifically discussed and defined in literatures, including philosophy, social psychology, history and communication, and discuss their differences and similarities before moving on to the features of explanations in classroom teaching which relate to these different types of explanations. Understanding the definitions of explanations will underline the importance of explanations to our understanding of the world and illustrate how explanations relate to teaching and learning. Although these fields address explanations as verbal forms of communication both spoken and written, the conceptual specifications of explanations from these fields provide a collection of features that can be applied to the construction of the new definition.

2.3.1 *Scientific explanations – a philosophical perspective*

Scientific explanation is a traditional term that philosophers use when discussing inquiries into knowledge (Salmon, 1989). Scientific explanations are not restricted to explanations of scientific matters; rather "it is explanatory knowledge that provides scientific understanding of our world" (Salmon, 1989, p.3). Aristotle's theory of explanation comes from his doctrine of the *four causes*, which are grounded in metaphysics. Though Aristotle did not specifically call his theory 'explanation theory', modern philosophers like Achinstein (1983) and Ruben (1990) argue that the doctrine of the four causes (or *aitiai*) was actually a theory of explanation. These four causes are material cause (or matter), formal cause (or form), efficient cause (or motion-originator) and final cause (or goal/end) (Achinstein, 1983; Ruben, 1990; Kinoshita, 1990).

These four causes simply mean that everything has *matter* and *form*, and that everything has an external 'efficient' force that makes a teleological plan come to an end, i.e. the 'final' cause (Achinstein, 1983, p.6). Let us look at some examples: material cause refers to a material change – for example, turning trees into paper represents a material change. Formal cause indicates the relationship between forms or patterns, such as the arrangement of numbers to form different phone numbers. Efficient cause is related to the primary source of a result, for instance, the efficient cause of a dish is the chef, or the efficient cause of a particular flight is the operating pilot. The last cause, final cause, concerns the final intention or ending of an event. For example, the final cause of being on diet is losing weight; the final cause for studying hard is the desire to obtain a good examination result. Ruben (1990) also points out that the per se sense of *aitiai* distinguished by Aristotle also ties into the concept of causation and explanation, meaning that "a cause in this sense necessarily explains what it causes" (Ruben, 1990, p.88). Aristotle treats an explanation as a proposition "because it is a proposition that purports to describe a cause" (Achinstein, 1983, p.6). Derived from Aristotle's scientific inquiry, scientific explanations continue to seek answers to the 'why' questions in the natural world.

Many centuries later, Hempel (1965) introduced his *covering law* of scientific explanation, which clarified an explanation "as an argument to the effect that the phenomenon to be explained" (Hempel, 1965, p.336). There are two types of explanations in Hempel's covering-law: *deductive-nomological* (or D-N) *explanations* and *inductive-statistical* (I-S) *explanations*, the differences between which will be defined below. Both models suggest that an explanation must include a set of true propositions, such as phenomena, facts, and at least one law-like generalization, (called an *explanans*) which gives rise to a description (an *explanandum*) (Hempel, 1965). Simply put, for Hempel, the explanans is the premise and the explanandum is the conclusion – the explanation itself describes the process of moving from the premise to the conclusion.

The difference between these two models is that the explanans of the D-N model must include a universal law that is always true, while the law-like component in the I-S explanation does not have to be; the I-S explanans can be a statistical generalization, i.e. not an absolute fact but something that has a high probability of occurring, usually derived from scientific research – for example, the proposition that smoking causes lung cancer. According to Hempel, the deductive model is the only model from which a good explanation is produced, since a good explanation requires a true premise, and only the D-N model can assure that a premise is true. However, Mayes (2001) argues that Hempel's principle of explanation only concerns the logical construction of the empirical model in a scientific experiment, discounting the reality of the event being explained.

Contrary to Hempel's theory of explanation, Salmon (1998) emphasizes the importance of relevance. Salmon disagrees with Hempel's models of explanation, saying that an explanation is not an argument and that the law-like feature of the explanans is not necessary in order to reach the expected explanandum consequence. Instead of demanding a high probability explanans, Salmon believes that what an explanation needs is relevancy among variables. He introduces the *statistical-relevance* (S-R) *model* to Hempel's theory. The S-R model is concerned with the explanation value with regard to the dependency or independency of the events that contribute the explanandum, stating that “statistically independent events are causally irrelevant” (Salmon, 1998, p.110). The S-R model requires all relevant factors to be included in the set of explanans, but sets aside the need for probability. This principle of explanation throws light on the existence of incidence and entities, believing that the authenticity of incidence is essential when verifying the feasibility and justification of the explanation. However, these kinds of explanation, including those theorized by Hempel and Salmon, do not take into account the communicative role of explanation as one of the primary forms of communication that is significant in understanding humans and their relationships (Mayes, 2001).

Garfinkel (1981) comments that philosophical scientific explanation stresses “the idea that developments in knowledge often take the form, not of discoveries of new facts” (p.5), and it is more about “what exactly is being explained by a given explanation” (p.12). In Garfinkel’s view, it is important for us to shift our attention to phenomena which should be explained in order to discover new insights about our world. Garfinkel introduces a concept called *explanatory relativity*, suggesting that there are alternative ways of providing explanations. For example, say a teacher wants to find out the reasons why her student plagiarized an essay, and she asks ‘why did you plagiarize this essay?’. If the student responds by saying ‘I forgot the deadline so I just copied something from the Internet in a hurry’, the answer matches what the teacher was seeking – the reason why the student plagiarized. However, if the student instead answered ‘this essay matched my topic’, he did not give the reason for plagiarizing, but instead told his teacher why he copied this particular piece of material rather than another. In this situation, the student and the teacher are operating in different alternative spaces. Therefore, whether or not an explanation successfully answers its question is related to how the explanation matches the contextual spaces targeted in the question or held by the person asking the question. In general, philosophers tend to focus on law-like scientific explanations, and yet Garfinkel shifts the focus and discusses explanations in terms of human relationships and interactions. These kinds of explanations are referred to as everyday explanations.

2.3.2 *Everyday explanations – a philosophical perspective*

Everyday, or ordinary, explanations refer to the explanations we encounter in daily life. These are explanations given in a social context that involves regular and ordinary human communication. Although the classroom context is specifically designed for teaching and learning purposes, it is still a social context in which teachers and students communicate casually, discussing their daily lives and experiences. Everyday explanations can involve causal relationships (although this is not a must) – relationships which may concern the reasons or rationales behind an event or a situation (Draper, 1988).

Everyday explanations are purpose-driven. In a natural conversation, explanations are given not only for the purpose of providing information, they are also "embedded in the hierarchy of goals" (Draper, 1988, p.26). This means that ordinary explanations are normally not given for the purpose of simply providing information, but rather work together with specific aims that people want to achieve. These explanations have "the power to redefine what is going on; and, of course, the new definition suits the speaker rather better than the original" (Antaki, 1988, p.2). In other words, the act of explaining provides a chance for speakers to put themselves in a favourable position through specific intentions or purposes. This purposeful characteristic of everyday explanations can also be explained in the notion of *speech act*, a dimension of the field of pragmatics for the study of language use in society.

Austin (1975) suggests that "to say something is to do something; or which by saying or in saying something we are doing something" (p.12). He proposes that speaking is not just a simple action, rather, speaking involves the speakers' intentions which are designed to achieve explicit and/or implicit purposes. He categorizes three acts that speaking involves: a *locutionary act*, *illocutionary act* and *perlocutionary act*. A locutionary act refers to the act of uttering a sentence with a particular linguistic form and structure and involves the surface meaning of an utterance. An illocutionary act represents the act that a speaker intends to perform, for example, giving an order, a warning or an instruction. Finally a perlocutionary act concerns the influence that the utterance intends to place on the listener.

> Saying something will often, or even normally, produce certain consequential effects upon the feelings, thoughts, or actions of the audience, or of the speaker, or of other persons: and it may be done with the design, intention, or purpose of producing them. (Austin, 1975, p.101)

Explanations are illocutionary acts for the simple reason that the speakers' intentions are always inherent in the act of explaining. By giving an explanation, the speaker intends to achieve various aims, such as adding information, clarifying ambiguous concepts, correcting misunderstandings or introducing new knowledge. Most of the time, the intentions behind giving explanations are implicit, yet "our intuitions about what does or does not have the general feel of an explanation are reasonably sharp" (Antaki, 1988, p.1). The explainer may, through giving an explanation, seek to repair a relationship, ask for forgiveness, look for sympathy or acceptance, or to attempt to strengthen confidence in a person, a situation or a product. For example, someone who is late to a meeting may explain his/her tardiness in terms of a terrible traffic situation with two goals in mind – first, to diminish the embarrassment at being late and secondly, to seek forgiveness from the people at the meeting. This example illustrates how daily life explanations are speaker-oriented.

Everyday explanations can appear in any form, with no restrictions on specific linguistic structure or use of discourse markers such as 'since', 'so that', 'because' and so on (Draper, 1988). Thus, in order to make sense of an explanation, both the overt meaning of the explanation (the locutionary act) and the implicit implication of the explanation in a specific social context, including the reason behind explanation (the illocutionary act) must fuse well together (Heritage, 1988). The analysis of explanations not only provides us with layers of meanings and provides insight into the relationships between explainers and their social context; this analysis also allows us to examine the social involvement and responsibilities of the participants and their relationship to social events.

2.3.3 *Narrative explanations – a historical perspective*

The act of recalling a past experience is a narrative act. The temporal character of the cause-and-effect part of a narrative makes it an explanation rather than the demonstration of a past event, since temporal explanations help connect life events, allowing people to see how one event leads to another and observe how these events contribute to particular goals (Polkinghorne, 1988). Narratives are a kind of explanation as narratives are used to provide a reason, or reasons, for a particular situation (Adams, 1996).

As a discipline, history can be defined as a narrative as "events narrated within a history, whether immediate or remote, have their existence only in the narrative" (Richards, 1992, p.24). Thus, historians use narrative explanations to explain why something happened, or how a past situation came to be. While not all narrative explanations are historical explanations, narrative explanations and historical explanations share many of the same features and characteristics, since they often connect facts that happened in the past in similar ways. Still, the existence of the events in historical explanations cannot be abstract, inventive or probabilistic ideas, they must be actual, real occurrences (Lemon, 1995).

2.3.4 *Practical explanations – a communicative perspective*

Historical explanations deal with things that are unclear. They are used to fill gaps with missing pieces of information which aid understanding of historical events. Similarly in social science, explanations allow us to understand the correlation between things happening during a particular event (Miller, 1987). However, in the field of communication, there is not a great deal of literature which discusses the notion of explanations.

In general, in the context of communication, explanations provide answers as to why things happen (Miller, 2005; Littlejohn & Foss, 2011). Littlejohn and Foss (2011) classify explanations into two types: *causal explanations* and *practical explanations*. Causal explanations discuss the cause and effect relationship of consequential events, while practical explanations focus on the purposeful relationship between an action and its desired goal (Littlejohn & Foss, 2011). For example, the statement 'I have a test tomorrow, so I will stay home and study tonight' is a causal explanation; while 'I want to get a good result on the test, so I will study hard tonight' is a practical explanation. The former simply illustrates a causal relationship, while the latter emphasizes the purpose (get a good result) behind the action (study hard).

Theories that discuss goal-oriented actions in human life in the field of communication are called *practical theories*. Cronen (1995) describes a practical theory as being any theory that is practical and valuable to making human life better. Cronen also provides ways to describe, explain and criticize different interpretations of human communication. As practical theories are goal-oriented, practical explanations tend to be used more to help communication researchers understand how social rules bring out particular goals, especially in terms of the choices that people make and how they overcome problems and difficulties (Littlejohn & Foss, 2011).

In the area of communication, explanations not only provide answers to questions about why things happen, but also describe communicative behaviour in terms of cause and effect relationships, both context-based and individual-based, and in terms of external causes and the internal motives of human beings (Miller, 2005). In the classroom, explanations are not restricted to explaining the causes of events; teachers also use them to explain the purposes of different teaching and learning activities, - this provides a clear direction to student learning, and is one of the essential elements in scaffolding. Therefore, even though practical explanations do not seem directly related to the explanation of concepts, they are important in terms of motivating and helping students to learn.

2.3.5 *Features of explanations in relation to teaching context*

In philosophy, explanation is tightly bound to causation (Salmon, 1998; Tanney, 2013). In the philosophy of science, scientific explanations are used to remove confusion, or "to explain an event or phenomenon is to identify its cause" (Mayes, 2001). In other words, philosophy looks at causal relation as a specific model with restricted rules and forms. Universal laws or statistical elements, and the completeness of events are essential to developing an explanation. Scientists work with robust hypotheses and develop correct explanations which can explain a phenomenon with high certainty of correctness. Scientific explanations, therefore, seek absolute correctness over concerns for the level of adequacy.

However, historians are not interested in law-like theories and do not seek to create generalizations. Roberts (1996) claims that historical events are too complicated to be fully described. Historians see every past event as a unique incident, specifically limited in time and space and isolated from the need to generalize. Carr (2008) argues that Hempel's covering law is 'tenuous' and 'limited' because of its neglect of subjective intention, personal goals and emotional accounts. Narrative explanations, on the other hand, "display the meaningful world of social actors pursuing their intentions" (Hall, 1999, p. 98). History involves choices made by people, the outcome of which cannot be determined by the generalization of scientific law since "choices would not be choices if they were fixed by causal laws" (Bevir, 2000, p.13).

Since everyday explanations do not have specific form and cursory hints into real, structural explanations (Draper, 1988), they are not intelligible from the scientific perspective because everyday explanations have no structure and do not require universal and statistical laws or the completeness of explanans as discussed above. However, this does not mean that everyday explanations are inadequate for certain purposes. Everyday explanations, narrative explanations and practical explanations are most concerned with the level of adequacy instead of absolute correctness. As long as the explanation given is clear and understandable to the listeners or readers, it is an adequate explanation. Still, historians love details and care about the past's significant moments, and thus all available historical explanations must be correct – after all, historians need to make sure that the historical events really took place. Historical explanations should be intelligible, adequate to resolve any confusion and correct in the context of that particular situation (Passmore, 1962).

Practical explanations, everyday explanations and narrative explanations used in daily life are goal-oriented and speaker-oriented. Practical explanations in communication are concerned more with the practical objectives and beneficial consequences of social situations, whereas everyday explanations allow the explainers to present information which fulfils their own needs and intentions. Narrative explanations do not only appear only in historical discussions, but also in daily life, since giving an everyday explanation is to narrate a past story or experience, to certain extent. In most of narrative-centric studies, narrative structure is based on the characters' actions. However, in pragmatics, the narrator's explanation becomes a major concern as "the representation of the character's actions is embedded in the narrator's act of representation" (Adam, 1996, p.110). Narrative explanations in ordinary life, are thus similar to everyday explanations and practical explanations. They are also purposeful and "a teleological explanation of an action" (Adam, 1996, p.115).

Scientific explanations, according to Ruben (1990), use unfamiliar ideas to explain familiar phenomena. For example, Newton's Law of Universal Gravitation was developed to explain why an apple falls from a tree. Passmore (1962) asserted that the concept of 'familiarity' in scientific explanations is between the explanandum and its explanans, rather than the explanans and everyday human experience. He suggests that scientific explanations often use concepts that are unfamiliar to ordinary people, but which are familiar to scientists; while in daily life and in history, people use the familiar (known) to explain the unfamiliar (unclear or unknown) (Mill, 1843/1973; Passmore, 1962).

As stated earlier, explanations can be causal or descriptive. A causal explanation tells you why something happened, whereas a descriptive explanation provides answers to questions regarding 'what', 'when', 'where', and 'how'. Declarative knowledge, procedural knowledge and conceptual knowledge deal with all these types of inquiries. For instance, when a teacher teaches the concept of depression as a medical term, they would not only expect the students to know the lexical meaning of the word, but learn about the symptoms, why depression occurs, how it affects the person's life and society, how it can be treated and so on. Therefore, teaching new knowledge means explaining it both causally and descriptively.

The primary goal of giving explanations in the classroom is to support learning and understanding. To support understanding is to fill the gap between what students know and what is new and unfamiliar, allowing them to make a connection. When explanations are used to create these connections, the content must, first and foremost, be familiar to students. Similar to everyday explanations, instructional explanations use familiar concepts to make sense of unfamiliar knowledge, since everyday explanations fill the 'gaps in the puzzle' with information that is familiar to our everyday life experience (Antaki, 1988). HE students also need to learn theories expressed in the form of scientific explanations, which can be unfamiliar to their own daily lives and experience. In this case, instructional explanations can be used to explain scientific explanations, supporting their understanding of the unfamiliar and bridging the gap with their daily life experience, while also developing students' familiarity with the science. For example, Newton's Law of Universal Gravitation explains gravity from a scientific perspective, employing specific terminology and physical concepts. To help students understand the scientific explanation of Newton's law, ordinary elements like a falling apple or a falling feather can be used to make sense of the unfamiliar. Once students understand and learn the related concepts and become familiar with the science behind Newton's law, they can then apply this scientific explanation to similar everyday physical phenomena.

Instructional explanations also work hand in hand with narrative explanations. No matter whether a narrative explanation is used to retrace historical events or to recall something that happened earlier in the day, its purpose is to "make sense of the complex of events that contribute to explaining the ending" (Polkinghorne, 1988, p.171). In the classroom, teachers often narrate past events and historical incidents to help students understand present phenomena. For instance, teachers in legal studies review past cases with their law students when teaching them about the establishment of laws. Similarly, economics teachers helping students understand the economic problems of a country may revisit past events that have affected the economy, such as political incidents, natural disasters or terrorist attacks. In these contexts, narrative explanations illustrate the causal relationship between these historical incidents and new knowledge.

A classroom is a social context and teaching is a type of social action. Explanations applied in teaching do not require universal laws or generalized models. Instead, like everyday and historical explanations, adequacy is the prime concern. Yet, since hypothetical events are commonly used in teaching, the absolute correctness of past events is not a necessary justification of adequacy in instructional explanations, as it is in historical explanations. However, the kind of adequacy required in instructional explanations involves more than simple understanding, it also has to meet students' needs and the level of difficulty of the course.

Taking students' prior knowledge into consideration, instructional explanations should be tailored to match the students' background, experience and language proficiency. For instance, in a study about using English and Chinese in the Hong Kong university context, university lecturers generally found that using Cantonese, the first language of students, could help clarify difficult points and explain key vocabulary (Flowerdew, Li & Miller, 1998). As mentioned in Chapter 1, since English is a second language in Hong Kong, language proficiency of students is one of the major concerns for teachers when explaining new-knowledge. Therefore, classroom explanations are distinct from all the other kinds of explanations mentioned so far in that they should be listener-oriented.

Furthermore, students' interests and expectations, curriculum design and subject-specific parameters, as well as cultural issues (e.g. taboos) and even legal responsibilities (e.g. the need to consider the Control of Obscene and Indecent Articles Ordinance) have to be taken into account. For example, the story of Steve Jobs, the famous CEO of Apple, would be more appropriate to explain the concept of entrepreneurial success in an information technology class than, say, the story of Sir Richard Branson, the founder of Virgin, simply due to subject specificity and the familiarity of the content. Since instructional explanations are highly selective, the appropriateness of the content used for explanations is of primary concern to the level of adequacy.

In everyday communication, intuition and mutual understanding between speakers and listeners allows people to identify explanations in their interactions, even though explanations "are not marked out syntactically" (Draper, 1988, p.17). Nevertheless, teaching is different from daily interaction and meanings need to be delivered in explicit ways to ensure all messages are efficiently transmitted between teachers and their students. To support understanding, the connection between events and concepts, the relationships between pieces of information, the rationales behind a procedure or an organizing structure, all need to be explicitly and clearly displayed.

Using discourse markers and signal phrases can overtly signal changes and create organization and a relationship with content; in turn this can help lead students through different related concepts in a systematic way (Mendelsohn & Rubin, 1995; Walsh, 2013). Though linguistic cues are not obligatory to conveying messages in the classroom and students generally recognize explanations as they do in daily life, good-quality explanations are highly influential in scaffolding students' understanding and in helping them construct knowledge in organized and systematic ways.

When taken as part of the wider general goal of giving explanations, instructional explanations are highly practical in that they aim to improve people's lives through learning. However, explanations in the classroom context are not practical explanations, since not all instructional explanations are causal explanations, and not all causal instructional explanations carry specific goals.

By looking at the features of explanations across several disciplines, we can see that explanations are not simply about giving reasons or delivering information. The different ways explanations are defined in those disciplines by different writers are summarized and outlined in Table 2.3. The features of explanations of the four disciplines provide a framework for me to synthesize and construct a definition of explanation that suits the instructional purpose. The classification shows that there is no single definition of explanation as the features of explanation vary from one domain to another. The unique category of instructional explanations to certain extend would also avoid argument of the kind of data identified as explanation. For example, without a specific classification and a clear definition, one may challenge that only explanations with law-like generalization features and with specific form could be taken into analysis. These features do not serve as criteria for identifying explanations from the data but are essential to describe what explanation means in this study.

Table 2.3 Summary of the features of explanations in different disciplines

Features of explanations	Scientific explanations	Everyday explanations	Narrative explanations	Practical explanations	Instructional explanations
Causal	*	*	*	*	*
Descriptive		*			*
Law-like generalization	*				
Specific form	*				
Require adequacy		*	*	*	*
Require correctness	*		*		
Goal-oriented		*		*	*
Speaker-oriented		*		*	
Listener-oriented					*
Use the unfamiliar to explain the familiar	*				
Use the familiar to explain the unfamiliar		*	*		*
	Hempel (1965), Achinstein (1983), Garfinkel (1981), Ruben (1990), Salmon (1998), Mayes (2001), & Tanney (2013)	Austin (1975), Draper (1988), & Antaki (1988)	Passmore (1962), Polkinghorme (1988), Lemon (1995), Adams (1996), Hall (1999), & Bevir (2000)	Miller (1987), Miller (2005), & Littlejohn & Foss (2011)	Synthesized features of instructional explanations

2.3.6 *Definition of instructional explanation strategies in this study*

From the above discussion, this study defines instructional explanation strategies as both causal and descriptive, in that they deal with 'why', 'what', 'when', 'where', 'who' and 'how' questions, and support the learning of declarative, procedural and conceptual knowledge. They have no specific form, and yet discourse markers are prominent when they were used in verbal form. Though there may be some restrictions on the choice of content and considerations regarding disciplinary areas and cultural aspects, instructional explanations are listener-oriented/learner-oriented and highly selective, matching both students' prior knowledge and learning needs. They seek adequacy and appropriateness and can also be used to explain or co-act with other types of explanation strategies. Instructional explanations explain unfamiliar concepts with familiar knowledge or information from daily life, and should be "grammatically simple, make good use of example, define any technical terms" (Kyriacou, 1998, p. 34).

These features of instructional explanations are not restricted to explanations in spoken and written forms. They refer to any teaching strategies, including non-verbal forms of explanation, carrying the purpose of explaining. Since knowledge and information can be presented in many forms, including verbal, aural and visual, and exists in an infinite number of sources, materials that are adequate, appropriate and student-familiar can be utilized in classroom explanations.

Last but not least, though the other types of explanations do not mention any limits on the length of explanations, instructional explanations should be coordinated with other classroom activities, with the length of each explanation of a particular topic being the right length to allow students to move from one step to another, as Kyriacou (1998) states:

> Perhaps the most important aspect of explaining, however, is the skill in deciding the size of step that pupils can take in going from what they know at the start of the lesson to the learning you intend will take place by the end of the lesson. This decision about the size of step has crucial implications for the type and sophistication of the explanations offered. (p. 34)

What Kyriacou (1998) suggested was that explanations provide learning support to students to construct new knowledge and expand their knowledge bank to higher levels, which tightly associates with the concepts of schema, zone of proximal development and scaffolding as discussed in the following sections.

2.4 Schemata in the constructivist paradigms

The purpose of teaching is to direct and facilitate learning, and based on different learning conditions, education researchers have developed learning paradigms representing different perspectives on the learning process. For example, behaviourism deals with behavioural change during the learning process, meaning behaviourists see learning as a change in behaviour prompted by external stimuli (Bower & Hilgard, 1981). Humanism, on the other hand, focuses on the internal motivation of learners and the development of personal potential, proposing that teachers do not take on the role of delivering knowledge, but rather facilitate students' self-directed learning (Rogers & Freiberg, 1994; Huitt, 2011). Both cognitivism and constructivism acknowledge prior knowledge and experience as key elements of learning; though cognitivism focuses more on the intellectual process of learning, while constructivism suggests that learning involves cognitive processes, as knowledge is constructed through communication with people and through connection to the external world. This study considers teachers to be facilitators who lead students on a learning journey through a series of interactive classroom activities. Along the journey, students explore new information and, with the support of their teachers, interpret meaning and construct knowledge. The most suitable learning paradigm adopted in this study to develop the theoretical construct, is thus from the view of constructivism.

2.4.1 *Constructivism*

Constructivism involves the construction of knowledge through the interaction of people and the environment, and through the bridging of old and new knowledge. Constructivism holds that knowledge is constructed through both human perception and life experience. The constructivist paradigm of learning suggests that an individual's construction of new concepts is based on their prior knowledge and experience (Winitzky & Kauchak, 1997). It suggests that teaching strategies need to engage students, address students' prior knowledge, and then integrate and reconstruct this knowledge in a collaborative environment. Therefore, even though teachers are the people who provide the information to students in the classroom, constructivism proposes that students are actively involved in building their own knowledge, and that they should consequently be guided to think and construct new knowledge during the learning process.

There are two broad types of constructivism: cognitive and social. Cognitive constructivism suggests that the development of knowledge takes place in learners' cognitive structure, or schema – a mental structure which organizes and stores knowledge (see 2.4.2) – proposing that knowledge is constructed rather than being the simple storage of information (Piaget, 1960). Cognitive constructivism implies that learning is a mental process during which learners make sense of new information to change and expand their schema. Building on Piaget's perspectives, Vygotsky developed social constructivism. This type of constructivism shares cognitive constructivism's view about child development (Gogus, 2012), and also acknowledges that existing knowledge is key to the construction of knowledge (Foote, Vermette, & Battaglia, 2001). However, Vygotsky (1978) argues that learning should not simply be something that happens inside the brain – it should be integrated with cultural and social interactions. Social constructivism emphasizes that learning is a social process involving social, cultural and language impacts.

Though both cognitive and social constructivism put forth different perspectives of learning - Piaget stresses the development of schema through individual cognitive development whereas Vygotsky believes social interaction to be the primary source of concept development and is the major role in the reconstruction of prior knowledge (Roschelle, 1995). In my view, nevertheless, both types are closely related to learning in the classroom context. Given that understanding is the primary goal of classroom teaching, and that understanding is a cognitive activity involving new knowledge being interpreted through its connection to our memory's existing network of knowledge, this present study about how teachers support understanding is concerning the strategies that facilitate cognitive development. At the same time, classroom teaching and learning is a social activity in which teachers provide support to help students achieve various goals. Scaffolding and the zone of proximal development, which will be discussed in Section 2.5, are two connected ideas which further explain the relationship between teacher support and student learning.

2.4.2 *Schema theory*

Kant (1781/1855) first introduced the term 'schema', describing it as a cognitive procedure that generates "an image of a concept" (p.109). According to Dicker's (2004) interpretation, Kant introduced the word 'schema' as being equivalent to the word 'concept'. In a discussion of the theory of remembering, Bartlett (1932) said that in everyone's mind, there are uncountable individual yet connected traces which "are generally supposed to be of individual and specific events" (p.197). These traces, when stimulated by new information, are activated and re-excited, therefore triggering recall and remembering. Although traces represent separate and distinct mental images, Bartlett suggests that these traces exist in a mass connected structure, a structure he calls a *schema*.

> 'Schema' refers to an active organisation of past reactions, or of past experiences, which must always be supposed to be operating in any well-adapted organic response. That is, whenever there is any order or regularity of behaviour, a particular response is possible only because it is related to other similar responses which have been serially organised, yet which operate, not simply as individual members coming one after another, but as a unitary mass. (Bartlett, 1932, p.201)

According to Bartlett's theory, a schema consists of accumulated past reactions and experiences which are stored in the long-term memory. It is an active, modifiable mental structure in which old knowledge is organized and connected as a mass of information and interacts with and influences any new incoming information.

Piaget built further on this notion of schema, with his ideas of intelligence and adaptation providing a fundamental framework for understanding cognitive development. Intelligence refers to the interrelationship between the human brain and the universe. Piaget (1960) describes it as the "equilibrium of cognitive structuring" (p.6) and the "developed form of mental adaptation" (p.6). In his view, this equilibrium is a balance between how people think about the world and how the world really is.

To reach equilibrium, people need to go through an adaptation process during which we pick up new information and match it with our existing schema. In other words, adaptation is the cognitive process we go through to reach equilibrium and thus construct our intelligence. This intelligence then helps humans adapt to and cope with their environment. Therefore, intelligence is “both the means and the end” (Anderson, Carter & Lowe, 2009, p.211) – we need intelligence to adapt, and the end result of the adaptation process creates enhanced intelligence.

According to Piaget, past experience is a key element in the adaptation process for both knowledge acquisition and cognitive development, during which someone “either assimilates new experiences consistent with existing schemas or [accommodates] schemas to fit his or her experience” (McVee, Dunsmore & Gavelek, 2005, p.536). To explain further, our existing memory houses pre-existing knowledge and experiences that accumulate throughout our lives, developing our schema which “organizes past experience and provides a framework for understanding future experiences” (Butz, 1997, p.20). When we learn a new piece of knowledge, we look for similar concepts and experience in our existing schemata, and then go through a process of either assimilation or accommodation.

Assimilation refers to the connection of new information to pre-existing schemata. If assimilation does not work, we go through the accommodation process, involving altering the pre-existing information to accommodate new information (Good & Brophy, 1990; Howard, 1987; McNally, 1977; Olson & Hergenhahn, 2009). For example, many people in certain parts of the world have standing fans at home. Referring to Figure 2.3, this type of fan stands upright on the floor, has several blades and is covered with a fan cage. Upon seeing a ceiling fan for the first time, as in Figure 2.4, we link the image to our pre-existing knowledge of fans to make sense of the ceiling fan – it has several blades and when they move, a breeze is generated. This is the assimilation process. However, one day we might go to an electric appliance shop and see a new designed fan, as shown in Figure 2.5. We cannot assimilate this bladeless fan with our prior knowledge of fans, as it has no blades and no cage. In this situation, we need to change our perception of what a fan looks like and we create a new schema. This is accommodation.

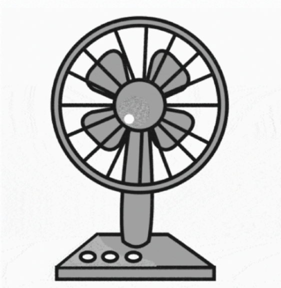


Figure 2.3 A standing fan

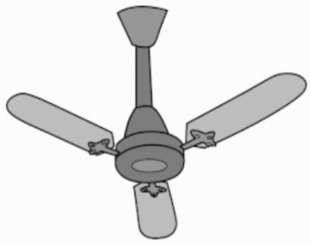


Figure 2.4 A ceiling fan


Figure 2.5 A bladeless fan

These two mechanisms work together during the adaptation process – “assimilation promotes accommodation, and accommodation improves further assimilation” (Sirois & Shultz, 2003, p.15). Therefore, adaptation is the equilibrium of assimilation and accommodation, and the end product is knowledge obtained via a revised and updated schema.

Piaget’s schema theory informs us about the acquisition of knowledge, and how knowledge is processed and organized since, according to Olson and Hergenhahn (2009), all experience gained in life has gone through the processes of assimilation and accommodation, and these processes lead to the reconstruction of schemata and result in learning. Piaget classifies schema into several different knowledge types: *sensorimotor schemata* refer to the knowledge acquired through observation and manipulation of the environment. *Cognitive schemata* involve the ability to think of concepts and images, while *verbal schemata* are associated with the use of language to express concepts from the cognitive schema. This is how humans master verbal meaning and communication skills (Good & Brophy, 1990, also see Piaget, 1960; McNally, 1977). Rumelhart (1980) summarizes the concept of schema as follows:

> Schemata can represent knowledge at all levels – from ideologies and cultural truths to knowledge about what constitutes an appropriate sentence in our language, to know the meaning of a particular word, to knowledge about what patterns of excitations are associated with what letters of the alphabet. We have schemata to represent all levels of our experience, at all levels of abstraction. Finally, **our** schemata are our knowledge. All of our generic knowledge is embedded in schemata. (p.41)

Schema theory implies that if any new things learned are close to, or similar to, our existing schema, we absorb these new pieces of knowledge faster and easier. This theory naturally extends to the question of how new knowledge can be taught successfully, i.e. how students can be helped to understand and then adapt new knowledge into their revised intellectual schemata. Roth (1990) points out that when students do not possess the related prior knowledge to link to the new concepts, or if they do not activate the related ideas stored in their schemata, they may simply memorize the pieces of new information, i.e. "memorising without thought or understanding" (Watkins, 2007, p.309). Although students may be able to name and recall the concepts, these concepts do not give them a better understanding of the world.

In lessons, students learn about their world through information provided by their teachers and ideas shared by their peers. They receive all sorts of stimuli from course outlines, lecture notes, projected PowerPoint slides, their own prior learning and life experience and that of their peers and teachers. However, teachers should not assume that all students will understand new knowledge merely from having it explained to them by teachers, simply because all individuals possess different schemata which contain their own background and experiences. Some students may not have the schemata that allow them to make sense of the new knowledge, some may not have the schema allowing them to make a connection between new and old knowledge, while some may interpret the new information in a way that is different to expectations. These types of mismatches may result in the misinterpretation and misunderstanding of new information (Howard, 1987).

To avoid such unwanted results and to help students understand new knowledge, students should receive support that allows them to build bridges between the concepts stored in their schemata and incoming new knowledge. When we move the focus to a teacher's ability to make the right choices that will make this adaptation possible, we need to consider whether the teacher's schema matches both the learning situation and the needs and desires of the students. In other words, a teacher's role in the delivery of new knowledge is to link the new subject matter to students' pre-existing schemata.

Effective teaching involves not only pedagogical activities and strategies, but also the ability to choose the right pieces of knowledge from teachers' own schemata which will help their students learn.

The central concept of Piaget's theory of schema, which stresses the influence of existing schemata in cognitive development, provides a useful model for this study with regards to the importance of teacher explanations acting as a scaffold to support the creation of these all-important bridges between old and new knowledge. Using instructional explanations to facilitate assimilation and/or accommodation for schema construction through stimulating prior knowledge in students' schemata and build their connection to new knowledge is a pedagogical approach called *scaffolding*.

2.5 The ZPD and scaffolding in the constructivist paradigm

The notion of schema explores the cognitive side of learning. However, learning is not only an individual cognitive process but also a social process – from the moment we are born, we start receiving information from the environment and the people around us, constructing knowledge inside our brains. Interacting with other people is a vital part of the construction of our knowledge, especially so during times when students need support in assimilating or accommodating new knowledge due to the gap between students' schema and incoming knowledge. In this section, we will look at this gap, called the *zone of proximal development*, and the scaffolding approaches which are used to bridge this gap from a social constructivist perspective.

2.5.1 *The zone of proximal development*

Vygotsky (1934/1986) suggests that knowledge is constructed through social experience and interaction with others. A significant experience in the learning process occurs when a learner receives guidance and support from a more knowledgeable person. Vygotsky believes that this interaction provides support to learners, allowing them to build up their abilities and/or knowledge in a zone, or gap, between a learner's existing knowledge and the higher level of a task that the learner is required to achieve. It is within this zone that "learning and cognitive development occur" (Berk & Winsler, 1995, p.26). Vygotsky named this area the zone of proximal development or ZPD.

> It is the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers. (Vygotsky, 1978, p.86)

A person's 'actual developmental level' generally means a level of ability where a person can handle a task independently, while their 'potential developmental level' is the ability a person can attain to solve a problem, finish a task, or understand an idea, given assistance by a more knowledgeable person. The idea of the ZPD implies that the assimilation and accommodation processes may not work if the existing knowledge of a learner does not link with or reach the level of difficulty of the new information.

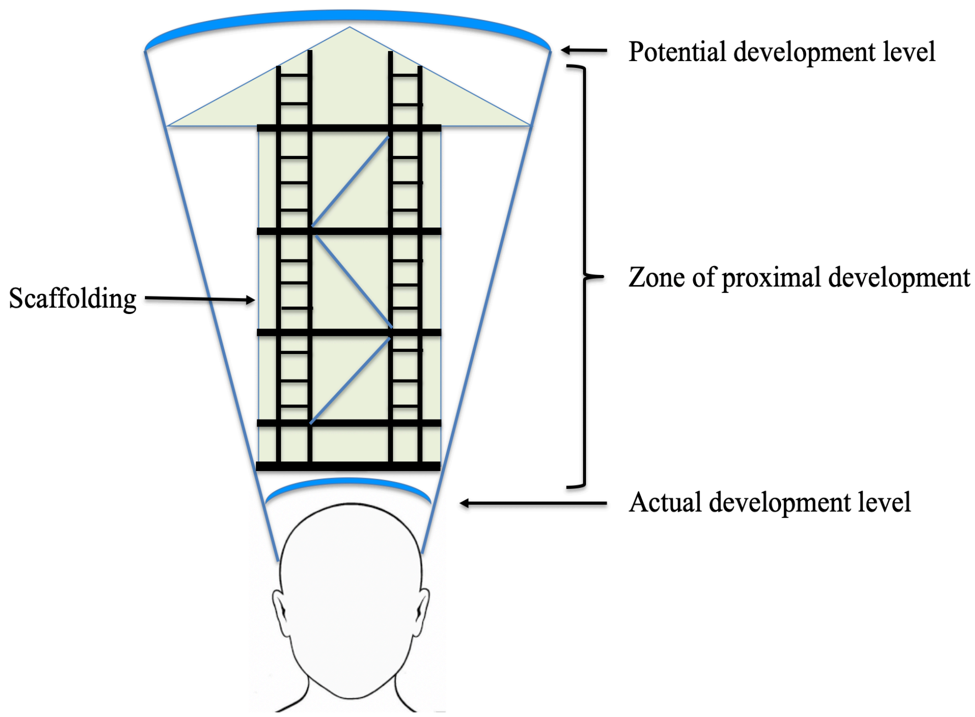
Theoretically, if new incoming information matches with a learner's schema, assimilation occurs. However, students may not realize that connections exist between the information in their memories and new information. In situations like this, support given in the form of a little hint may help trigger memories and facilitate assimilation. A personal anecdote: when my teacher explained during a school physics lesson that light is faster than sound, many of my classmates and I could not understand the idea until he gave us the example of thunder and lightning. We did not realize that this natural phenomenon, which we had all experienced before, was related to this scientific theory, but the hint quickly helped us connect the new information to our memories – thus supporting our understanding of the theory.

In cases like this, students may actually have the right schemata but are in need of support to connect the new and old knowledge and allow assimilation to occur. However, in some situations, students may not assimilate the new information.

Continuing with the above example, if, hypothetically, a student was to come from the Arctic area which – according to the National Aeronautics and Space Administration (NASA) (2001) – almost never experiences thunderstorms, using the example of thunder and lightning may not help the student assimilate the information. In this case, if there is no example equivalent to the thunderstorm, support should be given to the student to accommodate the new piece of knowledge instead.

Whether a learner requires support for assimilation or for accommodation, there is still a gap between what they know and what they need to understand, and this gap has to be minimized or bridged through support given by a teacher. This mechanism of support, according to Wood, Bruner and Ross (1976), is called scaffolding. In Figure 2.6, I have drafted an abstract diagram to illustrate the concepts of ZPD and scaffolding.

Figure 2.6 The ZPD and Scaffolding



2.5.2 *Scaffolding*

Influenced by Vygotsky's ideas about the ZPD, Wood, Bruner and Ross (1976) introduced the notion of scaffolding, which refers to a situation whereby a more skilful person helps a group of novices or less-skilled children to solve a problem. The original meaning of the word 'scaffolding' refers to a temporary structure used in building construction that elevates workers while construction or maintenance work is in progress, with the structure acting as a platform allowing workers to move from one level to another. In the learning context, the word represents the same idea – that students can be given support (i.e. a scaffolding) by a more knowledgeable person, allowing them to move to the next level of learning or a task, gradually elevating their knowledge or skills until they reach the target level or finish the tasks. Wood, Bruner and Ross (1976) define scaffolding as:

> [a] process that enables a child or novice to solve a problem, carry out a task or achieve a goal which would be beyond his unassisted efforts. This scaffolding consists essentially of the adult "controlling" those elements of the task that are initially beyond the learner's capacity, thus permitting him to concentrate upon and complete only those elements that are within his range of competence. (Wood, Bruner & Ross, 1976, p.90)

Vygotsky's ZPD and the idea of scaffolding focus on the same process – i.e. that learning takes place when learners build their ability from the existing level to a higher level of cognitive development through the intervention of another individual. ZPD talks about the specific levels of cognitive development and suggests that learning takes place within this zone through support given by a more knowledgeable other; while scaffolding also suggests that support from teachers is essential if students are to meet a learning task that is "beyond students' current capability" (Hardjito, 2010, p.131).

One characteristic of scaffolding is the withdrawal of support that occurs once the learners have improved their competence and have reached the point where they can achieve the learning tasks. The role of teachers as more knowledgeable others in their subject areas, therefore, is to help students reach a higher level of understanding while allowing them to use their own abilities to finish a task or make sense of a new concept "without being overly directive" (Hogan & Pressley, 1997, p.2) or "creating too much dependency" (Wood, Bruner & Ross, 1976, p.98). Vygotsky (1960) believes that with support people have a readiness to develop self-regulation to turn external stimuli to internal understanding and abilities in a learning process.

> All of this corresponds to some kind of inner brain process. As a result of several such experiences in the transition from an external operation to an internal one, all the intermediate stimuli turn out to be no longer necessary, and the operation begins to be carried out in the absence of mediating stimuli. (Vygotsky, 1981, p.183)

In the development of self-regulation, learners seek understanding of others' actions, interactions, instructions or other kinds of external stimuli, and then synthesize, construct and internalize the new information. Once self-regulation is achieved, external stimuli that support the accomplishment of tasks can be reduced or withdrawn as Bronson (2000) states:

> The help provided should, optimally, be the minimum necessary for the child to construct the new understanding or skill (or synthesis) so that it does not interfere with developing independent self-regulation. (p.20)

Teachers who use scaffolding should carefully and flexibly adjust the support and guidance given in order to avoid giving too much or too little support. If not enough support is given, the learners will not gain sufficient capabilities to finish their tasks. On the contrary, if too much support is given, the learners may become dependent on the teachers. In this case, even though the learners may produce a satisfactory result, learning would not take place during the process since the teachers did most of the work to get the outcome. Therefore, scaffolding needs to not only be temporary and removable, but also flexible and highly adjustable, allowing it to meet the different needs of learners.

Scaffolding has been described as "one of the most recommended, versatile, and powerful instructional techniques of constructivist teaching" (Clark & Graves, 2005, p.570) and "is the major component of teaching activity" (Roehler & Cantlon, 1997, p.9). The major goal of scaffolding is to keep learners in their ZPD through learning activities, guidance and interaction and gradually lead students to construct new knowledge.

Scaffolding also serves other functions. I have compiled the functions of scaffolding reported by Wood, Bruner and Rose (1976), McKenzie (1999), and Zagranski, Whigham and Dardenne (2008) in Table 2.4 for comparison.

Table 2.4 The functions of scaffolding

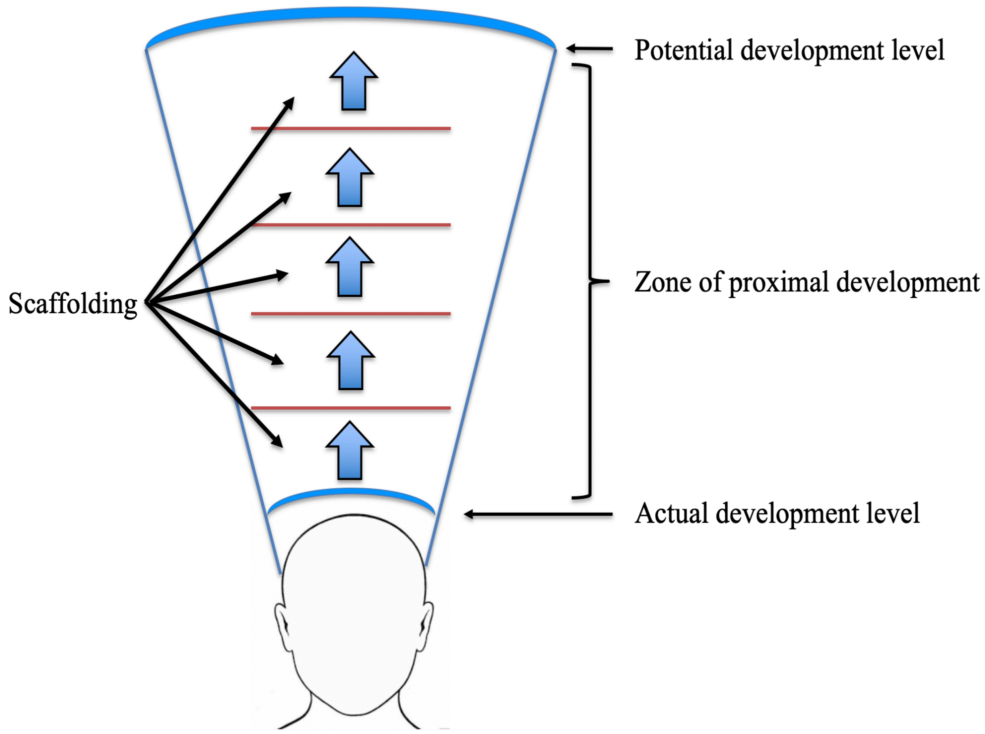
Wood, Bruner & Ross (1976)	McKenzie (1999)	Zagranski, Whigham, and Dardenne (2008)
• Recruitment: retain students' attention • Reduction in degrees of freedom: simplify tasks and procedures • Direction maintenance: motivate students, keep students' involved and on track • Marking critical features: interpret and point out discrepancies between the students' ideas and the expected outcome. • Frustration control: monitor stress and frustration when meeting difficulties and failure • Demonstration: provide modelling and examples (p.98)	• Provides clear direction • Clarifies purpose • Keeps students on task • Offers assessment to clarify expectations • Points students to worthy sources • Reduces uncertainty, surprise and disappointment • Delivers efficiency • Creates momentum (Also cited in Douglas & Kataoka, 2008, p. 341).	• Provides motivation for a student to learn by tying the new knowledge to present-day applications. • Breaks down the task or assignment into workable, understandable parts. • Provides a goal and an end point, giving the students a direction to follow. • Provides assessment tools so the students can see where they are in relationship to the standard(s) being addressed. • Reduces fear and frustration, and encourage risk taking. • Provides models that demonstrate the expectations of the activity the students will undertake. (p.109)

These lists, though they use different wordings, express several common elements, which I summarize in the following points, explaining that scaffolding:

- breaks down complicated ideas and tasks into understandable and achievable parts;
- provides models, examples and demonstrations to give students a better idea of what they are expected to achieve;
- provides a clear purpose and directions which reduces uncertainty, fear and frustration; and
- retains students' attention and keep students involved.

Figure 2.7 is another diagram I drafted to illustrate the scaffolding process in the ZPD. As shown in the diagram, scaffolding supports students as they build their knowledge step by step and progress from one level to another.

Figure 2.7 Illustration of the scaffolding process



To follow the scaffolding process, teachers should first break down complicated ideas or tasks into separate, achievable levels, and then provide support to students to help them achieve the expected tasks or construct new knowledge. These supports can take many forms, for instance by giving hints, guidance or directions, or by providing examples or demonstrations. Through these supports, students will have a better idea of what they are expected to do, what they need to achieve and what stage they have achieved; therefore reducing their fear of and frustration with the new knowledge or tasks. What's more, teacher-led interventions – whether they are hints, examples, or instructions – require students to pay attention, which actively involves them in the learning process.

I see giving explanations as one of the scaffolding strategies that have four above-summarized functions which support understanding across the ZPD. Explanation is not the only scaffolding strategy, and thus to find out the role of explanation in answering the second research question, other scaffolding strategies have to be recognized in the analysis.

Over the years, educators have suggested many different types of scaffolding techniques, some of which are summarized in Table 2.5.

Table 2.5 Scaffolding strategies

Tharp & Gallimore (1988)	Benson (1997)	Roehler & Cantlon (1997)	Martin-Kniep & Picone-Zocchia (2009)
1. Modelling 2. Contingency managing (giving rewards or punishments) 3. Feeding back 4. Instructing 5. Questioning 6. Cognitive structuring (providing an organizing structure)	1. Modelling 2. Questioning, asking prompting questions 3. Using cue cards 4. Cooperative learning among peers 5. Cognitive strategy instruction 6. analysing examples 7. demonstrating 8. providing feedback 9. 6. 'Thinking aloud' techniques	1. Offering explanations 2. Inviting student participation 3. Verifying and clarifying student understanding 4. Modelling desired behaviours 5. Inviting students to contribute clues	1. Modelling 2. Using explanations 3. Actively involving students 4. Giving feedback

Examining the four sets of scaffolding strategies listed above, they can be classified into several categories: involving students, giving learning direction, modelling, progress checking, and supporting cognitive structuring and understanding.

Actively involving students or *inviting students to participate* is one scaffolding strategy which can capture students' attention, keep them motivated and keep them on task. Students must remain actively involved in the entire scaffolding process from beginning to end, as they actively construct their understanding and knowledge. Constructivism suggests that knowledge is constructed by learners, as does the concepts of the ZPD and scaffolding; therefore, student involvement is fundamental to the scaffolding process.

Inviting students to contribute clues helps facilitate student participation and involvement as it simulates, motivates and encourages students to think and share their ideas. When students are invited to provide learning clues, they are stimulated to construct ideas via connecting their existing schema and the newly-learned knowledge. The clues given by students may also reflect their level of understanding at a particular point, thus allowing the teachers to check understanding, rectify any misunderstandings, correct wrong concepts, and clarify and elaborate on ideas. Furthermore, these clues may provide hints to the teachers, allowing them to use appropriate language and strategies in order to match the students' schema. Using student-generated clues may also arouse their interest in learning, as they may be happy to have their ideas recognised by teachers. *Questioning*, a scaffolding strategy suggested by both Tharp and Gallimore (1988) and Benson (1997), can effectively involve students by stimulating their thoughts and encouraging their active participation. Answers and feedback obtained from students can also help teachers identify students' learning progress, points that they have achieved, and any existing misconceptions. These points can then be input into other scaffolding strategies such as contingency managing and modelling and support strategies for understanding.

When a teacher shows appreciation of a student's answer or a given clue, according to Tharp and Gallimore (1988), this a scaffolding strategy called *contingency managing* which can keep a learner engaged with a task and act as a "prop or buttresses that strengthens each point of advance through the ZPD, preventing loss of ground" (p.53). This kind of prop provides direction to students and allows them to see if they are on track. Without doubt, the most significant strategy that gives direction to learning is *instructing* (Tharp & Gallimore, 1988), enacted by telling and giving direct instructions. Giving direction to learning provides students with goals and helps them build their knowledge in discrete parts. This can also reduce stress, frustration and fear associated with learning.

Modelling is a strategy that appears in all four sets of scaffolding strategies given in Table 2.3. The primary type of modelling is called *performance modelling* (Roehler & Cantlon, 1997) and which results in "providing models that demonstrate the expectations of the activity the students will undertake" (Zagranski, Whigham & Dardenne, 2008, p.109). Since the main feature of performance modelling is imitation, when using modelling as a teaching strategy, students are normally expected to imitate the model in order to change their existing behaviour (Pear, 2001; Sharma & Chandra, 2003). Although imitation is a powerful and effective learning tool for all ages, it may not however require understanding (Byrne, 1998). In contrast, *cognitive modelling* is closely related to the cognitive developmental process, where prior knowledge is elicited and new knowledge is encoded (Lane, 2012). The *thinking aloud* strategy recommended by Benson (1997) is a type of cognitive modelling whereby teachers verbalize the process and cognitive structure when applying a strategy, making a decision or solving a problem (Fetsco & McClure, 2005; Fisher & Frey, 2008). This strategy supports understanding through sharing models of thinking and reasoning with students.

When students are asked to think aloud, teachers can gain insight into students' thoughts on how to handle a task or verify their understanding of newly-taught knowledge. This allows teachers to provide any support that may be necessary, or allow them to remove the scaffolding. Apart from thinking aloud, the responses given by students when using the strategies of questioning and inviting students to contribute clues can also provide insight into the students' learning progress and verify their understanding. *Verifying and clarifying students' understanding* (Roehler & Cantlon, 1997), thus does not refer to a single strategy but a set of strategies that serve two purposes – verifying and clarifying the students' understanding. Verifying student understanding is a vital step in the scaffolding process as it involves checking student learning progress, allowing teachers to understand if they can move on, or whether they need to clarify or reteach any concepts that are unclear.

The last category of scaffolding strategies supports cognitive structuring and understanding. Cognitive structure, also called schemata by Piaget, governs our existing knowledge and provides ways of understanding and coping with our world (see 2.4.2). Assuming that all cognitive structures are developed through assimilation and accommodation (Rosen, 1989; Shi, 2012), and that these adaptation mechanisms are fundamental and inalienable to the process of learning, then learning results in the development of our cognitive structure. Strategies which support the development of cognitive structure are thus strategies that initiate and facilitate assimilation and accommodation. *Cognitive structuring,* suggested by Tharp and Gallimore (1988), refers to the act of leading students to 'see through' the conceptual and belief structures of the world, allowing them to construct and reconstruct their belief systems, enhance their mental operations, and increase their understanding.

To apply cognitive structuring during the scaffolding process, teachers can either provide explanations to help evaluate, group and organize old and new information; or direct students through a series of steps to help them reach understanding (Tharp & Gallimore, 1988). There are times when students may not be able to follow this cognitive structuring, or hold misconceptions that hinder their understanding. Therefore, scaffolding strategies which verify students' understanding and provide them with clarifications when needed are important. Since clarifying misconceptions can build a better understanding of concepts (Litt, Martin & Place, 2015), clarifying is also part of cognitive structuring. In general, both clarifications and explanations make meanings clearer and hence support understanding. However, while clarifications are given in response to instances of obscurity, misunderstanding or misconception (Walton, 2007, 2016); explanations promote an understanding of "what is being learned", "why and when it is used", and "how it is used" (Roehler & Cantlon, 1997, p.17).

Explanations cover all situations and stages of the teaching process, including the development of declarative, procedural and conceptual knowledge. Explanations are a part of the process of integrating and assimilating new information, and thus carry a significant role in cognitive development (Nakatsu, 2006). Accordingly, explanation is a crucial scaffolding strategy which helps the progression of knowledge construction and cognitive development. Nonetheless, not all explanations can produce these desired outcomes, as ineffective explanations basically "give no explanation at all" (Griffiths, 2010). Research into various explanation strategies would therefore be valuable as we seek to promote quality teaching.

The above discussion shows that under the constructivist learning paradigm, scaffolding is an important teaching approach which facilitates learning and understanding. Through scaffolding, students can receive the appropriate support to build their knowledge in manageable increments. Of the many scaffolding strategies in the classroom teaching context, providing explanations is one of the most significant strategies that supports understanding. Therefore, in this study, I will focus on explanation as a scaffolding strategy and investigate how this strategy is used by community college teachers to support students' learning.

2.6 Explanations in pedagogical studies

As an essential scaffolding strategy, explanations support the understanding of concepts. However, instructional strategies regarding how to give explanations are not commonly found in pedagogical publications. While some research shows that when teachers devote more time to explain subject knowledge, better student achievement is possible (Rosenshine & Stevens, 1986), there has, thus far, been relatively little attention paid to classroom explanation strategies, particularly in terms of the use of explanations in scaffolding strategies and in HE. Correspondingly, in the bulk of instructional and pedagogical literature, such as Light, Cox and Calkins (2009), and Cooper (2014) – which look at areas such as classroom management, instructional planning, the use of activities, questioning and so on – explanations are rarely discussed in detail and are, in fact, largely absent. This means that most pedagogical research on classroom teaching focuses mainly on behavioural and procedural strategies, rather than strategies that support the adaptation of new knowledge and the development of schema.

Some studies on explanations used by teachers do exist, but these mostly target school learners or tutoring. In a study about tutors' actions in producing deep learning and understanding in a one-to-one tutoring context, Chi (1996) believes that in the tutorial sessions she studied, the failure to use explanations effectively to promote deep learning and address misconceptions in subject knowledge stemmed from limitations in the tutors' instructional skills to identify tutees' misconceptions and thus did not directly address the misunderstanding. Chi concluded that:

> …no learning ever resulted from long-winded didactic explanations…possibly because these explanations did not address the tutee's misunderstanding directly; nor did teaming arise from correctly diagnosing misconceived knowledge. (Chi, 1996, p.11)

Similarly, Wittwer, Nückles, Landmann and Renkl (2010) used empirical methods to study the effectiveness of tutors' explanations. In the experiment, 15 tutees received instructional explanations in one-to-one tutoring sessions by 15 tutors who had learned about their tutees' prior knowledge on the targeted psychological topic, while another 15 tutees met with their tutors who were not provided with any information about each individual tutee. From analysing the pre-test of post-test results of 30 tutees before and after the tutorials, they found that personalized explanations or what they called "learner-adapted explanations" (Wittwer et al., 2010, p.85) could better facilitate learners' deep learning and application of knowledge, and strongly believe that explanations "should be regarded as a useful vehicle for engaging in meaningful learning" (Wittwer et al., 2010, p.86). They criticized that though building upon students' prior knowledge was widely acknowledged, teachers may still misjudge students' understanding in classroom context. However, I would argue that no one teacher can fully understand all prior knowledge that their students learned and experienced in life, and there are other reasons, such as ignoring impasses that the students experienced over the learning process, affecting the effectiveness of instructional explanations in classroom teaching.

Sánchez, García-Rodicio and Acuña (2009) observed from other research, including Chi, de Leeuw, Chiu and La Vancher (1994), Chi (1996), and Wittwer and Renkl (2008) that instructional explanations work more effectively when students are aware of their difficulties and their needs to overcome any impasses in the learning process. They studied the effectiveness of instructional explanations in the context of these impasses, addressing whether instructional explanations would be more effective in enhancing learning when students came across difficulties and problems. Their results show that students who overcame learning obstacles through instructional explanations received higher marks in a test than those who did not experience any obstacles before the test. They concluded that tailored instructional explanations worked more effectively after conflicts had been triggered and detected than the same explanations given to students who had not been through such an impasse-trigger process. Sánchez, García-Rodicio and Acuña's (2009) study shows that impasses and difficulties indicate students' needs, and by addressing these needs explanations can work more effectively. Nevertheless, in the everyday classroom teaching context, explanations should not only provide a mean of resolving student impasses, they should be tailored towards teaching all kinds of new knowledge.

Baker (1990) carried out a classroom-based study of instructional explanations regarding unplanned vocabulary in intermediate and upper-intermediate English classes in a centre for language learning in Australia. From a questionnaire given to collect students' views and preferences on instructional explanations, he found that from the student survey with 36 participants, two-thirds of students welcomed explanations of the new vocabulary that were given by the teacher. A retrospective analysis by Baker determined that when students requested explanations, teachers sometimes asked their peers to provide the meanings of the words. The teachers then checked for understanding and repeated the meanings once again. Most of the time, teachers used definitions or examples of the daily usage of the words in question.

However, although teachers believed that explaining unfamiliar words to students could be effective, comprehension checking and repeating the defined meanings were normal practice in classroom teaching, and they often felt that their explanations were not adequate enough. Baker concluded that teachers equipped with sound syntactic and lexical knowledge might still lack competence in giving instructional explanations. Despite this, “very little attention is given to [instructional explanation] strategies in teacher training courses” (Baker, 1990, p. 107). Until now, studies on the use of instructional explanation in classroom teaching are still quite minimal in research on teacher training, and the only recent one available in this area is the discussion by Inoue (2009).

Inoue (2009) discusses a study which examines the implementation of rehearsal explanation practice in pre-service primary school level mathematics teacher training. The practice was designed to enhance the instructional explanation skills of future teachers. The trainees’ performance was recorded and evaluated as they presented mathematics problems in front of other pre-service teacher trainees and course instructors, with the exercise exposing the weaknesses and problems in their explanations, allowing them to be given specific guidance to improve their performance.

The study found that pre-school teachers generally explained mathematical concepts based on their own understanding, without considering the needs and knowledge of their students. They failed to take into consideration the possible confusion and misconceptions of the learners. Naturally, it could be argued that even if these pre-service teachers were given the chance to practice giving instructional explanations in these training programmes, they could still perform poorly in real teaching situations which involve unpredictable student responses, reactions, feedback and questions. Furthermore, the course instructors’ views do not represent all students, and what they consider to be ‘good’ may not actually be ‘good’ for every student in the classroom. However, Inoue’s report does provide evidence that instructional explanations require special skills which in turn require practice and experience. Even teachers that are equipped with excellent knowledge of a subject may not be able to explain new concepts effectively because "mastery of subject matter does not actually guarantee clear exposition" (Wragg & Brown, 1993, p.32). What teachers need, according to Shulman (1986) is PCK, which involves understanding of the skills to present subject content for instructional purposes (Turner-Bisset, 1999) and the students' existing knowledge in relation to their age and backgrounds (Shulman, 1986) as mentioned in Section 2.2.4.

Wittwer and Renkl (2008) provide a very detailed summary of studies of explanations given for instructional purposes, addressing various aspects of instructional explanations. They acknowledge that the scaffolding approach in constructivism facilitates the integration of new and old knowledge; but they also state that some studies suggest that instructional explanations should not to be used frequently in order to avoid passive learning, which may affect students' engagement with other scaffolding activities. In view of the use of instructional explanations in classroom learning context, instructional explanations may lessen learners' cognitive engagement in learning as the more explanations are provided by the teachers, less effort the students may need to construct self-explanation and solutions to problems. Moreover, students may rely too much on instructional explanations believing that they could learn enough through the explanations, and thus discount further cognitive construction of knowledge. In addition, in a multimedia learning environment, while students need to pay attention to several different sources, they may learn little from explanations. Furthermore, using instructional explanations to match students' need is difficult for teachers. If the explanations do not connect well students' existing knowledge, comprehension breakdowns may happen. On the contrary, if an explanation is too easy for the learners, it may become redundant information which does not support learning.

The negative findings about instructional explanations summarized above come from two major reasons. First, the explanations given by the tutors or teachers do not meet students' needs. Second, students do not know when they need explanations and how they can use instructional explanations to deepen their learning. In addition, I agree that difficulties do exist in terms of the implementation of instructional explanations, as students' motivations, learning attitudes or overall interest in a subject area may affect the effectiveness of instructional explanations, since explanations support the cognitive process and student engagement is essential to knowledge construction. These problems, I believe, stem from inadequate pedagogic skills resulting in insufficient consideration of students' prior knowledge, comprehension abilities and needs in the process of generating and using instructional explanations, instead of saying that instructional explanations are ineffective or even hinder students learning. Indeed, the review in Wittwer and Renkl (2008) indicates that considering students' prior knowledge, generating learner-tailored explanations, using examples and information from other sources, and getting students involved would make instructional explanations more effective in the knowledge-construction and cognitive development process since instructional explanations can enhance students' critical thinking and problem solving, fill the 'gaps' to aid conceptual understanding, and most importantly, support the acquisition of knowledge. However, how explanations connect with students' prior knowledge, how they were tailored to students' needs, how and what examples and other sources could be used, how they fill those 'gaps' and how they support knowledge acquisition are still the missing pieces in pedagogical research.

2.7 Conclusion

Learning is a cognitive and a social process involving the integration of learning content and elements affecting the learners' incentive in learning. In classroom learning context, teachers take up the primary role to facilitate this integration through teaching activities. These activities are means in which elements of different learning dimensions interact for the purpose of achieving various learning goals. Understanding is a fundamental learning goal and teaching for understanding is a primary objective in the classroom. This study proposes that explanations are essential instructional support that facilitate understanding of new knowledge in declarative, procedural and conceptual forms. The literature review shows that to facilitate learning and understanding, content knowledge, PCK, knowledge of students and knowledge about teachers themselves are decisive for teachers when designing and implementing their teaching activities.

Students' motivation is one of the major incentive elements, and their motive in learning is determined by extrinsic or intrinsic motivational forces influenced by their own needs and interest, and the external factors such as pressure from parents or instrumental purposes. Therefore, not only teachers need to equip with the knowledge about the subject content and the skills of teaching, but they also require to consider students' motivation since good teaching does not guarantee effective learning if students are not interested and refuse to learn.

In the constructivist paradigm, knowledge is constructed and stored in our memories as a cognitive structure called a schema. The development of students' schemata involves assimilation and accommodation, both being processes of adaptation involving new knowledge and prior knowledge. The concept of schema provides an explanation of the synthesis of old and new information and the essential role of prior knowledge in learning. Schema theory helps us consider how new knowledge can be presented to support the assimilation and accommodation of new information that extends our schemata.

Parallel to the principle of schema theory, the ideas of the ZPD and the scaffolding pedagogical approach lead to the practical suggestion that teachers should provide support to students and lead them through the knowledge construction process via manageable steps – proceeding from their existing knowledge to new knowledge. Schema theory provides insight into how we perceive new knowledge, while scaffolding and the ZPD concepts suggest how teaching can facilitate learning. This in turn provides direction to teachers in their design of teaching materials and strategies.

This study defines instructional explanations as casual, descriptive, as well as goal and listener oriented. They are a kind of scaffold which require using adequate and familiar materials to explain the unfamiliar knowledge. Instructional explanations facilitate assimilation and accommodation, resulting in the construction of knowledge and new schemata by stimulating their minds to connect, discriminate and criticize the new information. However, although instructional explanations play a dominant role in understanding and cognitive development, and providing explanations is an indispensable scaffolding strategy in teaching, research on instructional explanation strategies, particularly in the HE setting, is markedly limited.

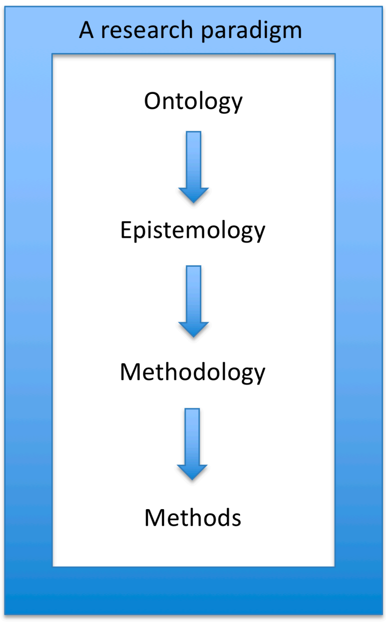
This literature review provides definitions of the keys concepts, learning, motivation, understanding, content knowledge, teacher knowledge and explanation in the present study. The discussions on schema, ZPD and scaffolding then provide theoretical framework of which the study shaped – explanation is a scaffolding strategy that support students learning through the ZPD and result in development of schema. The next chapter will discuss theoretical considerations in the research design and offer detailed descriptions of the methods of data collection and data analysis.

CHAPTER 3 RESEARCH METHODOLOGY

3.1 Introduction

Research is a scientific inquiry in which a search for new knowledge is undertaken through a series of carefully-designed, well-developed procedures. Research is a journey of discovery undertaken with a particular purpose and intention, involving a systematic inquiry and aiming to increase the general understanding of physical and social phenomena. The end product of research is often the advancement of academia's 'knowledge bank'. Underpinning most research projects are the philosophic orientations that shape research paradigms as shown in Figure 3.1 in which the four elements – ontology, epistemology, methodology and methods – form the research design for the process of inquiry.

Figure 3.1 Structure of a typical research paradigm



In the coming sections, I will explore, first of all, ontology and epistemology that shape the research paradigm. Then the methodological framework and research design will be addressed followed by some discussions on trustworthiness and ethical considerations regarding the whole practical application of the study.

3.2 Constructing the research paradigm

Ontology and epistemology are the philosophical foundation of every research project, informing different positions of how reality and knowledge are perceived. The ontological stance chosen for a research project informs epistemological assumptions, which in turn govern the research methodology and methods, i.e. the practical mechanism.

3.2.1 *Ontology*

Ontology is a branch of philosophy that studies the nature of reality. Ontological research aims to answer questions about what exists, what is real and how those things relate to each other. The answers to these questions are the beliefs we hold about reality. In dealing with research into social practices, ontology is concerned with the nature of social phenomena, that is how things really are and how things really work (Denzin & Lincoln, 1998). Realism and relativism, the two major ontological positions in social science research, are concerned with whether humans are observers independent from the reality (Hofmann, 2013), or they are social actors involved in the construction of reality (Mosteller, 2008).

Realism suggests that the existence of reality is independent from how we perceive it, and realities are universal and isolated from subjective judgments (Chandra & Sharma, 2004). When seeing the world through a realist ontology, reality is factual and governed by nature that exists outside the human mind (Scotland, 2012). The role of researchers is to objectively discover the truth of reality through scientific inquiry. In education research, realists "[insist] upon the practical nature of education" (Chandra & Sharma, 2004, p.69), look for generalizable patterns in learning through empirical research and explain the patterns in scientific theories.

The doctrine of realism states that human participation is not the major agent generating our reality. However, this study aims to discover patterns in education and learning through classroom activities in which the social actors, teachers and students are the central players. Therefore, I have chosen to adopt a contrasting ontological stance, one that acknowledges human contributions and subjective qualities in social reality as being significant.

Relativism suggests that reality “is a joint product of sensory input…and of our human conceptual contribution” (Sankey, 2000, p.69), and knowledge stems from people’s perception of the world (Raskin, 2008). Relativism does not believe reality exists objectively. Instead, relativists feel that there is no absolute truth as meanings constructed dependent upon culture, values and beliefs of people. Thus, Mosteller (2008) defines relativism as

> the nature and existence of items of knowledge, qualities, values or logical entities non-trivially obtain their natures and/or existence from certain aspects of human activity, including, but not limited to, beliefs, cultures, language, etc. (p.3)

This ontological view indicates that the subjectivity of the human mind and the contexts in which we are situated can affect the way we see the world and, in effect, allow us to create our own reality. Research based on a relativist view places value on human participants and great weight on understanding their reported perspectives in relation to their environment and situation. As this research project is centred in the classroom context and investigates teachers’ perceptions and activities derived from interactions and experiences with students and other cultural and social factors, I adopted the philosophical stance of relativism as the ontological position to frame my research paradigm.

3.2.2 ***Epistemology***

Epistemology concerns the nature and forms of knowledge and how it can be acquired and communicated to others (Cohen, Manion, & Morrison, 2000). Ontology and epistemology are closely connected, as the way people perceive the nature of reality directly affects how knowledge is formed and acquired. This was expressed by Crotty

(1998), who said “to talk of the construction of meaning is to talk of the construction of meaningful reality” (p.10). However, it is important to differentiate between the two: truth, belief and justification are the primary concerns in epistemological assumptions; which holds that knowledge should generally be a justified, true belief, and the synthesis of the objective human perceptions and the subjective phenomenon of objects in the world (Keefe, 2011). Therefore, a piece of knowledge to a person must be an idea that not only is believed by that person but must also be justified as a fact.

Similar to the differing ontological stances where reality can be interpreted either as objective entities in the universe or subjective interdependent correlations of humanity with the environment, epistemology takes “the nature of the relationship between the knower or would-be knower and what can be known” (Guba & Lincoln, 1994, p.108) into account. An epistemological stance determines the level of objectivity and the relationship between the researcher and what is being studied. When reality is seen as being ontologically independent of human perception, knowledge comes from the discovery of its objective nature. On the other hand, when reality is accepted to be a perception of social players, as is emphasized in relativism, knowledge focuses on our understanding of the interplay between human activities in different contexts. The two epistemological positions, which echo ontological realism and relativism, can be respectively represented by objectivism and constructivism.

Objectivist epistemology sees the meanings of objects in the universe as being external, objective and independent from human beings (Saudelli, 2015), and regards knowledge as being the discovery of constructs of reality that existed prior to human understanding. Essentially, objectivist epistemology proposes “that meaning exists independent of the consciousness of any individual” (Egbert & Sanden, 2014, p.20). Knowledge of this kind exists as an external reality instead of being generated by social actors. It is fixed and measurable by scientific methods, and can hence be seen as leading eventually to ‘laws’ and ‘truths’ in a fixed and non-dynamic universe. However, this study is centred on the actors in the education context and the meanings constructed by these actors, investigating their personal perspectives as well as their subjective views and approaches to teaching. This focus does not align with objectivism; instead, it subscribes to constructivism, a subjective epistemological position.

Epistemic constructivism views knowledge as being constructed through human thoughts, interactions and activities (Sheridan, 2008; Collin, 2013). Reality is seen as a social phenomenon with different natures in different contexts (Shkedi, 2005), and thus knowledge is derived from human interpretations of the world, which is influenced by both researchers and social actors. Knowledge is fluid, in that there is no single ‘truth’ for social processes. Knowledge is also different for everyone, in that different individuals may make different judgements and comprehend social processes in different ways. In contrast to the objectivist position, which holds that knowledge is an explanation of some external world in which universal truths are the end product; constructivism complements relativism, stating that humankind shapes reality and that knowledge is based on our social context and the roles we play in these contexts. Harmonizing with the ontological concept of relativism, this study adopts a constructivist epistemological stance.

3.2.3 *Research paradigms*

A research paradigm is "a loose collection of logically related assumptions, concepts, or propositions that orient thinking and research" (Bogdan & Biklen 1998, p.22). It is a shared research model which, as defined by Kuhn (1996), includes “law, theory, application and instrumentation” (p.10), and “affects the structure of the group that practices the field” (p.18). A research paradigm indicates specific ontological and epistemological positions bounded by a theoretical orientation of the research (laws and theories); the methodological principles that guide the researchers through their studies (applications); and the tools or methods (instruments) that the researchers use to collect and analyse data. There are a number of research paradigms, with positivism and interpretivism being two models frequently associated with education research (Burton, Brundrett & Jones, 2014). Positivism and interpretivism are also related to the philosophical foundations of the objective and subjective theoretical stances discussed previously.

Positivism characterises knowledge as objective reality and observable fact and insists on "explanation, prediction, and proof" (Maykut & Morehouse, 1994, p.3). Under the positivist paradigm, research is an attempt to explain the world through deductive scientific methods in order to test hypotheses developed from existing theories and empirical procedures, such as experimentation and statistical analysis. However, Davis (1989) argues that teaching cannot be standardized by positivist research, as it is oversimplified and insensitive to the different learning contexts of students with different backgrounds and needs. These contexts involve subjective human factors – teachers, students, institutional managers, and other stakeholders; indicating that education is a social activity shaped by and involving social actors. This study only focuses on the human context, as it considers the subjective choice of teaching strategies that college teachers made to accommodate a group of students with specific backgrounds and needs. As such, in line with the concepts of relativism and constructivism, I chose to employ interpretivism as the research paradigm for this study.

Interpretivism focuses on the dynamic interaction and interdependency between human activities and the outside world, and acknowledges norms and values "as shifting organic elements of social life" (Burton & Bartlett, 2005, p.22). Echoing realism as discussed in Section 3.2.1 above, interpretivists believe that objects in the world are socially related and often constructed. Epistemologically speaking, interpretivism is closely linked to constructivism, in that knowledge is constructed from our understanding and our interpretation, taking the form of the relationships between the social participants, the context, and the world.

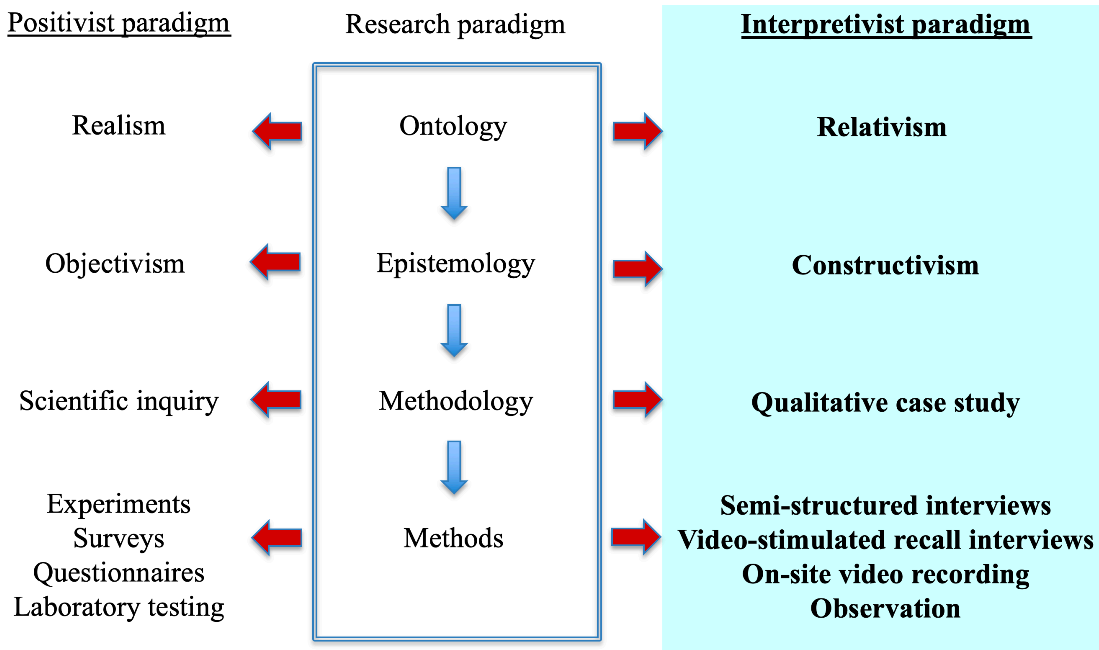
> As far as human affairs are concerned, any understanding of causation comes through an interpretative understanding of social action and involves an explanation of relevant antecedent phenomena a meaning-complexes. (Crotty, 1998, p.69)

The purpose of interpretivist research is to demonstrate the choices made by social actors and provide descriptions of how social events and choices are related and understood. The role of researchers who use this paradigm is therefore to understand social reality and explain it from their viewpoint. Research conducted under the interpretivist paradigm predominantly tends to use a qualitative methodology (Creswell, 2009; Nienaber, 2010), particularly when addressing research questions about "Why people behave the way they do", "How opinions and attitudes formed", "How people are affected by the events around them", and "How and why cultures have developed in the ways they have" (Hancock, Windridge & Ockleford, 2007, p.7).

The data collection methods in these studies usually involve human activities and individual accounts like interviews and observations in naturalistic social settings. Studies in education which use this paradigm are associated with personal experience and subjective interpretations of things that happen around people, and involve teachers' beliefs, students' perceptions, and teaching and learning behaviours, for instance. For example, Brighton (2003) used the interpretivist research paradigm to study teachers' beliefs about teaching and learning in middle school classrooms, attempting to see how those beliefs influenced their teaching behaviours. She interviewed teachers, students and school administrators, and observed lessons to interpret meanings and implications from what the participants said and did. Though Brighton's study was conducted in a secondary school environment, the philosophical foundation of her study is in parallel to this one: teachers' perceptions are involved in analytical accounts of their teaching behaviours.

Figure 3.2 summarizes these two research paradigms discussed above. The column on the right, i.e. the interpretivist paradigm, is the paradigm adopted for this study. I explore the world of the classroom and collect data of the natural human communication "to understand the subjective world of human experience" (Cohen, Manion & Morrison, 2011, p.17) through a qualitative case study in which data were collected interviewing participants, video recordings and observations of the teaching practices.

Figure 3.2 Positivist and interpretivist research paradigms



3.3 Methodology – Case study

A methodology consists of the strategies adopted and tools used to structure a scientific inquiry (Gerring, 2012), and includes a "strategy, plan of action, process or design" (Crotty, 1998, p.3). The methodology chosen for a research project is driven by its ontological and epistemological beliefs. At its heart, this study aims to understand research subjects and their behaviours in a particular context through the interpretation of data collected in the classroom setting and through interviewing the participants. Given that this research project seeks to understand human experience from a subjective perspective in a small group, I chose the interpretivist approach, collecting data relating to natural human communication through face-to-face semi-structured interviews, video-stimulated recall interviews, on-site video recording and direct observations. This study thus requires a qualitative methodology that "sees knowledge as personal, subjective, and unique" (Cohen, Manion, & Morrison, 2000, p.6); one which enables me to make contact with the participants, engage in discussions with them, and closely observe and understand their activities.

A qualitative case study approach was employed in this study, as case studies enable real-life situations to be explored and understood by studying what people say and do, how and why they do and say what they do, and the meanings of their verbal and non-verbal activities without controlling the behavioural events of the research context and the participants (Cousin, 2009; Cohen, Manion & Morrison, 2000; Gillham, 2000; Yin, 2009). Through the use of methods like interviews, observations and documentary source analysis, case studies allow us to explore, describe and explain the actions and motivations of people with specific roles in a specific field, as well as the psychological, philosophical and practical relationships between themselves and the research areas. The general purpose behind a case study can be explanatory, exploratory or descriptive (Yin, 2009).

> Explanatory case studies present data bearing on cause-and-effect relationships; exploratory case studies attempt to define the questions and hypotheses of a subsequent study, and descriptive case studies present complete descriptions of phenomena within their context. (Hale & Napier, 2013, pp.112-113)

A case study can focus on a particular phenomenon or multiple phenomena of an individual person, a group of people performing a specific job, a social role, a social group, an organization or a specific event in which people are actively involved. This phenomenon or these phenomena can be occurring at the time of the study and in a real life situation. For example, Missingham and Matthews (2014) reported on a case study which used a democratic, student-centred, team-learning approach to facilitate the learning of a group of first-year engineering students. They observed the students experiencing learning throughout the four stages of an essay writing assignment on a communication course. These students received scaffolding supports from student tutors, who were higher-level engineering students at the same university, and through peer discussions. From reflections given by the engineering students, the tutors and the lecturer, it was found that the approach was well-received and positively enhanced students' teamwork, critical thinking and communication skills; and created an active, interactive, student-directed learning environment. However, their study targeted only the implementation of the democratic approach in a specific course with a group of engineering students as they were taking the course. This illustrates that case studies tend to be highly selective and bound by a particular context, with the participant and the study focus framed by the research purposes and objectives.

In this study, a case study approach was used to determine the role of instructional explanations when using scaffolding techniques in terms of supporting new knowledge acquisition; how explanations as a teaching strategy help students learn new knowledge; and how teachers in a community college respond to the local learning culture.

There are many different potential approaches involved in the use of case studies. These are exemplified by the two categories suggested by Stake (2005) and Yin (2009), which are displayed and examined in Table 3.1.

Table 3.1 Relationship between case studies categorized by Stake (2005) and Yin (2009)

Stake (2005)			Yin (2009)		
Type of case	Purpose	Outcome	Type of case	Purpose	Outcome
Intrinsic cases	To understand an individual or a situation from the researcher's individual point of view	Revelation of the "inside story" of the case	Extreme or unique cases	To study a unique case	Discovery of a rare pattern through an uncommon case
Instrumental cases	To gain insight into a specific phenomenon or re-examine a specific theory	Understanding or exploration of another interest	Representative or typical cases	To investigate a typical case, taking it as a representation of other cases in the same situation	Become informed about the experiences of the people in that particular situation
			Revelatory cases	To study phenomena which have rarely been accessed or not previously accessed as part of a social science inquiry	The provision of evidence which will lead to further investigations or a vivid description of the situation
			Longitudinal cases	To study a same phenomenon in different time periods	Discovery if changes occur over time, and the extent and nature of these changes
			Critical cases	To test a well-formulated theory	Confirmation, challenge or extension of a theory
Collective cases	To study a collection of cases or multiple cases relating to a phenomenon or a situation	Extension of the understanding of a wider scope or larger set of cases	Multiple cases	To examine a theory or proposition which involves more than one case	Disclosure of a wider scope to a research project

Both Stake (2005) and Yin (2009) recognize that a case study design can address a single case or multiple cases, though Yin provides a more detailed breakdown of different types of single cases. Stake (2005) classifies single cases into *intrinsic cases* and *instrumental cases*, based on whether studying a case stems from the researcher's personal interest, or whether a case is a typical one to be studied in order to "advance the understanding of that other interest" (p.445). Yin (2009), on the other hand, does not take intrinsic interest into account. In spite of this, an *extreme or unique case* classified by Yin may also be an *intrinsic case*, owing to its unique character.

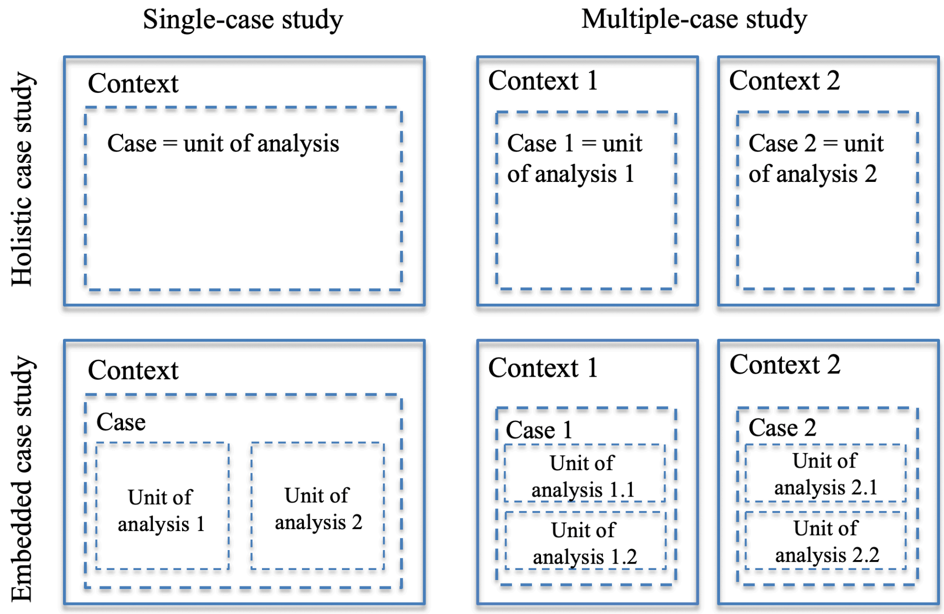
For Stake (2005), any cases that aim to provide "insight into an issue or to redraw a generalization" (p.445) over the researchers' personal interest could be seen as instrumental cases. For Yin (2009) however, the classifications are based on the characteristics of the cases as well as the research objectives. Apart from *extreme or unique cases*, other single case types include *representative or typical cases*, *revelatory cases*, *longitudinal cases* and *critical cases*. These case types, though different in their natures and purposes, are all instrumental cases as they all facilitate the understanding of particular issues, situations or theories. Stake's collective cases and Yin's multiple cases are analogous as they both refer to studies which employ more than one case. To illustrate these different types of case studies, some concrete examples of different educational case studies based on Yin's categorization were collected and presented in Table 3.2.

In two of the examples given in Table 3.2, both Yao and Grady (2005) and Martell (2014) examined several participants and described their study as being a multiple case study. But according to Yin (2009), both single case studies and multiple case studies can be further categorized as holistic cases or embedded cases. The former refers to the study of a single unit as a whole, while the latter involves two or more units in the investigation. The models shown below in Figure 3.3 provide a concrete illustration of models of holistic and embedded cases.

Table 3.2 Examples of different case studies

Case study type	Case study examples
Extreme or unique case study	McLean (2004) studied the perceptions of medical students who experienced two different programmes. No other study existed on a single group of students who experienced two different curricula, making this a unique case.
Representative or typical case study	Hu and Lei (2014) reported on teacher and student beliefs and feedback on using English as a medium of instruction (EMI) in university. Since using EMI is common at many universities in China, a case study at one university is typical of the wider situation.
Revelatory case study	Stockall and Gartin (2002) studied the authentic inclusive practice at a school. This revelatory case study further investigated the meaning of inclusion by aiming to understand the impacts of teachers' actions and teaching strategies on disabled students.
Longitudinal case study	**Martell (2014)** studied the possible changes in the beliefs and teaching practices of four history teachers before and after their pre-service training. The three phrases of data collection made this study longitudinal. Additionally, since the study investigated four teachers, it was also a multiple case study according to Martell.
Critical case study	Schied, Carter, Preston and Howell (1998) This study criticised and challenged a well-known management system, Total Quality Management process, and the possible impact of adult education in workplace context.
Multiple case study	**Yao and Grady (2005)** interviewed ten faculty members at a university to collect their individual views on student evaluation practices and to find common patterns. The multiple participants invited to the study provided ten different points of view, making this a multiple case study.

Figure 3.3 Illustration of holistic and embedded case studies in single case and multiple case models



(Runeson, Höst, Rainer & Regnell, 2012, p.27)

The Yao and Grady (2005) and Martell (2014) studies are holistic multiple case studies since they present each participant as a single case. In contrast, although this study involves eight participants, the study sees the entire community college learning environment as one context, and the eight participants represent eight units of analysis in the single case. Therefore, this study can be defined as a single embedded case study.

This research project is considered to be instrumental despite the fact that I embarked on it due to my intrinsic interest in the study of HE teaching strategies. I believe this because its specific research purpose pertains to gaining insights which will improve both teaching and learning, as well as the fact that the study itself was designed around established theories like schema theory and scaffolding theory. The outcome will be mainly descriptive, as it aims to produce a detailed description of how the teachers at the research site teach new knowledge. At the same time, this study is also embedded within exploratory and explanatory characteristics, as it reveals what teacher perspectives about teaching and why, as well as what they do and the reasons behind their use of particular teaching strategies. This present study can therefore be described as an instrumental typical embedded single case study with an exploratory, descriptive and explanatory presentation of results.

The greatest advantage of case studies is their in-depth nature, investigating authentic situations in a real life setting. Personal backgrounds and historical issues can also be carefully considered and thoroughly analysed, including those in unique and atypical cases (Duff, 2008). In addition, George and Bennett (2005) identify four other distinct advantages of case studies: high conceptual validity, eliciting new hypotheses, identifying causal mechanisms and examining complex causal relationships. They point out that the case study method has the advantage of having stronger validity in studies which involve conceptual analysis that is closely influenced by contextual factors. Also, in-person communication with the research subjects allows researchers to discover new variables which the researchers may not have expected or thought about when planning their study, allowing the potential evolution of new hypotheses. Case studies also have the power to explore causal mechanisms, i.e. the processes or routes of the causes and effects relating to the variables in a study. This power in turn may help construct new models of causal relationships.

Owing to the uniqueness and small sample size of case studies, the limitation of this research method is weak generalization, meaning that one case cannot accurately represent the general population and situation outside the study (Duff, 2008; Tayie, 2005). Then again, the value of case studies "is not to infer findings from a sample to a population, but to engender patterns and linkages of theoretical importance" (Bryman, 1989, p.144) in providing a detailed, in-depth understanding of the research case through a wide range of data collected via different methods.

Another disadvantage of case studies is the possibility of bias in the case selection stage, where researchers may select cases that match their expectations (Comer & Gould, 2013). For instance, a researcher might select a school that had successfully run a new curriculum in order to highlight the benefits of that curriculum, but what if a number of other schools had found the same curriculum hard to implement? However, I would argue that if this were the case, the value of the study should not lie in proving how good the curriculum was, but rather in what that school had done to execute the curriculum successfully. What should be most important is the insight provided by each case. The uniqueness of the cases in the case study method is what makes this method so strong.

Others criticize case studies as being time consuming (Myers, 2013; Tayie, 2005). It may be true that for multiple cases, extra time is required to collect data in each embedded case, and that the complexity involved in relating and connecting various sources of data does increase the difficulty of the analysis. However, time frames should be carefully considered during the research design stage – if extended time for a case study is built into the research project at the start, the required length of time is a part of the study and not a disadvantage. If there is not enough time to conduct a case study, this method may not be the most suitable methodology for that study.

All case studies fall into a "bounded system" (Merriam, 2009, p.40), which means the cases are "field-oriented" (Wolcott, 2001, p.17) and have clear geographic, institutional and/or phenomenal boundaries. The boundaries of this single case study are a group of teachers teaching at one of the community colleges in Hong Kong. This case was selected based on the context of my interest and the accessibility of the data to be collected. The research site was representative, given its history and its well-established Associate Degree programmes. The sections that follow will present a description of the research context, sampling, participants, and the tools used to collect data.

3.4 Data Collection

The data for this study were collected using four different methods: video recording of lessons conducted by the participants, direct class observation, semi-structured interview and video-stimulated recall interview (VSRI). The video recordings provided data for the analysis of the instructional explanation strategies that the participants used in their lessons. The videos were also used during VSRIs to help the participants recall the detail of teaching situations to aid discussion of their use of strategies. Classroom observation data contributed supplemental information and played a supporting role in the data analysis. While sitting in the classrooms, I could experience the lessons and witness the classroom dynamics as well as the interactions between the teachers and students. Interviewing the participants provided an important channel to learn about their beliefs and perceptions, and understand their views on the use of teaching strategies. Table 3.3 offers a specific breakdown of the major data capture techniques related to the research questions.

Table 3.3 Major research questions and their related data capture techniques

Research questions	Data capture techniques
1. How do the teaching strategies used during instructional explanations reflect the way the college teachers respond to their perceptions of teaching and students' learning in Hong Kong?	- Semi-structured interviews - Video recording - Class observation
2. How is new knowledge explained in content-based lessons in community college in Hong Kong?	- Video-stimulated recall interviews - Video recording
3. How do instructional explanation strategies scaffold and support knowledge understanding in college classrooms?	- Video recording

To answer RQ1, i.e. finding out whether explanation strategies reflected the participants' perspectives, teachers' opinions collected from the semi-structured interviews were compared and the ways they supported students' learning in the classroom through video recording and class observation were examined. The major data capture methods used to answer RQ2, concerning the strategies used for explaining new knowledge, was the VSRIs and video recordings. The explanation strategies were first derived from the VSRIs and further enriched from the video data. Evidence of the use of these strategies came from the video recordings, showing examples of what the participants did in class and validating what they said in the interviews. To answer RQ3, video recordings were the primary source for examining how instructional explanation strategies support learning and the role of instructional explanations in relation to other scaffolding strategies such as questioning. A detailed account of the data collection context, samplings, arrangements, procedures and methods are discussed in the following sections.

3.4.1 *Research Context*

Though this research project studies college teachers rather than students, a brief overview of the college will aid understanding not only of the research context, but also the background of students being educated by the participants.

The site of this research study is a local community college, one of several Associate Degree (AD) programme providers in Hong Kong enrolled with about three to four thousand students. AD programmes are two-year full-time programmes which are primarily designed to cater to students who were unable to enter an undergraduate degree programme directly after finishing their secondary school studies. AD programmes offer this group of students an alternative study path by which they can enter a university.

This college offers general and specific courses for students. Upon enrolment, each student selects a specific disciplinary area, such as psychology, communication studies, computer science and food safety, and all students are required to take general subjects including academic writing and public speaking. The curricula of the specific courses are designed to guide students towards undergraduate programmes while, the general subjects develop their academic study skills.

The class size of each group is about thirty to forty students, and the classes are mainly conducted in the form of lectures in which students sit in row in classrooms. For some courses, students occasionally are required to take their lessons in specific laboratories such as psychology laboratory, and food and nutritional science laboratory.

The students have little or no prior knowledge of the subjects in the AD curriculum; this means that information introduced in the lessons is new to them. Since the medium of instruction in the college is English, the college students need to make sense of new information through their second language, which poses much challenge to them as mentioned in Chapter 1. In addition, this group of AD students has generally been promoted from secondary school where they have been strongly influenced by the prevailing culture of passive learning, demanding assessments and rote learning for at least twelve years in primary and secondary school education.

The students who successfully complete an AD programme and fulfil the admission requirements are eligible to be admitted directly into the second year of undergraduate programmes offered by local universities or other top-up degree programmes organized by local or overseas tertiary institutions.

3.4.2 *Researcher positionality*

Researcher positionality refers to the awareness and reflection of researchers' identities and personal influences, including their subjective views and power relationships with the participants (England, 1994). Careful consideration on minimizing personal influences in the investigation process was taken.

My position in this study was both an insider and an outsider. I have an adequate working knowledge of the research environment, including the social and cultural aspects of the research context and the institutional issues of the research site. My work experience in teaching has given me comprehensive knowledge of the classroom context of education in Hong Kong. The fact that I was employed by the college in which I conducted the research afforded me the opportunity to interview the teachers, as well as to observe classroom activities.

Consideration about my position in relation to the students was also taken. Since I was still a member of teaching staff at the time of data collection, I sought administrative support to find out the number of students who were in my class and also appeared in the subject lessons that were scheduled for class observation and video recordings. Without disclosing the students' identities, I was told that 5 out of 112 students in my language classes were also taking the courses that I was going to observe. I did not know who those five students were and which subject classes they attended. Since the total number of students involved in those 16 lessons was 270, the percentage of the overlapped cases was only 1.85%, and since this study focuses on teachers instead of the students, the influence of my position as a researcher on the students also taking my lessons was considered minimal.

In spite of the fact that my position as a staff member at the research site gave me access to collect the data, the participants and I were in different subject teams teaching different subject areas. I intentionally avoided subject lessons related to my teaching area in order to minimise any personal bias about the methods that the teacher participants used. All the subject areas, including the syllabus structures, the subject content, the materials and so on were all unfamiliar to me, giving me an outsider role at the data collection and analysis levels.

Dwyer and Buckle (2009) point out that both insider and outsider roles have their strengths and weaknesses because an insider's experience "might result in an interview that is shaped and guided by the core aspects of the researcher's experience and not the participant's" (p.58), but being an outsider does not guarantee there will be no subjective researcher's influence. They suggest that researcher attitude is more important.

> "[T]he core ingredient is not insider or outsider status but an ability to be open, authentic, honest, deeply interested in the experience of one's research participants, and committed to accurately and adequately representing their experience." (Dwyer & Buckle 2009, p.59)

Other possible influences my position may have had on the study will be discussed in accordance with different stages of data collection as well as in the discussion of trustworthiness and ethical issues later in the chapter.

3.4.3 *Sampling*

Sampling refers to the process through which the research participants were selected. In this study, the primary consideration in terms of sampling was accessibility. It is difficult to just 'walk into' an educational institution as a research student to perform research, make contact with the teachers and the students, and collect classroom data. The convenience of gaining access given my staff status at the time and being able to approach the college teachers made the sampling method of this case study a non-probability sample.

The main difference between probability and non-probability sampling techniques is the fact that probability sampling is random in nature whereas non-probability sampling is selective. Probability sampling gives each individual unit in the population an equal probability of being selected within the research sample (Reis & Judd, 2000; Lohr, 2010) and is predominantly used in quantitative studies when larger samples are needed for statistical analysis to reflect the wider population and for generalization purposes.

Non-probability sampling methods do not use randomization and do not attempt to reflect the wider population. They are commonly used in case studies "when generalizations are not being made to a population" (Hall, 2008, p.188). In non-probability sampling, the samples are selected based on other considerations, such as the convenience of recruiting participants and the researcher's judgement regarding the purpose of the research. The convenience of sampling is one of the non-probability sampling methods that "involves using available cases for a study" (Ary, Jacobs, Sorensen & Walker, 2014, p.169). My accessibility allowed me to approach potential participants and inquire about their willingness to participate in the study, thus making the sampling method of this study a convenience sampling.

The teachers participated in this study on a voluntary basis. There were three stages in the sampling process:

Step 1: Approach the college teachers informally and explain my intention to recruit participants for a study. Eleven teachers showed their willingness to participate in the study.

Step 2: After further discussions with these eleven teachers, three decided not to take part in the study. One of them did not have a class at the same campus as the others, which made class observation unfeasible; while the other two felt uneasy about being observed and recorded.

Step 3: The eight remaining teachers were given a clear explanation of the research purpose and procedures face to face, and an invitation letter as well as a formal consent form (see Appendix 2 and 3) were given to each of them.

These eight college teachers worked in four different academic areas – communication studies, psychology, food science and computer studies. They were all local Hong Kong people who held one or two Masters degrees, with six of them having a PhD qualification. They also had between two and thirteen years of teaching experience working in the college. Table 3.4 provides the demographic information about the participants.

Table 3.4 Information on the teacher participants

Teacher	Gender	Qualification	Years of teaching experience	Years teaching at the college	Subject area
T1	Male	2 Master's degrees	8	8	Communication
T2	Female	2 Master's degrees 1 PhD	9	6	Communication
T3	Female	1 Master's degree 1 PhD	9	4	Communication
T4	Male	1 Master's degree 1 PhD	20	13	Psychology
T5	Female	1 Master's degree 1 PhD	3	2	Psychology
T6	Female	1 Master's degree	10	3	Biology / Food & Nutrition
T7	Female	1 MPhil 1 PhD	4	2	Biology / Food & Nutrition
T8	Male	1 Master's degree 1 PhD	7	4	Computer Studies

3.4.4 *Data collection arrangements*

The first stage in the data collection process was observing and video recording the scheduled lessons. This stage carried on for five weeks, starting in week seven of the second semester of the 2013 – 2014 college academic year. (see Appendix 5 for the data collection schedule). Once the approval of the data collection from the college management was received, the eight volunteers were approached with an invitation letter and a participant consent form on which the objectives of the study and the affirmation of confidentiality were stated clearly (see Appendix 2 and 3).

Each participant was asked to select two lessons in which they intended to teach new knowledge during which they would be observed and recorded. The suitability of a lesson was based on whether or not the lesson would provide information-rich data which would answer the research questions. Though all the classes lasted for three hours, in many cases the participants offered only the first two hours for data collection because they had arranged activities like presentations or graded assessments in the third hour of their lessons. Considering that the students' performance in these presentations and assessments might be affected by the presence of myself and a video camera, the participants only agreed to have the instructional elements of the lessons filmed and observed. Furthermore, as sixteen of these hours clashed with my own work schedule, the final plan was to have twenty-two hours across twelve lessons directly observed and recorded with me present. The remaining sixteen hours were recorded without me being present for most of the time. Therefore, there is a discrepancy between the time recorded and the time observed for eight of the lessons in Table 3.5. For example, in the Public Speaking lesson I could only be present in the class for one hour, but two hours of video were recorded.

Table 3.5 Hours of classroom data collection

Teacher	Lesson	Video recording (hours)	Observation (hours)
T1	Graphic Design	2	2
	Public Speaking	2	1
T2	Public Relations and Advertising	3	3
	Interpersonal Communication Skills	3	3
T3	Public Relations and Advertising	2	2
	Public Relations and Advertising	2	2
T4	Abnormal Psychology	2	2
	Abnormal Psychology	2	1
T5	Abnormal Psychology	3	0
	Research Methods in Psychology	2	2
T6	General Biology	2	2
	General Biology	3	0
T7	Food Service Management	3	1
	Food Service Management	3	1
T8	Computer Programming	2	0
	Computer Programming	2	0
	Total number of hours	38	22

Ensuring that the video recordings and class observations were completed before the interview was a deliberate arrangement. If the interviews were performed beforehand, the participants might get ideas about what the videos were trying to capture. If I were to then visit one of their lessons, they might consciously or unconsciously focus their efforts on making the explanatory elements of the lesson of a higher quality than normal. I thus chose to carry out the interviews after collecting the classroom data. Two interviews were planned to collect two sets of data: a semi-structured interview for understanding teachers' experience and beliefs, and a VSRI focusing on the teaching strategies. Considering that it would be more convenient to the participants to meet once instead of twice, given their busy summer schedules, the two interviews were completed together in one meeting in which a semi-structured interview was followed by a VSRI.

The students were also participants in the study, even though the focus of the research was the teachers, which meant that getting student consent was an important ethical procedure before making video recordings and sitting down to observe the class. Since all students were over eighteen years old and thus parental consent was not necessary to be considered. A sample of the student consent form appears in Appendix 4. Following the agreed time slots, I entered the classrooms with the presence of the teacher participants. I explained the purpose of the recording and the observation. Afterward, each student was given a consent form with a brief description of the research objectives and a confidentiality agreement. The students were then given a few minutes to read and decide whether they were willing to give their consent. They were told that if they did not agree, the recording and observation would not take place during their lessons. They were also encouraged to ask questions to clarify any uncertainties about the data collection procedures and the use of classroom data. Since the participants had talked to their students and gained their verbal agreement about the observation before confirming the class visit schedules, the students in each class expressed that they did not mind having a visitor or being having recordings made when giving their formal consents, knowing that the study targeted their teachers and did not focus on them. In the end, all the students signed the consent forms, which were then collected individually and a verbal note of thanks given. I then returned to the back of the class, began the video recording and started observing the lessons. For the lessons I was unable to stay for, I left the classes after collecting the consent forms and starting the video recorder at the back of the classrooms, and then returned to collect the camera at the end of the lesson. Two illustrations of two classroom settings which were used during the research, depicting the location of video camera set-up and where I sat to observe the class are collected in Appendix 6. The figures also indicate the video capture zone – i.e. the area in which students participating in the class would be visible. The complete data collection process is discussed chronologically below.

3.4.5 *Video recording*

Video recording was the main source of data used to answer RQ2 and RQ3. Video recording enhances the richness of qualitative research, capturing in detail classroom events perhaps more effectively than other instruments, while also acting with other research methods to gather data (Hatch, 2002). Since video recordings can capture action, movements and sounds in the research situations, they provided clear information about the way the participants taught in class. Apart from providing detailed and accurate information, videos could be played back so that the "behaviour under consideration can be seen or heard repeatedly, scrutinized and discussed, and interpretations and coding during analysis can be checked" (Foster, 1996, p.37). Not only can we go back and forth in video records, we can also view them with different purposes or foci (Pirie, 1996).

Though video recording is a powerful source of data, it also has some limitations. One of these stems from technical concerns, including the quality of the equipment (Hatch, 2002) and the position of the video camera (Seidel, Dalehefte & Meyer, 2005). The digital video camera used in the study was considered to be high quality, as it was user friendly and reliable, capturing all classes without any technical breakdown. The sound quality was satisfactory as well. However, the camera's position was a limitation. Video cameras have a limited angle of view and capture things happening within a limited zone, and unless several cameras are used when filming, the use of one video camera facing in one direction will miss people's actions, gestures or facial expressions that remain 'unseen' by the camera's 'eye'.

It was observed that most students preferred not to sit close to the teachers, instead sitting on either side of the classroom and at the back of the classroom. The number of students and their reactions to the teaching activities were also limited by the camera. Although students' performance was not the research focus, teaching is an interactive activity and what teachers do in class is directly related to the reactions of the students. Most importantly, teaching is not a 'one person show'; the application of strategies may require student involvement – indeed this is vital to the scaffolding process. In order to overcome this limitation and gain a more extensive understanding of how the teaching strategies employed related to the learning attitudes of the students provided by the teacher participants in the interviews, classroom observations were arranged as the third data collection method.

3.4.6 *Class observation*

Once again, classroom observation not only provided opportunities to investigate the teaching process in a natural context, but also allowed me to witness the entire classroom environment, the connection between the teachers and the students, and the involvement of students in the learning process. Realizing the limitations of recording, the twenty-two hours of class observation recordings to be discussed below acted as a complementary source of data to support the analysis of the video recordings and helped me collect evidence to validate what the college teachers said about their students learning attitudes and performance in class.

Observers may take up different roles – as participant-observers or nonparticipant-observers. Participant-observers participate in activities with other participants in the research context, while nonparticipant-observers "observe in a completely unobtrusive manner, without any interaction with the research participants" (Roller & Lavrakas, 2015, p.173). To minimize the effects that observation may bring into the context and to retain as natural a classroom dynamic as possible, I chose to observe the classes as a nonparticipant-observer.

A non-participant-observer can also be overt or covert in nature (Bailey, 2007; Roller & Lavrakas, 2015). An overt observer announces their researcher role to the participants whereas a covert one masks this role. Therefore, an overt nonparticipant-observer openly collects observation data unobtrusively, while a covert nonparticipant-observer collects data without letting the participants know they are being observed, even though the observer may be in close proximity to them, watching and listening. A college classroom is a confined setting in which a group of people studying one subject meet up in a fixed location once or twice a week with the same subject teacher. Given these circumstances, students are able to easily identify any new face in their class. In reality, as a mature adult, there was no way I could disguise myself as a teenage student either as a participant-observer or nonparticipant-observer. In addition, as the main research subjects, the college teachers had to understand the data collection procedures as their permission was needed for me to sit in their lessons. Therefore, the type of observation is overt observation and my role was that of an overt nonparticipant-observer. Without intruding on the teaching and learning activities in the class, the observation was done openly in the research context and all participants were aware that they were being observed.

During the classroom observation, I sat at the back of the classroom observing how the college teachers explained new concepts to the students and how the teachers responded to the students' behaviour. My field notes (see Appendix 7 for an example) were typed and recorded electronically using a tablet computer and a portable keyboard. In order to record the fast-moving lessons, my field notes were written in bullet points. I noted down teaching activities and some observable student feedback without selectively recording what I thought were explanations, as Maykut and Morehouse (1994) stress that "the qualitative researcher's field notes contain what has been seen and heard by the researcher, without interpretation" (p.73). For the same reason, I also avoided using words with interpretative meanings in my notes, like 'enjoy', 'bored' or 'happy'.

These field notes were used in two ways. As one important function of scaffolding is to get students involved in the learning process, the notes in which both the teaching practice and students' responses were recorded helped to examine if and how the teachers involved students when explaining new concepts, and how they supported their understanding. For example, in Appendix 7, Teacher 1 kept using questions while using examples to explain the concepts related to *semiotics*. The record of the class activities including teachers' actions and students' responses was used to validate the trustworthiness of the information provided by the college teachers in the interviews about their experience teaching this group of students and their learning attitude. This was important in terms of triangulation and reliability, something which will be discussed later in this chapter.

There are several potential challenges inherent in using overt non-participant-observation. Though the observation provides first-hand information about the behaviour of the classroom participants, overt nonparticipant observation may cause observer effects and may possibly affect the ways teachers and students behave (Springer, 2009). However, as discussed above, in this particular study, permission had to be gained from the teacher participants and consent from the students owing to the ethical norms, and overt observation was the only possible observation strategy. To lessen any observer effects in the classroom context, using the nonparticipant method to avoid intrusiveness was one approach that I took; another was lowering participants' worries by clearly stating on the teacher participant invitation letters and consent forms to both teachers and students about the study's ethical stance and the fact that that data would be handled confidentially.

Classrooms are unique places. They provide a dynamic and ever-changing social context, one in which all teachers and students play a variety of roles, perform and react differently. But at the same time, this dynamism makes classroom observation imperfect in terms of the completeness – the observers may not be able to note down every single event happening in every corner of the classroom during a lesson. What is more, as an outsider in the subject area, I might not have any prior knowledge to make sense of any technical or theoretical information being provided. This might also have affected my effectiveness in note-taking, or meant that I missed a significant student reaction which might have been giving signals to the teachers to modify their explanations while I was trying to figure out the meaning of the subject content. There were also times when the teachers used pictures or diagrams to illustrate ideas, and it was impossible to draw or capture this graphical information in writing given the fast pace of the lesson. However, some of these problems could be mitigated or resolved using the video recording. Thus, the video recording and classroom observation methods complemented each other and were both essential to this qualitative study.

3.4.7 *Semi-structured interview and video-stimulated recall interview*

A significant element of using an interpretive paradigm is the need to allow participants to speak for themselves and share their experiences. Conducting interviews with teacher participants was the last, yet crucial, data collection procedure in the study. Since the research design was developed to understand their perspectives in teaching the college students in Hong Kong (RQ1), and capture instructional explanation strategies by interpreting the ways college teachers teach new knowledge through their descriptions (RQ2); I adopted a semi-structured in-depth interviewing technique and a video-stimulated recall interviewing (VSRI) approach.

In-depth interviews offered the most suitable channel for me to access participants' "thoughts, reflections, motives, experiences, memories, understandings, interpretations and perceptions of the topic under consideration" (Morris, 2015, p.5). In-depth interviews are suitable for qualitative research as they provide an extensive picture of the personal perspectives of the research participants on the research theme. These interviews involve an interview process in which researchers follow a set of questions to guide them through the interviews while they also use open questions which give the interviewees flexibility to elaborate. Seidman (2006) believes that in-depth interviews effectively explore the life experience of interviewees, and their interactions and connections with people and social contexts.

Since in-depth interviews are often conducted using the semi-structured interview approach, they are also known as semi-structured in-depth interviews (Morris, 2015), which are also framed by a fixed set of topics, and the researchers guide the participants as they talk about their inner thoughts and experiences around these topics (Cousin, 2009).

> [The semi-structured interview] has a sequence of themes to be covered, as well as suggested questions. Yet at the same time there is an openness to changes of sequence and forms of questions in order to follow up the answers given and the stories told by the subjects. (Kvale, 1996, p.124)

Semi-structured in-depth interviews provide valuable flexibility which allows more space for discussion within the scope of the study, but in-depth interviews also have some limitations. Morris (2015) points out that participants may build up stories that do not reflect real situations, and it is usually hard for researchers to examine the truthfulness of these stories. In this study, however, video recording and class observation data helped to verify the teachers' actual classroom practices and experiences to a certain extent. Another concern was how time-consuming in-depth interviews can be, especially as these interviews may extend beyond the set themes and questions, meaning that the interviewees may want to share more information than was needed. There was also the chance that the interviewees may gradually shift away from the research questions. In such situations, the time had to be controlled and the interviewees were skilfully directed back on the discussion themes.

Stimulated-recall refers to reviewing past events during an interview, allowing the interviewee's memory to be stimulated and recalled through reading, or listening to or watching a recorded medium (Shkedi, 2005). It is a kind of introspective method that prompts participants "to recall thoughts they had while performing a task or participating in an event" (Gass & Mackey, 2000, p.17). More specifically, the approach this study adopted is video-stimulated recall (VSR) as videos were used as the sole stimulus in the stimulated-recall interviews. In this study, the purpose of stimulated recall was to aid the memory of the participants about their lessons, allowing them to more accurately recall their experiences in order to provide more accurate information regarding their teaching practices.

Since the time for each VSRI was limited, it was not possible to watch a several hour-long video and discuss every moment. Therefore, moments where the teachers indicated a start of a new topic were first identified in the videos, and then used to review and discuss teaching strategies and how they helped explain and support the students' understanding and learning of new concepts. In each of the interviews, the participant was invited to briefly introduce the lesson topic and then asked to watch the selected segments from their lesson on a tablet computer, allowing them to recall the memory of that lesson. As in the semi-structured interview, the VSRI adopted the in-depth interview style, and the participants were again encouraged to elaborate on their ideas and share their experiences. Though the main focus was on teaching strategies, the conversation also included discussions about their experiences with their students and anything related to their teaching practice which related to the focus areas of the interview.

3.4.7.1 Pilot interview

To ensure that the interview questions would produce data which would help answer the research questions, a pilot interview was performed as part of the trial of the data collection procedure. As Cousin (2009) said, "the trialling process enables the development, grouping, and timing of the themes" (p.82). Using a pilot interview provided space and ideas to revise and regroup the interview questions, if necessary. A lecturer, who was also an experienced researcher, teaching in another department at the same university was invited to conduct the pilot interview.

The pilot interview concentrated on the teacher's perspective and the teaching strategies used to explain concepts. The interview began by greeting the interviewee and introducing the purpose and structure of the interview. I then moved onto the list of interview questions prepared for the semi-structured interview, starting with the professional background of the interviewee, teachers' perspectives of the Hong Kong education environment, the interviewee's perceptions on the learning attitude of students, and considerations made when designing teaching strategies. Since there was no video recording for a VSRI, the interviewee was asked to think about a lesson from the previous semester and then answer some prepared questions. Although no video was used in this part of pilot interview, the trial run was still valuable since its purpose was to identify problems with the questions' style, examine the way questions were delivered and critique my interviewing skills. The pilot interview lasted thirty-five minutes and was conducted in Cantonese.

The pilot interview process uncovered a few problems that needed to be addressed. First, some of the questions were not specific or clear enough. For example, when I asked 'what is your perspective in teaching?', the interviewee said the question was vague and asked for clarification because ‘perspective’ could mean a number of things: opinion, viewpoint, stance, mind-set, attitude and so on. Second, since the interview questions were written in formal English (See Appendix 8), when they were translated into Cantonese, the style often sounded formal and unnatural. When I realized this problem and tried to sound more natural, it took a few seconds to translate the questions into the spoken style of Cantonese and this affected the flow of the conversation. Third, though I had foreseen the need to lead the interviewee into a more in-depth discussion, I encountered some frustration and a loss of direction when a question steered the interviewee into a different area that was worth exploring. Finally, when reviewing an audio recording of the interview, I realized that some answers were too brief, ambiguous and lacked concrete information about the interviewee’s experience. Since the questions were not clear and I did not ask for elaborations, these answers were not sufficient to answer the research questions.

To resolve the above-mentioned problems, first the questions were translated into Chinese. To ensure the questions would be asked in a more natural conversational tone and style, the Chinese questions were written in spoken Cantonese style. Though Cantonese is a Chinese dialect, spoken Cantonese does not strictly follow the written Chinese characters, as it would sound unnatural. To address the problem of ambiguity, some of the questions were broken down into a subset of more specific questions and carefully selected words and phrases which would make the questions clearer and more specific. For example, the question ‘what is your professional background?’ was subdivided into several Chinese questions asking about the subject area they studied, their academic qualifications, the length of their teaching career, and types of students or courses they had taught. Moreover, some prompts were prepared to refocus the discussion on the research questions if necessary. Although I did not pilot the VSRI, the same rationale applied to the modification of those questions.

The pilot interview was a valuable experience, not only to identify the shortcomings and revise to make questions more focused on the research questions; it also raised my awareness about the importance of certain interviewing skills, like asking questions precisely and clearly, mastering casual and formal language styles, exploring information from the interviewee without being too directive, and creating a relaxed conversation. The main interview process is described below.

3.4.7.2 Interviews with the participants

The interviews were arranged after the end of the second semester. Each participant was invited to take part in an individual face-to-face interview lasting about one hour, at their convenience. The college library was chosen as the venue, given its cosy and quiet setting. The interviews were recorded on audio using the recording function on a smartphone. This helped create a relaxed atmosphere, as I could fully concentrate on the conversation without worrying about writing down their answers. Essentially, the audio data were the major data set which was later transcribed, coded and analysed.

This study planned to find out if there was any rationale behind the use of teaching strategies (RQ1) which stemmed from the teachers' beliefs and perceptions. A teacher's professional background may affect their beliefs, which may then affect their teaching practices (OECD, 2009). A teacher's beliefs may also be shaped by their experience, and vice versa (Richardson, 2003). Therefore, the interview questions were designed to discover information in three areas: professional background, personal beliefs, and their perceptions of students' learning attitudes developed from their teaching experience. Professional background questions provided demographic information on participants, while the length of their teaching career would be significant to their perceptions on students and teaching strategy design. Next, they were asked about their beliefs in teaching and their own teaching philosophies. The last part of the semi-structured interview sought to find out their perspectives on students' learning based on their opinions formed from their experience. Discussion began with the teachers' views about Hong Kong students in general, and then narrowed to their AD students, including any problems they noticed with students' learning attitudes, possible factors contributing to these problems and how they handled the problems. Examples of students' behaviours and teachers' responses identified from the field notes were also used in the discussion. The questions in

Chinese for the semi-structured interview are listed in Appendix 9, and the English version is attached in Appendix 10.

The main purpose of the VSRIs was to explore the instructional explanation strategies and the way the teachers taught the subjects. In the interviews, while revisiting their teaching videos, participants were invited to talk about how they helped support students' conceptual understanding and how they explained new knowledge. The field notes were also used as reference materials in both the semi-structured interview and the VSRIs. Some supporting questions were prepared to orient the conversation to a deeper dimension and discuss different situations which may have come up in the lessons.

Data from the VSRIs were also treated as the main source of information to answer RQ2, querying the strategies that college teachers use to explain new knowledge for conceptual development. However, the interviews were generally open to the participants' direction, providing more space for them to share their teaching experience. They were not directly asked how concepts were explained, but rather invited to talk about the strategies they used to teach concepts. There were two major reasons for this approach: first, when analysing the explanation strategies used by the participants, I also wanted to learn whether the participants realized the strategies were related to instructional explanations. Second, the word 'explanation', normally interpreted as the clarification of concepts through telling, may have limited the scope of discussion.

The questions for the VSRIs in Chinese and English are shown in Appendix 11 and 12 respectively. They were set up in the same format as the semi-structured ones, with the main questions on one side of the table and the supporting questions on the other. Since different participants had their own unique teaching styles and strategies, with no two being identical, each main discussion area was initiated using the standard questions, but the follow-up questions were always different in order to cater to the various subject areas, lesson topics, and particularly their teaching strategies. I followed the flow of the interview and then adapted, modified, and added to the prepared questions while maintaining the focus of the discussion.

3.5 Data analysis

The semi-structured interviews, VSRIs, video recordings and classroom observation yielded four sets of data, each analysed in a different way.

3.5.1 *Interview data*

The interview data were transcribed and underwent a coding process. Coding was an important step in the analysis, as it involves categorizing the data (Charmaz, 1983) and then providing "the link between data and conceptualization" (Bryman & Burgess, 1994, p.5). Through coding, the data were transformed from loose sets of conversation into meaningful, analytical entities. Two types of coding methods were used in the analysis of the interview data: a priori coding and emergent coding.

A priori coding refers to a coding method where specific codes are developed before the analysis (Beaudry & Miller, 2016). In the semi-structured interview, several specific themes – understanding the participants' academic and work background, their beliefs in terms of education, their views about their roles, their perspectives on student learning attitude and the reasons behind these views – were the main areas of discussion. Therefore, the questions were more directed to those themes, and the priori codes for this part of analysis were:

- The meanings of education
- The teachers' roles
- The students' learning attitudes
- The reasons for these learning attitudes

The interview results on those four priori codes were subjected to analysis through which sub-themes of each code were emerged, identified and are discussed in Chapter 4. A sample of priori coding analysis is attached in Appendix 13.

In reporting the findings from VSRIs, as with the data from the semi-structured interviews, the interviews were transcribed and presented in Chinese. However, the data transcribed from the VSRIs underwent only emergent coding because there was no specific theme and thus no a priori coding was needed. The change in the coding approach was due to the change in the specific aims of the two interviews.

As Neuendorf (2002) mentions, "when the researcher wishes to begin the development of a new [theme], the emergent option is employed" (p.195), an specific codes and themes emerged through open coding (Strauss, 1987). The open coding method allows concepts related to the strategies of giving explanations to emerge from the transcripts. During the process, the data were broken down, examined, compared, conceptualized, and categorized (Strauss & Corbin, 1998) while new codes were built and coded ones were revised (Cousin, 2009). When all of the codes were identified and refined, the codes were re-categorized and grouped again via axial coding (Strauss & Corbin, 1998). An extract showing the open coding of Teacher 6's VSRI transcript can be found in Appendix 14.

In the open coding analysis, the concepts related to teaching and the explanation of subject knowledge were identified and listed under the column of emerged code as shown in Table 3.6. The code numbers indicate the number of the code determined in this open coding stage while the numbers under T1 to T8, i.e. Teacher 1 to Teacher 8, represented the number of times the teachers mentioned the coded items over the VSRI. A complete coding table can be found in Appendix 15.

Table 3.6 Extract of the open coding table (VSRI data)

No.	Coded items	Teachers (Subjects taught) Number of times discussed over the VSRI							
		T1 (GD/ PS)	T2 (IPC/ PRA)	T3 (PRA)	T4 (AP)	T5 (RM/ AP)	T6 (Bio)	T7 (FM)	T8 (CP)
1	Skills / techniques/ procedures	1	2	1		1			1
2	Concepts / conceptual info	5	2	2	3	1		1	3
3	Things happen w/o specific skills (counterexample)		1						
4	Application of concepts /knowledge (students are expected to do)	7	5		1	4	1		6
5	Use visual images	1		2	2	1			
6	Use daily life examples	3	1	2	1			2	1

After creating a list of one hundred emergent codes, I applied an axial coding method, i.e. "the act of relating categories to subcategories along the lines of their properties and dimensions" (Strauss & Corbin, 1998, p.124). The third column in the open coding table as illustrated in Appendix 14 shows the properties classified in this step of analysis. These properties became different themes, such as *Types of knowledge* and *Strategies of explanations*. The coding results of this first round of analysis came up with the major types of explanation strategies used by the college teachers to support the understanding of different knowledge types will be presented and discussed in Chapter 4.

3.5.2 *Video recording data*

The video records of the participants' lessons provided another set of data to explore the strategies of explanations they practiced in their classes. Instead of transcribing the verbal elements and codes derived from the transcriptions, as I did for the interview data; the videos were coded from the teaching activities that were recorded. With the main themes of knowledge types, scaffolding and explanation strategies in mind, I used a thematic approach, where priori coding and open coding were again applied to this data set.

As shown in Table 3.5 in Section 3.4.4, sixteen lessons of eight participants covering nine subject areas were recorded in total. Since there were some overlapping situations where two participants may have been involved in one subject, and other situations where some subjects were only recorded in one lesson, to ensure that the analysis could cover all the participants' lessons and all subject areas, one lesson from each subject area was selected for analysis. Table 3.7 shows the lessons of eight participants in the nine subject areas that underwent the coding analysis. As Teacher 1 taught two of the nine subjects, he appeared in the table twice.

Table 3.7 The nine subject areas underwent video analysis

Participant	Subject area
Teacher 1	Graphic Design
Teacher 1	Public Speaking
Teacher 2	Interpersonal Communication
Teacher 3	Public Relations & Advertising
Teacher 4	Abnormal Psychology
Teacher 5	Research Methods in Psychology
Teacher 6	General Biology
Teacher 7	Food Service Management
Teacher 8	Computer Programming

At the start of the analysis, I watched the videos and wrote down the teaching activities for each sub-part of the lesson. For instance, as shown in the sample of the video analysis attached in Appendix 16, the lesson activities of Teacher 3 were recorded. Types of knowledge being taught in each of the sub-topics of the lesson were identified. In the sample, Teacher 3 intended to teach the concept of public relation (PR) and have the students learn some vocabulary. The third column in the attached sample describes how the activities scaffold students through the lesson, while the fourth column, 'scaffolding tool', lists the scaffolding strategies identified from the activities. The final column lists the strategies for giving explanations. The analysis of video lessons was then transformed and tabulated findings in 4.5 and 4.6 in Chapter 4 for further analysis and discussions. The video data not only provided evidence in support of the interview findings, but most importantly, they yielded another set of findings exploring more detailed and specific features of the types of knowledge and explanation strategies that did not clearly reveal from the interview data.

These findings also provided insight into the weighting of explanations in relation to other scaffolding strategies identified in college classrooms. The number of all scaffolding strategies, including the explanation strategies, were counted and tabulated. To examine the relationships between instructional explanations and other scaffolding strategies, a diagram illustrating the scaffolding structure of each of the nine classes was created. The detailed findings and discussions on this part can be found in Section 4.7.

Last but not least, the findings derived from both interview and video data were further analysed and related to *instructional explanatory approach* (see Chapter 5), a core category to be refined and developed, by using selecting coding method, through which the "previously identified discrete concepts and categories are further defined, developed and refined…[then] core concepts are identified" (Matthew & Price, 2010, p.157). These core concepts will be the key to understand the principle of how explanation strategies support understanding and learning in answering RQ3.

3.5.3 *Classroom observation data*

The purpose of the classroom observations was to observe the participants' classroom teaching environment, including their teaching practice and the students' responses to their use of strategies. The findings served as evidence to back up the participants' perceptions about the learning attitudes of their students. In the analysis, situations that reflected what the college teachers had described about their teaching experience were identified. An extract of the field notes made in Teacher 3's Public Relations and Advertising Practice lesson is attached in Appendix 17. From the field notes, we can see that the students did not respond much to the teacher (see arrows); this backs up the teacher's comment that the students were 'passive'.

3.6 Trustworthiness of the study

Validity and reliability are two indicators which help identify the quality of research and its findings. Simply put, validity refers to whether research accurately measures what the study intends to measure, while reliability concerns the repeatability of the research. Originating in a positivist paradigm, validity and reliability are more generally used in quantitative research where sampling, experimental design, data collection processes, measurement of statistical data, are deemed to be objective, accurate and consistent in the research. These ensure that the measuring variables and procedures reflect the measuring phenomena, and that both the study and findings are replicable and generalizable (Baumgarten, 2012).

There is much debate about the suitability of applying the criteria of validity and reliability to qualitative research, as naturalistic research using an interpretivist paradigm and qualitative methodologies addresses different kinds of knowledge claims underpinned by different ontological and epistemological positions from those in positivist quantitative studies. One common alternative replacing the concepts of validity and reliability in qualitative research is the idea of *trustworthiness* proposed by Guba (1981) as an alternative framework with corresponding criteria. (Table 3.8)

Table 3.8 Scientific and naturalistic terms appropriate to the four aspects of trustworthiness

Aspect	Scientific Term	Naturalistic Term
Truth value	Internal validity	Credibility
Applicability	External validity / generalizability	Transferability
Consistency	Reliability	Dependability
Neutrality	Objectivity	Confirmability

(Guba, 1981, p.80)

Lincoln and Guba (1985) suggest that the four criteria commonly used in positivist research, namely internal validity, external validity, reliability and objectivity, concern the aspects of credibility, transferability, dependability and confirmability in naturalistic research, responding respectively to the truth value, applicability, consistency and neutrality of the research study.

3.6.1 *Credibility*

Truth value refers to the degree of truthfulness inherent in the findings developed from the collected data and the accuracy with which the reality is presented. Within a positivist paradigm, truth value is presented as *internal validity,* which assesses the accuracy of the findings derived from the precise control of the research procedures and variables so as to ensure that the findings reflect the phenomenon being observed. Since reality is dynamic and multifarious under the naturalistic assumption, as well as in qualitative research, validity is only relative to the research purpose and the actual research context instead of being a product of context-independent experimental conclusion (Maxwell, 2005). Truth value, in the interpretivist paradigm, concerns and is acquired from human experience (Krefting, 1991), and "a qualitative study is credible when it presents such accurate descriptions or interpretations of human experience" (Krefting, 1991, p.216). Therefore, credibility is said to be more appropriate in assessing truth value in the interpretivist paradigm when the role of a researcher is to discover participants' life and experience and reveal the subject-oriented reality to the world.

Careful design of the data collection methods and logical interpretation of data are the major areas that demonstrate the credibility in this study. In order to reveal the reality through naturalistic data, this study adopted a qualitative case study methodology. By using the semi-structured interviews, VSRIs, classroom observations and video recordings, the participants' voices were heard, and their actual teaching practices were disclosed. Furthermore, the approaches to analysis such as using verbatim transcriptions and the detailed descriptions of teaching activities also aimed to reflect the natural contexts. In addition, triangulation, which will be discussed in 3.6.5, and member checking are the measures that enhance the true value of the study.

Member checking is a strategy used to enhance credibility. It involves verifying the collected data and interpreting it via the research participants (Lincoln & Guba, 1985; Pitney, 2004). Member checks can be done during the data collection process and/or at the end of the process, such as showing the participants the transcripts of interview dialogues or relevant the interpretations (Shenton, 2004). The observation field notes were used as reference materials for the discussion of students' attitudes and teachers' strategies. In the discussion, the teachers were asked to confirm the contents written in the field notes, and after the discussion, they were also asked to go through the field notes for verification. However, owing to the limitations of this study, meeting the participants to perform member checking after the primary interviews was not feasible. In addition, there was also a concern that the participants may not remember well what they had said in the interviews after the verbal data were transcribed. Moreover, since the verbatim transcription captured every word in the conversation without involving translation from or into different languages, immediate checking for the clarity of meanings expressed over the interviews was considered much more pragmatic and useful than sharing transcripts after the interview with participants for verification. Therefore, I chose to member check on the spot over the course of the interviews, and the participants were also in agreement with this arrangement. For example, I repeated and rephrased participants' responses and then asked for their affirmation to check the accuracy of meaning they expressed about the teaching situations and during the interview itself. The participants were also requested to further elaborate and clarify the meanings given by them. In addition, while using the field notes as reference material in the VSRIs, the participants were invited to confirm the accuracy of the observation records. Stimulated recall was used as another member checking strategy (Lincoln & Guba, 1985). The discussions in the VSRIs provided opportunities for the teacher participants to talk about their use of teaching strategies from the video recordings. Not only could I ask them to clarify meanings of what they said and what they did in class, but this also allowed me to ask and check with them if my understanding of their actions were accurate.

3.6.2 *Transferability*

Applicability concerns the generalizability of findings that can be applied to other contexts with the expectation of achieving similar or the same results. External validity refers to how well the research findings can be generalized to other research contexts. Quantitative research uses external validity as an indicator to evaluate if a study is valid via its generalizability. However, in qualitative research, every study is unique and cannot be generalized as in a positivist paradigm. Therefore, *transferability* is said to be more appropriate when describing the aspects of applicability in qualitative research, so long as the researcher provides detailed and sufficient reports and descriptions about all the research procedures, and as long as the study can be repeated in other situations and with different participants. Then, the study's applicability has been addressed (Guba, 1981; Lincoln & Guba 1985; Krefting, 1991; Morrow, 2005).

One common strategy employed to deal with transferability in qualitative research is *thick description*; a phrase used by Geertz (1973) to describe an interpretive model of ethnography, saying that "ethnography is thick description" (Geertz, 1973, pp.9-10). Geertz believes that the description of culture should go beneath the superficial and observable behaviours of people but include "the piled-up levels of inference and implication, the hierarchy of structures of meanings, in terms of which twitches, winks, burlesques and imitations are produced, perceived and interpreted" (Rapport & Overing, 2000, p.350). When thick description is used in terms of the notion of trustworthiness, it refers to detailed descriptions used in the research.

> Today, when rich, thick description is used as a strategy to enable transferability, it refers to a description of the setting and participants of the study, as well as a detailed description of the findings with adequate evidence presented in the form of quotes from the participant interviews, field notes and documents. (Merriam, 2009, p.227)

In this study, thick descriptions of the background of the study, its methodological procedures and findings are provided. The theoretical framework in the development of the research design, starting from the ontological and epistemological considerations through to the making of methodological decisions, was discussed and developed in Chapter 3. Moreover, steps in the data collection process including the sampling approach, ethical measures, data collection procedures and data analysis methods were carefully described. The samples of transcribed interview and video data, field notes, and coding tables were also provided for fuller and more informative illustrations of each method.

The semi-structured interviews, video-stimulated recall interviews, video recordings and class observations yielded four sets of data covering the participants' voices at different points in the project, plus records of their actual teaching practices in the form of videos and field notes. As a result, they had opportunities to voice their perspectives in more than one way and these were reviewed in relation to the observation data, contributing to the analysis of thick data.

The verbatim transcription method ensured the interview data were fully transcribed and thus laid out for detailed and repeated analysis. In the video transcription process, every single action of the teachers and students was observed, recorded and cross-checked with the class observation field notes. Consequently, this combination of data constituted thick material for analysis. In the analysis process, I repeatedly swept through the data, analysing continuously and in great detail to uncover the multiple layers of meanings about the types of knowledge covered in the lessons, the teachers' use of explanation strategies, the scaffolding structure and the complexity of what happens in the classrooms. The repeated process allowed me to classify in detail teachers' explanatory strategies and arrive at detailed taxonomies to capture and summarise that complexity. This was then complemented by capturing their perspectives about the context in which they work and their practice.

Interview data were also transcribed and relevant quotes from the participants used in the discussions of findings and analysis. Providing detailed descriptions of how the research was implemented and how the data were analysed was also the approach of the audit trail (Merriam, 2009).

Though I did not construct a formal research journal, on-going reflections and memo notes regarding, for instance, the conceptual processes, research design ideas, analytical insights, and methodological considerations were written down in a paperback notebook during the study. For example, the objectives in each of the data collection steps, the timeframe and approaches used to invite participants, and the chronology of the data collection methods underwent a lot of reflection and revision before execution. This served as a means of checking back to the focus of the work and the RQs. The notebook provided a space for recording my inspirations and questions raised over the research process, sketching diagrams to organize ideas, and listing out steps for research planning. It was a channel for the structuring of reflections on the quality and organization of the data collection and analysis. Through writing and sketching, I communicated to myself, refined arguments, clarified concepts and developed my ideas. Not only this practice added value to the development of the study, but also enhanced my conceptual maturity and growth in academic research.

3.6.3 *Dependability*

Consistency refers to how reliable measurement strategies are in producing consistent results, or whether the research methods yield the same results in other similar contexts. For example, if a laboratory experiment is repeated in a different laboratory with the same outcome, this experiment is judged to have greater reliability. However, this concept of reliability is questionable in qualitative interpretivist research, since human behaviour and experiences can be contextualized and can differ over time and space. Even if the exact same methodological approaches were used, the findings are unlikely to be identical from one study to another, since qualitative research focuses on exploration, interpretation and description relating to the informants' reality, rather than attempting to control them through an experimental approach (Krefting, 1991).

Parallel to the concept of reliability, Lincoln and Guba (1985) use the idea of *dependability* which "is based not on whether particular findings can be reproduced by another researcher, but rather whether they are reasonable based on the data collected" (Pitney, 2004, p.27). Findings in qualitative research are unique in terms of specific research contexts and participants. Yet researchers have to demonstrate that the findings are dependable from the ways the data are collected and interpreted. Therefore, a study's dependability depends on whether the research procedures and variation in the research context can be tracked and explained through the strategies applied in the study process.

Thick description not only provides detailed information for the repetition of research, but also gives a history of decisions made so that others could follow the description and obtain dependable results when redoing the study. In this thesis, framing of research paradigms, establishment of the methodological direction, considerations and decisions about sampling criteria, data collection methods and their executions, and data handling are all reported in detail earlier in this chapter.

3.6.4 *Confirmability*

Neutrality relates to the notion of objectivity within a positivist paradigm where "the biases of the investigator are effectively screened out" (Guba, 1981, p.81). In quantitative research, objectivity can also be established through objective measurement such as scientific experimentation and statistical analysis. Also, explicit and clear descriptions of the research design, and data collection procedures and analysis designed to ensure the repeatability of research can also help reach the highest degree of objectivity (Hoy & Adams, 2016). In qualitative research, Lincoln and Guba (1981) use the term *confirmability* to replace the concept of objectivity. They believe that qualitative studies should emphasize the neutrality of data provided from the informants instead of the researchers, that findings should be evolved from the data, and that strategies should be used to avoid researcher bias. Neutrality can also be achieved through credibility and transferability, and therefore detailed documentation of research procedures, considerations and decisions of how the data is to be collected and interpreted are essential. Moreover, the interpretation of data from different sources to assure that the data supports the analysis and reflects the reality can also enhance the objectivity of a study.

To enhance the neutrality of data, the interview questions were carefully designed in order to avoid leading questions which "reveal a bias or assumption that the researcher is making" (Merriam, 2009, p.99). Questions such as 'do you think the students are *passive*?' or 'do you think the role of a teacher is to *facilitate* student learning?' carrying bias words or assumptions were never used. The questions in the semi-structured interviews simply invited the participants to share their views and experience on three general topics including education, teacher's roles and students' learning attitudes. In the VSRIs, the participants were invited to provide course information and talk about the teaching strategies recalled from the videos. In the interview questions and in the discussions, the words 'explain' and 'explanation' were intentionally avoided. In contrast, an approach was sought that would elicit data that would highlight what teaching strategies the teachers used to explain or support their explanations. This open approach was adopted instead of beginning with suggestions or prompts that included any predetermined assumptions as to what these explanation strategies were. Moreover, whether or not the teachers see the strategies they used as explanation strategies was a part of the research inquiries. The way that participants described their use of strategies when they were actually explaining concepts might also reflect how aware the teachers were of explanations as a scaffolding teaching strategy. The interview data were transcribed verbatim to avoid any input of the researcher's ideas while the video recordings were transcribed in terms of the participants' actions. Also, during the observations, I was careful not to write any subject comments such as *interesting examples*, *responded quickly* or *felt excited*. In addition, those were never used in the video data transcription nor in the field notes. Furthermore, using member checking to enhance credibility, providing a thick description of methodological consideration and procedures, and going through repeated analysis of the data collected from four different methods using triangulation were done to achieve a position as close to neutrality as possible.

3.6.5 *Triangulation*

Triangulation refers to the use of a combination of research methods to gather evidence from various sources resulting in the enhanced validity of the data and in turn the reliability of the research (Creswell, 1998; Cohen, Manion & Morrison, 2011). Newby (2010) and Merriam (2009) suggest that triangulation is essential to demonstrating validity and reliability in qualitative research. Triangulation allows researchers to cross-check data collected from different sources to ensure the degree of truth value (credibility), repeatability of the study (dependability) and confirmability (Krefting, 1991). There are four types of triangulation as shown in Table 3.9: methods triangulation, data sources triangulation, analyst/investigator triangulation and theory/perspective triangulation (Patton, 1999).

Table 3.9 Types of triangulation

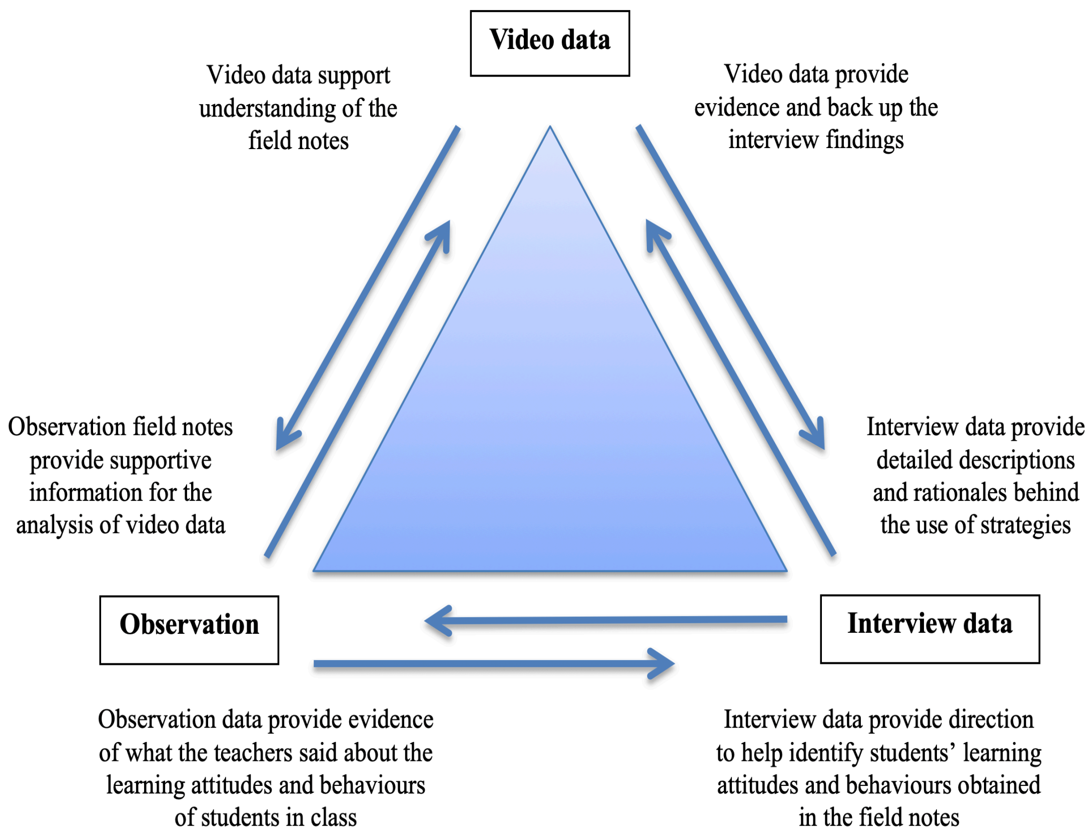
Type of triangulation	Purpose
Methods triangulation	Examining the consistency of findings by comparing data collected by both qualitative and quantitative methods.
Data sources triangulation	Checking the consistency of different data sources by using different qualitative methods gathered from different times, spaces or perspectives.
Analyst/investigator triangulation	Using multiple investigators to collect data and/or having multiple analysts analyse data and review findings
Theory/perspective triangulation	Using multiple perspectives or theories to interpret the same data

(Patton, 1999, p.1193)

The type of triangulation this research study adopted was data source triangulation: three sets of data collected from three methods were analysed to answer the research questions. Classroom observation provided authentic classroom experiences for the researcher, but the fast pace of class activities meant that a complete and accurate set of field notes could not be obtained. Moreover, researcher bias can also affect the comprehensiveness of the data, as the researcher is obliged to selectively note down the evidence in a dynamic environment. Video recording partially solved the problem by allowing me to revisit the classes, but only part of the classroom could be captured on video. Each of these two methods compensated for the limitations of the other to a certain degree. While classroom observation provided opportunities for experiencing and witnessing the class dynamic, video data supported the thick repeated analysis of teaching activities.

Finally, the semi-structured interview and VSRI provided data directly from the participants' perspective, allowing them to explain their behaviour and the strategies they used in class. The interview data supported the video recording analysis and the field notes, while these two sets of data also provided evidence to back up what the participants claimed in the interview. Triangulation was achieved through a process of continual cross-checking. First of all, the classroom activities documented in the field notes were crossed checked with the video recordings. While the play back function of the videos allowed detailed checking of the teachers' actions, the field notes also provided data about students' reactions that was observed in class but outside the filming area. Then, the interview data findings were cross-checked with the video recordings and field notes while the evidence obtained in the classroom observations and video recordings supported the emergence of the codes, the themes and the analysis. For example, the scene in which a group of students blamed Teacher 6 for wasting their time to learn a topic that would not be assessed was the evidence supporting Teacher 6's claim about students' refusal to learn subject content outside the examination syllabus. Evidence identified from the video and observation data confirmed the truthfulness of teachers' comments on and experience with their students shared in the interviews. The process of triangulation not only assured the trustworthiness and consistency of the data, but also the accuracy of the data analysis. Figure 3.4 Illustrates the triangulation of the study.

Figure 3.4 Data triangulation



3.7 Ethical considerations

Ethics is an essential issue in every research project. Beginning with the initial design of the research project, and moving through the setting up of the research questions, gaining access to collect data in the research context, sampling the participants, conducting the data collection procedures, handling data and presenting findings, ethical considerations were taken seriously at every stage (Cohen, Manion & Morrison, 2000). The study was designed with theoretical constructs, methodological plans and ethical concerns and had received ethical approval both from the University and the head management of the research site before any data were collected. In this qualitative case study, ethical procedures were strictly implemented in the data collection process and during the data handling stage in particular. In order to carry out the study in an honest, fair, and impartial manner, the data collection methods were designed to ensure the trustworthiness of the study, and to make sure that all of the participants were protected in terms of informed consent and anonymity. The confidentiality of participants was given top priority.

3.7.1 *Informed Consent*

Informed consent implies providing informants with adequate information about the research purposes and procedures, ensuring their understanding of the information, their ability to make informed decisions, and respecting their choice to – or not to – participate in the study (Cohen, Manion & Morrison, 2000). As described in 3.4.3, all participants agreed to participate in the study on a voluntary basis. They were given relative information and an invitation letter. Since all the participants were well-educated with at least a post-graduate degree and years of teaching experience, I was confident that they would be able to make informed decisions. Still, to ensure that they all understood the study, verbal explanations in Cantonese together with the written documents on the study were provided. They were informed of the research purpose, objectives, and methods through which their information and data would be handled, including "exactly how data will be used, how they will be stored and who will have access ” (Hatch, 2002, p.128). No coercive force was applied when they were invited to join the individual interview sessions, and the participants were free to withdraw from the study at any time if any of them became unwilling to continue.

Besides the teacher participants, consent from the students was also obtained before beginning any video recording. Although the research subjects were the eight teacher participants, the students sitting in the classroom during the recording and observation were part of the study and thus students' consent also had to be collected. Again, verbal explanations in Cantonese regarding the research and the information on the consent form were presented to them to ensure their understanding. They could also choose to refuse to be observed, or choose to sit outside of the video recording zone. Their decisions would neither result in any negative consequences nor provide them with extra academic credit.

3.7.2 *Confidentiality and Anonymity*

Confidentiality is essential to allaying ethical concerns. By knowing that the recordings will only be used for this particular study, the participants could become more relaxed. The data collected from the classroom observation, video recording and interviews were kept confidential and stored securely, and to maintain confidentiality, the names of the participants were kept anonymous. In the class observations, none of the student's names was recorded, and their behaviour was never discussed with their class teachers at any point. Though there were five students who were taking my class and also attended the lessons being observed, their identities were never identified and remained unknown. No student identity was disclosed and no face in the video data was captured when the teaching materials were illustrated in this paper. Moreover, since this study focuses on the teaching activities, teacher-student interactions were not transcribed for analysis.

Although the teachers were the participants, and they knew their students, concerns were also placed on anonymity of students while the teachers were reviewing their lessons as students' behaviours and their interactions with teachers and peers might be shown in the videos. When selecting the reviewing parts for discussion, scenarios were chosen which only captured teachers' activities, with all students' backs facing away from the camera. None of the student were identified from the videos nor being discussed. In fact, the VSRIs were arranged after the semester end, when the students had finished the courses and their results had been confirmed. Students' academic performance records would not be affected even if the teacher participants had recognized their students. However, I believe that mechanism to protect students' anonymity was a necessary ethical concern.

The interviews were all conducted with individual participants, and the interview locations were carefully selected to maximize privacy. According Brink (1993), social context in which the researchers collect participants' information may affect the accuracy of the data, since participants may behave differently in different social situations. Conducting the interviews in the college library over the user-free period of time means that the participants did not have to worry about being overheard by other people and had their privacy protected at the same time. Furthermore, all the participants were interviewed in the same spot in the library, creating consistency of both environment and atmosphere.

No interview information, field notes or any of the audio recordings will be shared or disclosed to any of the other participants, stakeholders, or the public and will not be used for any other studies or for any other purposes. The participants' feedback and performance in class was kept confidential, and will never to be shown to other teachers or their supervisors or used outside of this study in any way.

3.7.3 *Honesty*

In addition to receiving consent and upholding confidentiality, my role in dealing with ethical issues was to make considered judgments on how much information the participants should be exposed to in order to ensure that the data could retain its authentic, naturalistic character. Honesty involves the integrity of the researchers and the fair reporting of the research findings. In this study, I provided accurate information to receive ethical approval for assessing the data and honestly informed the participants of the research objectives and the use of data. Using proper citations and referencing to avoid plagiarism was another basic type of honesty used in this thesis.

Qualitative research analysis requires not only knowledge of the context, but also an understanding of the social constructions of the activities and the communicative relationships between the participants. All precautions were taken to ensure that my status as a staff member at the college would not generate any anxiety in the participants or interfere with my objective role as an individual researcher in the study. Concerns about fair reporting also arose regarding the consideration of sampling. I chose to include teachers with different expertise and in different academic fields from myself, thus avoiding creating any possible uncertainty and uneasiness among people in the same academic field and in the same team as myself, and to eliminate any possible biases I might have had when observing and interpreting the teaching practices of the people teaching the same subjects as me.

In the process of collecting and analysing the data and reporting the findings, I ensured that I was honest in recording data in an open manner and allowing the data to explain the reality, as said Hollway and Jefferson (2000):

> Honesty entailed approaching the data openly and even-handedly, in a spirit of enquiry not advocacy, deploying a theoretical framework that was laid out and justified, making only such judgements as could be supported by the evidence, and not ignoring evidence when it suited us. (p.100)

The purpose of this research was to make sense of the participants' realities, as "constructed by persons in them" (Postholm & Madsen, 2006, p.51). Though the "subjectivity of the researcher will always be present" (Cousin, 2009, p.35), as an ethical researcher, data should be presented as objectively as possible. The instruments to establish rigor and trustworthiness also helped to demonstrate the fair reporting of the findings of this study.

3.8 Conclusion

This chapter provides a framework for the study building upon ontological and epistemological and methodological assumptions, framing the research project and leading to the research design and methods of data collection and analysis.

Starting from establishing the relativist ontological and constructivist epistemological positions, the interpretivist education research paradigm, which acknowledges the value of human perceptions to reality, interactions in the world and construction of knowledge, is framed. The discussion provides theoretical support for the adoption of case study methodology and four qualitative data collection techniques that were considered to be the most appropriate approaches to answer the three research questions.

To explore the real-life situations in the college classroom and to gain insight for improvement of teaching and learning through a bounded research context with eight teacher participants, an instrumental embedded single case study was employed. Four sets of data collected for the study speak to the three research questions which are answered through the analysis and discussions appearing in the following two chapters.

CHAPTER 4 FINDINGS

4.1 Introduction

This chapter presents the findings from the semi-structured interviews, the video-stimulated-recall interviews (VSRIs), the video recordings and the class observation records.

The first three parts of the chapter (4.2, 4.3 and 4.4) focus on the semi-structured interviews conducted with the eight study participants, examining their beliefs about and perspectives of teaching and learning, as well as their experiences with their students at the college. These sections help answer RQ1, dealing with teachers' perceptions and the influence of the local learning culture on their actual teaching practices.

Drawing on the priori codes, this chapter starts with the teachers' perceptions of the learning attitudes of their students (4.2). With the support of data obtained from the classroom observations, I then present what the participants believed to be the cause of these learning attitudes (4.3) is presented. Afterwards, I look at the participants' perceptions of themselves are considered when dealing with attitudes that they believed would hinder student learning (4.4).

The second half of the chapter (4.5, 4.6 and 4.7) examines the findings from the VSRIs and the video data filmed during the participants' lessons. These play an important role in answering RQ2 and RQ3, specifically in terms of the use of strategies to support conceptual understanding in those content-based lessons under investigation. The report is based on themes emerging from the open coding analysis of the VSRIs. These findings are then used to explore the various kinds of strategies that college teachers use to teach concepts in their lessons. The discussion therefore focuses on the various strategies reported in the VSRIs and the complementary evidence captured from the video recordings. Before revealing the explanation strategies uncovered in the interviews, it is important to discuss the types of knowledge and what the college teachers expected their students to do with the knowledge, as this will provide a fuller picture of what students were expected to learn, what they were expected to do with the knowledge, and how the teachers helped them learn.

In Section 4.5, types of knowledge that emerged from the VSRIs are classified. Reading about these types not only provides information about what college students learn, it also allows analysis of possible connections between the types of knowledge and the strategies used to explain and support understanding. Section 4.6 explores the strategies that the participants used to explain new knowledge. Finally, in Section 4.7, I present an analysis of the teaching strategies used in nine different subject lessons and discuss the role of explanation strategies in the teaching process of those lessons.

4.2 Teachers' perceptions of the students' attitudes towards learning

In response to the a priori themes about students' learning attitude, teachers' predominant beliefs fell into three sub-categories: grade orientation, passive learners, and dependence. These beliefs are presented in three subsections below, with the support of quotes and observational evidence drawn from the semi-structured interviews and classroom observation throughout the discussion in response to each belief from the respective teachers.

4.2.1 *Grade-oriented and exam-oriented*

Six of the participants described their students as being grade-oriented and/or exam-oriented. Teacher 1 thought that the students were very exam-oriented. They wanted a good final grade, and therefore they cared more about their grade in each assessment than what they had learned.

> *They are very exam-oriented. They check to see if the syllabus is related to the exam. If the topic is related to the exam, they will put more effort. This is a very common phenomenon.* (Teacher 1)

In Teacher 1's eyes, the students cared so much about their studies because they wanted to move on to undergraduate programmes. However, what they appeared to care most about was not their learning, but their results. Asking for coursework samples was a common request from the students, which stemmed from the students' grade-oriented attitude in both Teacher 1 and 2's opinion. In Teacher 1's design-related classes and public speaking classes, the students often asked for sample artwork and previous spoken assignments with high grades as indicators of what criteria the graders make their decision upon. Teacher 2's advertising class required creativity, but the students often asked for model answers when they were assigned to create a new advertising plan for a product.

> *You need to create something, and the coursework requires you to create a new thing, asks you to think. But they always ask if there is any A-grade work, and ask you for some samples.* (Teacher 2)

What the students wanted above all was to get high grades.

> *[They are] scared to make mistakes. They are not curious, and always want to find model answers. They ask you for sample answers and want to know how former students answered the questions without checking their problems. They try to find answers that they think best match your expectations.* (Teacher 2)

The teachers felt that the students appeared to not show much interest in extending their learning, not only in terms of their assignments, but also in the learning process. Teacher 4 used the term "surface learning" to describe the students' performance, with the cause of it, he believed, being exam-oriented attitudes.

> *They only look at the syllabus, and only learn and memorize what is included in the syllabus…They only care to know one thing, and the level of "knowing" is limited to [a level which is] merely enough for the examinations.* (Teacher 4)

Teacher 4 defined "surface learning" as memorizing the materials provided by the teachers. He reported that no student ever came to ask him for more information about the taught material or to challenge his ideas. His perception was that his students never saw an assignment as a learning tool – a good final grade was all that they wanted.

Teacher 5's experience was similar but saw it from the point of view of questions: in their experience, the students were not silent, rather they asked a lot of questions. However, the questions they asked did not facilitate learning – they were only seeking a more direct way to get good grades.

> *They ask everything. What does it mean? You have to give them answers. For example, how many pages do you require? Would you deduct any marks if they submit a page more? Would marks be deducted if I write more words? Can I skip writing this? They ask everything indeed!* (Teacher 5)

Teacher 5 also added that the students do not take risks, as he felt they did not want to make any mistakes which might cost them marks.

> *[They do not have] enough confidence and worry about mark deduction. They are scared that marks would be deducted if they do less or do more. All of them focus on the grades. It would be the best if you could tell them how to get an A. Then they could follow the same process.* (Teacher 5)

Teacher 5's students also expected them to provide a complete set of reference materials and refused to go further to find extra information for their assignments. When they met problems, they only asked the teacher for solutions.

The grade-orientation that Teacher 6 experienced was the most overt – she claimed that the students openly requested that she teach only the topics that would be on the exam and were reluctant to learn knowledge which would not be tested. A scene from the observation appears to illustrate this kind of attitude from the students. Teacher 6 introduced a new topic – the immunological system – to be delivered through a video.

She then explained and further elaborated on the concepts presented in the video. However, when the students discovered that this new topic would not appear on the examination, their reaction indicated that they did not want to learn about it or spend time on topics that would not be assessed. Below is an extract from the field notes on this scene.

> *When finished discussing and explaining the content in the video, T6 asked if the students understand what she said.*
> *No student answered her, but they talked among themselves regarding whether the topic would be on the exam.*
> *One student spoke up and asked T6,* ***"exam or not?"***
> *T6: "What [do you mean] "exam or not?""*
> *Several students asked,* ***"will all these appear on the exam?"***
> *T6: "these will not be on the exam."*
> ***One student dropped his pen on the desk and yelled that he should not have copied things down.*** *Others also expressed similar feelings, blaming the teacher who did not tell them earlier and wasted their time.*
> *T6: "then you still need to learn"*
> *Noise remained for a while, though nobody responded to the teacher.*
> (Teacher 6, General Biology)

Experiencing too much exam pressure and too little curriculum time, the students only aim to pass examinations instead of learning and expanding their horizons. The students in Teacher 6's lesson lost their interest in taught content that would not be assessed; on the contrary, the students in Teacher 7's class reacted differently, as shown in the following field note, when they knew what the teacher said was included in their examinations.

> *T7: shows a diagram with 10 factors (words only)*
> *T7: recalls a student experience on a trip as an example*
> ***T7: tells students if exam Qs ask about these factors, they should not name the factors but analyse the case using the factors***

*S: **all students look at the teacher and listen carefully, including those who had been doing other things at their desks***
(Teacher 7, Food Service Management)

The bold text in the above extract indicates that mentioning the exam appeared to trigger a change in posture or gaze, with far more tracking of what the teacher was doing and talking about. Before the word "examination" was brought up, the class was quiet, with the majority of the students sitting and listening without giving much feedback to the teacher, but became more active and paid more attention after the teacher discussed 'how to answer questions on the exam'.

The behaviour of the students gave a strong grade-oriented impression. The most upsetting part of this for Teacher 6 was that while the students cared a lot about their results and getting into university, some did not even complete the coursework if it was not counted as a part of the final result.

Clearly, many of the participating teachers felt that learning for knowledge and self-development was no longer a goal for this group of students. Since learning was perceived as instrumental and extrinsic motivation for passing an exam was high, arousing students' interest in a subject is rarely easy, but helping them become self-motivated to learn about the subject was typically even harder for these teachers.

4.2.2 *Passive learners*

Four of the eight participating teachers explicitly used the word "passive" to describe their students. Teacher 3 felt that Hong Kong students were usually more passive than their foreign counterparts.

> *I feel that Hong Kong students' learning attitude in general is rather passive. …Hong Kong students are [also] not outspoken in discussions. They are not active in discussion. (Teacher 3)*

Teacher 2, 5 and 7 believed that it was passiveness which stopped students from responding in class; even though students were encouraged to give feedback, they generally remained very quiet.

> *Hong Kong students are quite passive. For example, they don't want to answer questions. Once a question is asked, all of them lower their heads. (Teacher 7)*

The participants generally labelled their students as passive due to the fact that they did not respond much to questions from teachers in the classroom. This general result of passiveness was backed up by the classroom observations and appeared in all the classes I observed. The majority of the students did not answer questions asked by the teachers. Many times, the students gave no feedback at all to their teachers. For example, when Teacher 3 reviewed the main points of a previous lesson, I hardly observed any feedback from her students.

> *T3: shows the topics, explains verbally and shows pictures of in-store media*
> *S: many are getting ready for the lesson, some are doing things.*
> *T3: lists the key terminologies on the screen, gives a verbal explanation of the terms. She asks prompting questions about the contents.*
> *S: **no response.***
> *T3: shows video clips of out-of-home media – shaving cream - 3D, motion, IKEA curtain ad shows video clips – shaving cream, Ikea as example of 'out of home media'; asks students to give feedback.*
> *S: **one student gives a response about the Ikea ad.***
> *T3: shows video IBM smart idea - creative use of out-of-home media.*
> *S: **no response.***
> *T3: elaborates on the ideas and asks students to give feedback.*
> *S: **no responses.***
> *S: most sitting and listening; some are doing their own thing.*
> (Teacher 3, Public Relations and Advertising)

Frequently, the teachers said that they have to repeat questions several times before they receive any responses from one or a few students. Though Teachers 1 and 6 did not describe their students as passive in the interview, lack of response from students was also identified in the class visit. I observed in Teacher 1's Graphic Design lesson that the teacher had to ask several times before receiving a response as shown in these field notes.

> *T1: asks students to recall the communication model.*
>
> ***S : no response from students.***
>
> *T1: uses Cantonese to ask the Q (question) again.*
>
> ***S : one student answers.***
>
> *T1: draws on the whiteboard to visualize the concepts.*
>
> *T1: asks several Qs about communication model.*
>
> ***S : no response.***
>
> (Teacher 1, Graphic Design)

In this case, Teacher 1 received one student's response when shifting the language of his question to Cantonese. However, in Teacher 6's lesson, even when she repeated her question in Chinese, she received no response from the students, as shown here:

> *T6: shows two pictures of a foetus' hands, then asks students "why there is space between the fingers?"*
>
> ***S : no response.***
>
> *T6: uses Cantonese to ask the question again.*
>
> *S : a few students talk about it in their seats, but* ***do not respond to T****.*
>
> (Teacher 6, General Biology)

In my observation, the college teachers often received little response when asking questions and teachers giving the answers was a frequently observed phenomenon. Though this situation may be caused by poor elicitation techniques of teachers and/or students' weak English proficiency to understand teachers' questions, this persistent lack of response to teachers created the perception in many of the participants' minds that the students were passive in class.

4.2.3 *Dependence*

Another attitude towards learning discussed by the participants during the semi-structured interview was the concept of dependency. Although only one participant explicitly used the word “dependent”, the descriptions provided by the other five out of eight participants reflected that they perceived a dependent attitude in many of their students. Teacher 8 described Hong Kong students as being dependent because they require their teachers to provide everything very clearly and specifically. They need to know what exactly is correct and incorrect.

> *There are many dependent students. They want you to tell them everything clearly…They only read the [materials] that their teachers give them and rarely explore other information by themselves.* (Teacher 8)

Teacher 4 and Teacher 6 also expressed the same opinion, saying that the students relied heavily on the materials provided by their teachers. Teacher 6 reported that the students not only asked her directly for the model answers of in-class review questions even though such answers could be found in the lecture notes, they also asked her to show them the exact references in the recommended reference books.

> *When I asked them to read a reference book, they asked me to highlight the [relevant] paragraphs for them! [laughs]* (Teacher 6)

Teacher 6’s laughter here illustrates her sense of helplessness at her students’ instrumental attitudes imposed by the exam system. The act of asking for model answers, discussed earlier, could also be considered a sign of dependency, since the students did not seek answers for problems they encountered but instead expected the teachers to give them all the solutions.

In my class visit to Teacher 2’s lesson, I noticed that none of the students had tried to provide answers to the missing parts of the students’ notes. Every student waited to be given the answers by their teacher. In Teacher 2’s opinion, the students were afraid of making mistakes, so they would ask for model answers before even looking at the questions.

Teacher 8 also shared an example from his computer programming class to further illustrate the point that the students were not willing to take risks or try solving problems by themselves:

> *When they started writing up the program, very often they made mistakes. They needed to make corrections and to modify the program until it worked. However, they didn't usually try this but asked me [to give them solutions].* (Teacher 8)

Teacher 8 went on to say that knowing how to make corrections was very important in the process of learning how to write a computer program. He believed that providing the answers does not help the students learn, as the problems they face in different situations will often require different solutions. Unfortunately, though he tries to provide hints to his students, his students are unwilling to put effort into thinking about the problems, and instead request direct answers from him. Same as other teachers' experience, even though the teachers provided space for students' creativities and room for self-exploration, the students expected and requested to receive exam-focused materials and model answers. From the teacher's point of view, they were not willing to try out things and were scared of making mistakes and thus were highly dependent on the teachers.

In summary, the eight participants believed that their students, in general, were grade-oriented, passive and dependent on the teachers. In the next part, I will examine the participants' perceptions of the reasons behind these attitudes.

4.3 Teachers' perceptions of the reasons behind the students' attitudes towards learning

After the participants were asked about their perceptions of their students' attitudes towards learning, they were also asked to discuss their beliefs about the possible causes of these attitudes. Their responses show that they believed the major drivers behind these attitudes are the Hong Kong education system, the school curriculum and learning environment, traditional Chinese cultural influences, high parental expectations, and the students' own ability to learn. I will discuss each of these perceived causes below.

4.3.1 *The Hong Kong education system*

Four of the participants stated that they believed the education system in Hong Kong was the main cause of the exam and grade-oriented attitudes of the students. Teacher 1 expressed that from the time Hong Kong children start their school lives, they are subjected to a very competitive selection system which sees examinations conducted at all levels decide their future paths and study opportunities.

> *They normally only focus on exam topics – [and are] too focused in primary and secondary school. They endlessly drill on particular topics that are very target-oriented.* (Teacher 1)

The roots of this exam-oriented attitude toward learning, Teacher 4 explained, lie in habits which the students have developed throughout their school years.

> *I feel that [this attitude] is developed in primary and secondary school. The overall learning aims are the mid-term exam and the final exam. Teachers do not encourage more and wider thinking, but focus on how to ensure students get high marks. After ten years, [they] get used to it.* (Teacher 4)

Teacher 6 believed that learning merely to get high marks has become an ingrained habit in students. The attitude of reluctance to ‘use the brain’ and instead ‘just fulfil the requirements’, as she phrased it, came mainly from schools where they did not clearly understand the meaning of education but instead approached all subjects in terms of tests, exams and public examination results. Since they often obtained satisfactory results through rote learning, many students have acquired a habit of learning through memorization and recitation.

> *There is no way not to recite. I feel that from Form One to Form Three, all exam questions require recitation.* (Teacher 6)

In her opinion, this experience of learning have not changed from her generation to the current one, and does not change between the secondary school level and the college level, but this approach to learning encouraged by the education system imposes a lot of stress on the students.

Teacher 5 and Teacher 7 suggested that the prevalent grade-oriented attitude is obvious to this group of students, as the education system requires that they have good grades to get into a university.

> *…We tell them that learning is not for the grade, but how can they not aim for the grade? Here they need the grade to get into university more than ever. They need the marks. So I feel that all that they do is understandable.* (Teacher 5)

The fact that only students with high grades have the chance to continue their studies at a higher level is ‘the rules of the game’, opined Teacher 7. These teachers’ comments reflected the struggle they have been experiencing. On the one hand, they encouraged students to learn by heart. On the other hand, they realized from the negative washback on her teaching as expressed from students’ responses that grade-oriented teaching approaches were expected and needed to be adopted.

4.3.2 *The curriculum and the learning environment*

Some of the teachers also felt that generally the extremely heavy curricula do not give the teachers enough time to conduct interactive teaching. Instead, they felt that they had to use a "force-feeding" approach. As Teacher 7 explained it,

> *Another [factor] is the "force-fed education" in Hong Kong. You have to cover a wide syllabus and teachers find it hard to finish all the things covered in the syllabus in the limited class time. So the quickest and the most direct way is to tell, to teach, i.e. "I talk and you listen". If you want to be more interactive – want them to brainstorm, then discuss, and then conclude, you will need much more time for them to learn.* (Teacher 7)

The limited time available and the "force-feeding" education practices mean that students tend to sit and listen in class, without becoming actively involved. Large class sizes were also a problem for Teacher 7, who found it hard to arrange interactive activities.

> *I think for interactive activities, twenty students is already too many, then split into four groups. But most of the time our maximum [class] number can reach thirty. Such a big class, with one teacher is pretty hard ... I've had thirty-three, thirty-four students.* (Teacher 7)

The limitation of arranging interactive activities in big classes, as Teacher 2 thought, was also one of the reasons why students were so passive in class because throughout their learning experience in school, the opportunities to build up their confidence and overcome communication apprehension in order to respond publicly were very few.

> *They surely wouldn't answer questions actively…because the primary and secondary school learning style, means thirty to forty people in a class, how can you have time for discussion?"* (Teacher 2)

When they reached college, the situation appeared to be the same. On average, there were thirty to thirty-five students in each class I observed, and the students remained quiet and passive. Large classes are a persistent problem in Hong Kong's education sector (Waters, 1992; Cheng, 2015). Having thirty to forty students in one class, with a tight syllabus and limited time, means that the students do not have many opportunities to speak up. In the two psychology lessons observed, the teacher talked through the lesson without giving many opportunities for students to give oral feedback or ask questions since the teacher had to cover a lot of topics in one lesson. This situation in which teachers were locked into transmission teaching for covering the heavy curriculum has persisted for years, certainly since these students were in primary school; thus, when they reach college, face the same large class size and experience the same directive, teacher-centred approach of teaching, they continue to remain quiet and passive.

4.3.3 *Cultural influences*

The teachers also proposed that the students' classroom passivity could be influenced by the general school culture prevalent in Hong Kong. Teacher 3 pointed out that in most secondary schools, students are always required to stay quiet in class.

> *I guess the secondary school style is to quietly sit there and listen to the teachers. The definition of "good" is "quiet". Don't make a sound. If you say a bit more, the lesson may be affected.* (Teacher 3)

She recalled an interaction with a student who was relatively active in her class.

> *There was a year one student who was relatively active. I showed my appreciation for their active participation, and the student said, "teachers here find us okay, these kinds of 'talk a lot' students; but secondary school teachers thought we were annoying".* (Teacher 3)

Teacher 3's experience reflects an interesting perspective on students' classroom performance: to avoid being an 'annoying student' in the teacher's eyes, students remain quiet most of the time. This student perspective suggests that quiet and unquestioning application is what is perceived to be most highly valued by teachers. Like the other participants, Teacher 3 saw 'being passive' as being equivalent to remaining quiet in class. She explained that being quiet is a virtue in Chinese culture.

> *I feel that Chinese people need to be modest. When a person keeps talking about one's feelings, saying this and that, other people will think that this person is showing off. Chinese culture is more collectivist. [Having] these kinds of individualistic ideas, seems like you're making all others listen to you.* (Teacher 3)

Chinese people frequently do not appreciate active youth and may see this behaviour as showing off. This mind-set creates a kind of peer pressure among students who do not want to be labelled as being show-offs and eventually isolated by their peers.

> *Or perhaps it's about the culture of Chinese people. For example, when I am conducting a lesson, if a student asks a lot of questions, other classmates would think that this person was showing off. This may be a reason why they do not want to actively ask questions.* (Teacher 3)

Teacher 7 brought up a Chinese aphorism: 'talk less, do more', and implied that remaining quiet was seen as proper behaviour, particularly in a strict school environment.

> *It was very strict in secondary school. Even just taking a look out of the window could be scolded as misbehaviour.* (Teacher 7)

The expectation of 'proper' behaviour in school prevails in most Chinese families. Teacher 7 believed that the family expects students to respect senior members of society, including teachers. Traditional Chinese thinking emphasizes obedience, with this idea taught not only in the family but also in schools. Children are not encouraged to offer opinions but rather to obey rules, particularly in school. Teacher 7 felt this might be one reason why students in Hong Kong are relatively quiet in class.

4.3.4 *Parents' high expectations*

The high expectations of students' parents were suggested as yet another reason for the students' exam-oriented learning attitudes. Teacher 1 suggested this explicitly. He thought that the parents' expectations might arise from traditional Chinese thinking. He observed that the attitude described by the Chinese phrase *wang zi cheng long* (望子成龍), meaning 'longing to see their children succeed in life', is still very much prevalent in Hong Kong society today.

> *Since a certain level of academic qualification is a part of the definition of 'wang zi cheng long', getting a bachelor's degree is very basic and must be done. Having high qualifications would allow them to find a more comfortable job. But do they really need to get an undergraduate degree in order to have a comfortable and contented life? Not really, but this attitude is really strong.* (Teacher 1)

The teachers felt that success in most people's minds is equated with holding a high-paying job. Going to university and getting a higher qualification is not done to learn new knowledge, but to secure a brighter future.

> *[The aim of learning] has become obtaining higher pay. They hope their pay after graduation will be secured …Therefore, the parents hope that after their children graduate from university their children can repay their living expenses.* (Teacher 1)

The 'repayment' of parents is generally practiced in Chinese society, in that it is expected that grown-up children will become responsible for the financial support of their parents. Though most parents will not overtly request this, the practice remains a social norm in Chinese families. Repaying parents is not, of course, the only motivation for holding a well-paid job – most parents hope their children lead stable and comfortable lives. But well-paid jobs normally require high qualifications, and an undergraduate degree is a basic requirement for many jobs. An undergraduate degree is therefore the main target of the majority of Hong Kong students and, by extension, their parents. For students who fail in their first attempt to get into university, studying at a community college is their second chance, and perhaps their last chance, to fulfil this ambition.

This means that pursuing grades is not just a habit developed from long years of exam-oriented school education, it is also a value promoted, albeit indirectly, by the families of many students. Teacher 4 certainly believed that parents focus on their children's results but ignored the more important meaning of learning.

> *Perhaps parents are the same. It means that I don't care about process but only care about your class rank in the end. They again focus on the final result.* (Teacher 4)

He felt that he should not blame the parents for overemphasizing on the outcome and ignoring the process because this is a common phenomenon in performative cultures where results are seen as the first priority.

> *Nobody will care to ask you what you actually learned in university, or whether a university education really benefited you? I think nobody would be concerned. The whole society is the same. We only see the end product. The simplest measurement is to see how much you earn.* (Teacher 4)

In the interviews, Teacher 5 offered an example of the frustration a student faced due to this results-oriented mentality. She commiserated that the student had demonstrated a massive improvement over the four semesters, yet his parents did not care and only showed dissatisfaction on his final mark. The parents' attitudes put heavy pressure on students. That pressure, in turn, pushes them to treat marks and grades as the most important factor in the learning process.

Teacher 6 also felt that family pressure and the overall education system contributed to developing the students' dependent and exam-oriented attitudes towards learning. She explained how in primary school, parents have already begun to use class rank as an overall performance indicator rather than actual learning. Parents praise and punish their children based on their results rather than on the cognitive development of the child. Achieving a high class rank thus becomes the goal of each semester.

> *Some parents request [that the children] get very good exam results, for example being ranked in the top ten in class. If they fall out the top ten, their vacation trip for that semester would be cancelled.* (Teacher 6)

She said that many students did not know why they were studying a particular subject; they seemed to simply choose subjects based on their parents' expectations.

> *Parents may want their children to take something like business, and then they can become rich after graduation…But perhaps their son does not like that subject.* (Teacher 6)

Teacher 8 thought that if the traditional Chinese attitude of obedience to their parents causes a student to enrol in a subject they are not interested in, this could clearly discourage the student from taking too much initiative in learning.

> *From child to adult, in Asia and Hong Kong, everyone is aware of the concept of rank. That means you must listen to the senior members of society and those who are more capable than you. This means…very little self-motivation, very little self-guidance, most of the time following others.* (Teacher 8)

Following the instructions of their seniors and being obedient are virtues in Chinese culture. Also, this is a way to avoid making mistakes which might lead to unwanted punishments by the seniors.

> *Perhaps when they made mistakes, they wouldn't get any encouragement. Once they got something wrong, their parents would scold them and give them negative comments.* (Teacher 8)

Teacher 8 believed that this unpleasant experience was a reason leading to the fear of mistakes and failure reflected from students' behaviours. He added that not allowing mistakes in the family environment is a serious problem since many things can be learned from mistakes. However, growing up in an environment with such a traditional mind-set, students accustomed to follow instructions for everything they do because following instructions not only gives them a sense of security, helps them avoid making mistakes, and also yields high marks in coursework and assessments. Nevertheless, as Teacher 8 concluded,

> *These concepts, in fact, restrain them from exploring new interests and new knowledge.* (Teacher 8)

The traditional Chinese mind-set which promotes obedience to senior individuals and appreciates quietness contribute the results of passive and dependent habits and attitudes in learning. Owing to the competitive education environment, parents expect their children to get into top-rated schools and get outstanding school results. The teachers felt that parents' focus on results directly affects children's perceptions in learning, since getting good results is the main goal of studying that brings future rewards and success in life. This instrumental value in studying may drive students to achieve desired results, but in fact, interfere their creativity, critical thinking development and intrinsic motivation in exploring new knowledge.

4.3.5 *Students' perceived ability to learn and understand the subject matters*

Through interacting with students in class activities, Teacher 4 felt that the students lacked the ability to understand theoretical concepts, while Teacher 7 perceived that the students displayed weak logical and critical thinking, as well as a lack of ability to make sense of the course content.

> *Their logical thinking skills are not good…Their analytical skills are very low. They talk about things very superficially and cannot express their points.* (Teacher 7)

Teacher 7 also felt that the students lacked the ability to participate in discussions and to ask and answer questions because they did not understand the subject matter.

> *I can say they don't have the ability to analyse and to understand, so they can't absorb. When I look back on the students' results this semester …they were totally lost in class.* (Teacher 7)

Teacher 7 noted inadequate language ability as a possible reason why the students were unable to properly understand the subject matter. She explained that since their exposure to English in secondary school had been insufficient, particularly the Chinese-medium secondary schools in which all of the subjects except English were taught in Chinese, they did not have a strong proficiency in the language. Using English as the medium of instruction in the college resulted in this becoming a 'killing field' for the students.

Teacher 2 also pointed out that a weak English ability might explain why so many of the students appeared to be unmotivated. English is the medium of instruction, but many students' low English language proficiency means they might not understand everything delivered in class.

> *The language ability of some of them was not good. Perhaps they did not understand what was said, and this would be one of the problems.* (Teacher 2)

Teacher 2 believed that the students' language ability might also explain some of their passivity. As they might not fully understand the content, they chose not to give any responses in class. The teachers felt that the students' ability to understand the course content was another reason behind their perceived passiveness in class and their 'dependency' on the teachers.

The above-discussed perceptions echo the Hong Kong learning environment discussed in Chapter 1. Similar to the general impression of the public and in accordance with previous publications about Hong Kong education, the exam-oriented education system, tight curricula, Chinese culture and parents' expectations were perceived by the participants as possible factors behind the learning attitudes of Hong Kong students. These perceptions provide an understanding of how they see their students and how they interpreted the students' learning behaviour; they may also affect and shape their roles as teachers. In the next section, we will look at how the participants described their own roles in the classroom.

4.4 Teachers' perceived roles and perceptions of the meaning of education

To find out if the teachers in this study actually taught their students in the ways that they perceived themselves to teach, it was necessary to understand both their perceptions of teaching and the roles they played in the classroom and then compare and contrast these perceptions with their actual classroom practices. The report in this section focuses specifically on the teachers' responses in the semi-structured interview regarding the meaning of education and the teachers' perceived roles in the classroom. The primary goal of all the teachers that I observed was to teach the students the course content. Three teachers reflected that, as they saw it, education was not only about teaching knowledge but also about instilling positive mind-sets, values, attitudes and confidence. Other considerations reported by individual participants included widening students' horizons, building up students' confidence, inspiring students to think deeply during the learning process in order to apply their knowledge outside the school context, leading students to discover their own goals, and supporting them to pursue and achieve their learning goals.

When analysing the teachers' descriptions of their roles, I categorised the roles into three sub-themes: deliverer, facilitator, and motivator. *Deliverer* refers to the role of introducing, providing and transmitting subject knowledge and related information. The second role, *facilitator*, as defined by Bee and Bee (1998), is a person who develops a smooth learning pathway, offers help, and removes obstacles to guide and support learners during their pursuit of their learning goals. In order words, a facilitator gives advice, direction and guidance, encouraging students' involvement and building their confidence, challenging old concepts, supporting the connection between prior and existing knowledge, and inspiring students to think about the subject matter. Finally, a *motivator* aims to enhance students' motivation through encouragement and by stimulating their interest in learning.

Delivering subject knowledge appeared to be a common role for all teachers in the classroom teaching context. The teachers in this study generally believed that education involves more than teaching knowledge; it also involves facilitation and motivation which gives students positive learning and life influences.

> *The meaning of education, I think, is to teach students the things you have learned and make them understand. Another meaning is to inspire them to think, which means inspire them to find ways to solve problems.* (Teacher 2)

> *I think the most superficial [meaning of education] is to let them know the course content. Teaching them something they may not know, explaining it to them. The deeper level is giving the students some kinds of influence, teaching them some principles about being a good person.* (Teacher 3)

The interviews revealed that the teachers facilitated and motivated students in different ways based on their perspectives on the meanings of education and their perceived roles. Teacher 1 saw himself as someone who led students to see things from a wider perspective. Despite calling himself an 'information provider', he acted as a facilitator for his students – he involved them in the knowledge construction process by inviting them to share experiences and information during his Graphic Design lesson.

I feel that I am a provider and at the same time the students are also [providers]. Sometimes we share information and are more interactive. (Teacher 1)

Teacher 1 believed that the knowledge he provided was limited, and students needed to explore further if they wanted to deepen their knowledge of the subject. He welcomed the fact that students searched the Internet for information relevant to the class, as this represented students' interest and involvement in learning.

Teacher 2 facilitated their students' involvement through class discussion and the synthesis of prior and new knowledge.

My role is a facilitator, to facilitate [their learning]. Since they are adult learners, they learned some things in secondary school, and now I facilitate the linking of that old knowledge with this new, added information. (Teacher 2)

When observing her class, I noticed that Teacher 2 used class discussions to encourage her students to share their daily experiences and knowledge of communication skills, and then linked their existing knowledge to the subject content or challenged their misconceptions before directing them to learn the course material.

Teacher 6 was firmer in her view that education means teaching students knowledge at the appropriate level and helping them get into university or find a job. When she was asked to share her teaching philosophy, she replied that

No matter whether it is at the Higher Diploma level or Associate Degree level, I want them to graduate from the programme and be able to find a job. Then my job is finished! (Teacher 6)

Teacher 7 shared the same view, emphasising that the aim of education is principally to help students gain academic qualifications for their future studies.

> *In fact, their aim is to pursue knowledge, [and they] want to get a qualification that allows them to continue their studies.* (Teacher 7)

However, these two teachers also stressed the importance of motivating students and facilitating learning. As I observed, besides using interesting examples and visual aids to motivate learning, both Teacher 6 and 7 frequently played a facilitating role for the students by asking questions and guiding them through analytical examples.

Teacher 5 explained how the nature of the course she taught meant that she played different roles in the classroom.

> *I really feel that different courses require different roles. Abnormal Psychology involves too much factual information. I am really a 'deliverer', telling them the information, and they sit passively, only copying down notes, just listening.* (Teacher 5)

> *In Research Methods, I can be a facilitator. I can ask a student to ask questions, or I can add information, ask deeper questions. So, I feel that in different courses, the roles are different.* (Teacher 5)

She explained that since, in her view, factual knowledge cannot be criticized, the students only study the course materials in her Abnormal Psychology class. However, students in her Research Methods course are encouraged to offer criticism of other people's projects and think about whether or not their projects have the same problems. She felt that this criticism allowed the students to think more.

Teacher 3 also said that she saw herself playing different roles in different courses. In her Advertising and Public Relations course, she focused on teaching the subject knowledge; whereas in her Public Speaking course, her role was more of a facilitator

– building the students' confidence through facilitating practice and giving encouragement. She felt that her students lacked confidence because of their lack of success in public examinations, she thus tailored her role to match the students' needs, trying to rebuild their confidence and lead them to find direction in their lives.

> *I want them to feel that they in fact have potential through my encouragement … As a teacher, I really hope they can take up their own responsibility to find and think.* (Teacher 3)

Encouragement is about "accepting people as they are and orienting them toward self-reflection and intrinsic motivational states" (Peterson & Seligman, 2004, p.225). Through her encouragement, Teacher 3 wanted her students to know that they were capable of learning and that they were able to do well in their studies; her aim was to remove her students' fear and worries, and in turn help them gain confidence, self-satisfaction, joy and an interest in learning. Though Teacher 3 labelled her roles as a 'deliverer and facilitator', her emphasis on encouragement indicates that she also played the role of a motivator.

Three other teachers – namely Teachers 4, 7 and 8 – said that they wanted to arouse their students' interest in the subject matter and the course materials. Since interest is defined as a motive in relation to intrinsic motivation (Hidi, 2000), being concerned about the students' interest meant these teachers played the role of motivator.

> *My philosophy is to arouse students' interest in the subject. They then explore further and do not rely on me to tell them everything.* (Teacher 8)

Teacher 8 believed that connecting the students' knowledge of computers to their daily lives would stimulate their interest, as they could directly apply the information they learned in class to the real world. Teacher 4 applied the same strategy to motivate students through relating students' knowledge of psychology to their daily life experiences. Despite labelling himself as a facilitator only, Teacher 4's words below show that he is also a deliverer who provides information and a motivator who wants to spark students' interest in learning.

> *I think I provide an environment and some information. Then I use strategies to make them feel interested in the material. I tell them how the material relates to them and their daily lives. Whether they can really learn or not, in fact, I cannot do it; that's why I said I am a facilitator.* (Teacher 4)

Teacher 7 explained why encouraging students to like the subject matter was important:

> *Another role of mine is to be a motivator; that is to stimulate them to find information….to make students like the subject. Since if they like something, they will find [information on] it. If they don't like it, even though they are sitting there, they won't listen. So in fact I often think about how and what strategies I can use to make them like a subject.* (Teacher 7)

The perspective of Teacher 7 and the other two teachers implies that they are concerned about their students' intrinsic motivation. These teachers felt that the instrumental motives – i.e. getting good results, obtaining opportunities to get into university programmes and future prospects – were not enough to make students the learn "with their hearts". The three teachers felt that using daily life experiences was a better way of arousing interest: Teacher 8 encouraged students to apply computer knowledge in their daily lives, Teacher 4 used daily life issues to explain psychological concepts, and Teacher 7 used examples of well-known companies and products to teach strategic planning and food management. Teacher 7 also felt that having a good relationship with students, and teaching them life skills and positive philosophies were important motivators.

> *My philosophy is that sometimes I feel like I infuse some values in my class unintentionally, such as being positive, industrious, not using trickery, having goals, and so on.* (Teacher 7)

Similarly, Teachers 3 and 5 stated that they believed that education is no longer simply a channel to teach information from the curriculum, but also a means to develop ‘the whole person’. They also sought to motivate students in learning and provide students with positive life influences.

To conclude, the participants took up a number of roles in the classroom: knowledge deliverer, facilitator and motivator. The findings show that teachers’ perceived roles were of a greater scope than the roles with which they labelled themselves. The meanings of education they perceived was strongly related to their perceived roles, but not absolutely so. The teachers who were instrumental-oriented also demonstrated their concerns about using various strategies to facilitate learning, and motivating students to learn and become independent learners.

Furthermore, the teachers who taught a number of different subjects often played a number of different roles. One potential factor affecting the dominant role played by a teacher in a particular lesson is the type of knowledge focused on in that lesson. For example, in a lesson that focused mainly on factual information, a teacher’s dominant role was that of a deliverer; while in other lessons which involved more conceptual thinking, problem solving and activities, the same teacher became a facilitator.

Throughout the semi-structured interview discussions and classroom observations, no single lesson focused on one single type of knowledge and no teacher played a single role in their class. All the roles were all intertwined, with the teachers achieving their goals in different subjects in different ways: guiding students to explore new knowledge, facilitating learning by inviting students’ involvement and connecting old and new knowledge, and, motivating students through arousing their interest in subjects, building up confidence and teaching them positive values.

The semi-structured interviews provide findings on teachers’ perceptions on students’ learning attitudes, their beliefs on those perceived attitudes and their views on the local education system as well as their roles in classroom. In the rest of the chapter, the findings from the VSRIs are reported and discussed.

4.5 Types of knowledge

Before finding how knowledge was explained (RQ1) and how explanation strategies support understanding of knowledge (RQ2), the first thing I did was to discover what kinds of knowledge the teacher participants explained in their lessons. This section reports the types of knowledge identified from the VSRIs and video data. As discussed in Chapter 2, for the purposes of this study the three most common types of knowledge in the classroom teaching context are classified as declarative knowledge, procedural knowledge and conceptual knowledge. These three types of knowledge involve concepts that require explanations to support understanding and learning. In the college classrooms in this study, instead of using these three categorical terms, the participants described the kinds of knowledge they taught as being skills/techniques/procedures, concepts, words, factual information, strategic concepts, routinized applications, steps/processes, and theories. Table 4.1 summarizes the eight types of knowledge mentioned by the participants (T1=Teacher 1 and so on) in the VSRIs. The numbers across each type of knowledge represents the time the eight participants mentioned. Since my aim is to identify what knowledge types the college teachers taught in their lessons for further analysis, the total frequency of knowledge types mentioned is not the focus here. Instead, I report the total number of teachers mentioned about those knowledge types in the last column because later on I could compare these numbers to the results from video analysis to see if any different between what they mentioned and what they actually did in the lessons.

Table 4.1 Codes referring to knowledge types from the first stage of axial coding of the VSRI data

Code no.	Types of knowledge	Teachers Number of time mentioned the knowledge types over the video-stimulated recall interviews								Total no. of teachers mentioned
		T1	T2	T3	T4	T5	T6	T7	T8	Total
1	Skills /Techniques /Procedures	1	2	1		1			1	5
2	Concepts	5	2	2	3	1		1	3	7
18	Words	1		1	1				1	4
58	Factual		2			5	1			3
83	Strategic concepts		2	1						2
84	Technical skills								1	1
87	Steps/ processes		1		1		1	1	3	5
98	Theoretical		1	1	4					3

To further investigate whether there may be any connection between explanation strategies and these different types of knowledge, I classified the eight types of knowledge identified by the participants into the theoretical typologies of knowledge – declarative knowledge, procedural knowledge and conceptual knowledge. The classification is shown in Table 4.2 with indications of teachers who mentioned those knowledge types in the VSRIs.

Table 4.2 Classification of knowledge types derived from the VSRI data

Teacher	Types of knowledge							
	Declarative				Procedural		Conceptual	
	Word meanings	Facts	Concepts	Steps/ Processes	Techniques /Procedures	Technical skills	Theories	Strategic concepts
Teacher 1	✓		✓		✓			
Teacher 2		✓	✓	✓	✓		✓	✓
Teacher 3	✓		✓	✓	✓		✓	✓
Teacher 4	✓		✓				✓	
Teacher 5		✓	✓		✓			
Teacher 6		✓		✓				
Teacher 7			✓	✓				
Teacher 8	✓		✓	✓	✓	✓		
Total no. of teachers	4	3	7	5	5	1	3	3

As discussed in Chapter 3, triangulation was used to enhance the trustworthiness of the study. Apart from studying the VSRIs data, I also analysed the video recordings (see Section 3.5). The videos tell us what kinds of knowledge the teachers taught in their lessons, and also show us the distribution of knowledge types throughout the different subject lessons. The video data revealed the same types of knowledge described in the VSRIs, and I further identified five types of concepts. On the left of Table 4.3 listed the different types of knowledge including eight types of declarative knowledge, two procedural knowledge and two conceptual knowledge. The ticks in the table represent the types of knowledge found in the videos of different lessons. The table shows us that the dominant type of knowledge in the classrooms was declarative knowledge, while procedural knowledge appeared in five out of the nine classes, and conceptual knowledge only appeared in three. In the following sub-sections, each type of knowledge is discussed based on both the VSRIs data and the video findings.

Table 4.3 Types of knowledge identified from the nine subject lessons

Types of knowledge			Teachers/ Subject lessons/ Types of knowledge identified from the vide data								
			T1 Graphic design	T1 Public speaking	T2 Interpersonal communication	T3 Public relations & advertising	T4 Abnormal psychology	T5 Research methods in psychology	T6 General biology	T7 Food service management	T8 Computer programming
Declarative	Word meanings		✓	✓	✓	✓	✓	✓	✓	✓	
Declarative	Concepts	Concepts of subject-related words & terminology	✓	✓		✓	✓	✓	✓	✓	✓
Declarative	Concepts	Object concepts				✓			✓		
Declarative	Concepts	Event concepts				✓					
Declarative	Concepts	Skill concepts	✓	✓	✓						✓
Declarative	Concepts	Behaviour concepts (psychological /neurological / communication)			✓		✓				
Declarative	Facts				✓				✓		
Declarative	Steps / processes								✓	✓	
Procedural	Techniques / procedures			✓	✓			✓		✓	✓
Procedural	Technical skills (computer programming skills)										✓
Conceptual	Theories /theoretical knowledge						✓				
Conceptual	Strategic concepts							✓		✓	

4.5.1 *Declarative knowledge*

The types of declarative knowledge evolved from the VSRIs data are word meanings, concepts, facts, and steps and processes.

Word meanings simply refers to general English words and terminology. This type of knowledge involves explaining the meaning of words but not getting into detailed concepts. Telling students the dictionary meanings of English words was a common practice that was captured in the videos. For example, Teacher 3 told the students the meaning of the word ‘mutual’ when she explained the term ‘mutually beneficial relationship’ in a PR lesson; while Teacher 7 gave the meaning of the word ‘internal’ when teaching the concept of ‘internal force’ in strategic management. Since the lessons were conducted in English and the materials were written in English, the teachers frequently needed to explain the meanings of certain general English words to support the understanding of written information appearing on the screen and in the students’ printed materials.

Giving the meanings of the English words was different from explaining their concepts. When dealing with the meanings of words, the teachers provided the Chinese translations of the words, whereas when explaining the concepts, the teachers provided detailed explanations of the meaning of words in relation to the topic under discussion. This implies that when dealing with words and terminology, explanations involved two levels – dictionary-type meanings and concepts. For example, the psychology teacher did not simply explain the lexical meaning of the word *delusion*, but further explained the underlining concepts of what exactly *delusion* means in psychology and distinguished it from similar concepts, like *illusions*. Likewise, knowing the lexical meaning of a term which refers to a particular skill is different from being able to perform such a skill. For example, after verbally explaining the lexical meaning of the word *monotone* in a public speaking lesson, the teacher demonstrated this concept using a flat tone of voice to explain the concept of the word as it relates to public speaking.

The phrase 'concepts' basically covered all the VSRIs in which the participants used the word 'concept' when talking about the content they taught. As discussed in the literature review, the types of concepts employed in classroom learning are divided into object concepts, symbol concepts and event concepts (Merrill, Tennyson & Posey, 1992). However, these authors did not make any connection between these concept-types and the different types of knowledge. If these refer to declarative knowledge, then the understanding of object concepts, symbol concepts and event concepts can be assumed to be limited to understanding only what the objects, symbols and events mean. If understanding a concept involves connecting symbols and related objects or events, then this requires more conceptual understanding of the various types of concept. Similarly, since an event concept concerns the relationship between living and non-living participants and may also involve some procedural elements associated with an event; knowing what the event means is one thing, while knowing the process of the event and the interrelation between items involved in the event is another. Therefore, when dealing with declarative event concepts, I separated these concepts into two categories: event concepts and skill concepts. Moreover, if those learning about an event are expected to not only understand the meaning of the event and its various procedures, but also understand the knowledge and skills needed to carry out the event, the knowledge type would shift from declarative to procedural. This means that while object concepts are declarative, both symbol and event concepts could be declarative as well as conceptual or procedural.

Circling back to declarative concepts, this study found that the teachers explained object concepts and event concepts but not symbol concepts. This does not mean there were no symbol concepts present in the college classrooms, however. In an abnormal psychology lesson, for instance, symbol concepts made an appearance when the teacher showed a chart representing some psychological research findings. The teacher did not teach or explain the mathematical concepts involved in the chart – such as what the x-axis and y-axis meant – since the students had already learned these symbols. The teacher did not explain the labels and numbers used in charts or tables as individual declarative concepts; instead, they used them to explain more complicated theoretical knowledge.

Apart from object concepts and event concepts, this study found three more types of declarative concepts: concepts of subject-related words and terminology, skill concepts and behaviour concepts. Table 4.4 lists the five types and examples as they appear in the different subjects.

Table 4.4 Types of declarative concepts in different subject areas

Concepts covered	Subjects	Examples
Concepts subject-related words & terminology	Graphic design	What is *colour symbolism*? What is *cultural specific*?
	Public speaking	What do manuscript and impromptu mean in public speaking context?
	Public relations and advertising	What are *internal relation* and *investor relation*?
	Abnormal psychology	What does *absence of stimulation* mean? What are Type 1 and Type 2 schizophrenia?
	Research methods in psychology	What are *internal* and *external validities*? What is a control group?
	General biology	What are *internal fertilization* and *external fertilization*?
	Food service management	What do *strategic management*, *external force* and *internal force* mean?
	Computer programming	What are two dimensional Arrays and three dimensional Arrays?
Object concepts	Public relations and advertising	What is out-of-home media? What are consecutive pages and gatefold?
	General biology	What is DNA? What is a female reproductive system?
Event concepts	Public relations and advertising	What is an PR event? What is issue management?
Skill concepts	Graphic design	What does 'fixing the image with words' mean in graphic design?
	Public speaking	What does monotone mean? What does pitch variation mean?
	Interpersonal communication	What does 'a denial response' mean? What is active listening?
	Research methods in psychology	What is experimenter bias? What does random sampling mean?
	Computer programming	What are 'access and assign values in arrays' ? What does 'pass the whole array' mean?
Behaviour concepts	Interpersonal communication	What is Asperger Syndrome? What are males' and females' communication behaviours?
	Abnormal psychology	What is obsessive-compulsive disorder? What is all-or-none reasoning?

Factual information is another kind of declarative knowledge appearing in the VSRIs. For the participants, examples of factual information include understanding the MRI scan images on male and female brains, or the biological systems of human bodies. According to the participants, even though they found the subject knowledge to be factual and straightforward, this knowledge involved concepts that were abstract to them, and therefore required detailed explanations. For example, although learning about the structure of DNA and the steps of protein formation was factual, Teacher 6 described these contents as being abstract to students because the students had never seen DNA in its real form. For Teacher 6, when knowledge is abstract, it involves concepts that need to be explained.

> *Since most people have not seen DNA… I think this area was a bit difficult for them. And the steps involved in DNA producing proteins are rather abstract, so it was hard for them to remember the whole process.* (Teacher 6)

Knowledge regarding steps and processes was approached differently. I classified steps/processes as a kind of declarative knowledge, since students were expected to know what the steps were instead of simply learning how to carry them out. For example, knowing about the steps of protein formation in DNA, and knowing certain kinds of HACCP management system procedures as described by Teacher 6 and 7 respectively.

The findings reveal that declarative knowledge was the most dominant type of knowledge appearing in the classrooms being studied. The data show that explaining concepts to students was the most essential activity in all lessons, with supporting student understanding of word meanings being considered equally important. College teachers normally provided the dictionary-type meaning of a word before explaining the concept of how the word is used and related to in the specific subject area. Facts were found in three lessons, Interpersonal Communication and General Biology, while steps and processes were only found in the General Biology and Food Service Management classes.

4.5.2 *Procedural knowledge*

Procedural knowledge is about knowing how to do something. In a college classroom, 'knowing how' is not simply about 'doing' – like knowing how to ride a bicycle without knowing how a bicycle works. Out of the nine subject classes investigated in this study, procedural knowledge was inclusive in five of them, including Public Speaking, Interpersonal Communication, Research Methods in Psychology, Food Service Management and Computer Programming. According to the VSRIs, being able to practically apply the knowledge learned was a primary concern for the participants. They expected that the students wanted understanding of the declarative form of knowledge – like what techniques were available – and then to be instructed on how to use those techniques in specific tasks. The participants referred to this ability as the application of knowledge, and I classified this knowledge into two types: techniques/ procedures, and technical skills in computer programming.

For techniques/procedures, the students were required to learn the techniques or procedures and be able to apply these in course assignments, their future studies, their work or their daily live. The students were required to follow suggested procedures when handling their tasks, yet they may perform differently when mastering the techniques. In terms of technical skills in computer programming, the students had to pick up the knowledge and immediately apply it in class in order obtain the expected results for further application. The students had to learn and apply the knowledge accurately; otherwise they would not be able to finish the tasks.

4.5.2.1 Techniques and procedures

The participants who taught procedural techniques emphasized on application of knowledge. For instance, in a public speaking lesson, Teacher 1 taught speech-giving techniques in the expectation that the students would apply these techniques in their presentations. The other three courses, on the other hand, aimed to equip students to use the taught skills in their real lives and in industry. These were Interpersonal

Communication, Research Methods in Psychology, and Food Service Management. Teacher 2 did not discuss in detail the idea of applying knowledge in the interview, but she claimed that interpersonal communication was more about daily life application than academic knowledge. Meanwhile, one of the assessment criteria in the public relations course was the application of strategies and tactical plans. Similarly, one objective of the research methods in the psychology course was to teach students psychology research techniques and procedures. The video record reveals that, while teaching students research techniques, strategic concepts occupied the main part of the lesson. When explaining those concepts, Teacher 5 used many examples to show how to apply them in real research projects, and why those techniques influence the internal and external validity. For example, she used a previous drug research to explain the technique of using placebo control. She told the students that she gave some vitamins instead of the drug to the participants in the placebo control group and the participants believed that they were receiving medication for reducing their psychotic symptoms.

4.5.2.2 Technical skills

Teacher 8 described the knowledge he taught in computer programming classes as technical skills. As opposed to other courses where students learned a lot of declarative knowledge and were expected to choose and apply the suitable techniques and procedures on their coursework, students in the computer programming class required hands-on application of concepts: they had to write computer programs using different computer languages in class.

> *In every lesson, I would bring up a concept, then show them some examples or programs in order to show the students what was going on, and how the concept could be applied.* (Teacher 8)

As the computer program created was highly specific, knowing only about its applicability but without accurate application would not guarantee acceptable results.

The application of knowledge was thus the students' goal in computer programming. Though there were steps the students could follow, Teacher 8 found that explanations of every single step and the outcome were essential since the skill concepts were abstract. Here, Teacher 8 gives his view of the technical knowledge he taught in a computer programming lesson:

> *In fact, both abstract and concrete. The major thing was to connect [the programming language] to the computer structure. I could not describe the structure, what this part and that part are like.* (Teacher 8)

Although the knowledge in Teacher 8's computer programming lessons was technical, the knowledge itself was abstract to the students since the concept of the program's structure could not be seen. In the video record of the computer programming lessons, Teacher 8 explained all concepts and techniques to help students understand how to write computer programmes – the students needed to understand what the symbols represented and how to write a program to create a specific outcome using a specific computer language.

4.5.3 *Conceptual knowledge*

Conceptual knowledge is about knowing why things exist, how things are related or are done in particular ways, and "is a form of representation that reflects your understanding of your declarative and procedural knowledge" (Byrnes, 2001, p.50). Therefore, conceptual knowledge implies a deep understanding of a single relationship or intertwining relationships between different concepts, and is the integration of other types of knowledge. The two kinds of subject knowledge that I identified as conceptual knowledge were theories (or theoretical knowledge) and strategic concepts.

4.5.3.1 Theories /theoretical concepts

Theories are conceptual knowledge since theoretical knowledge describes relations between objects and phenomena in reality. In turn, this involves knowing what, how and why things are connected and interrelated to each other.

> Conceptual knowledge consists of information on objects, humans, relations, instruments, etc. If it describes relations between objects, conceptual knowledge consists of theories – thus, it also can be called theoretical knowledge. (Harteis, 2012, p.336)

Theoretical knowledge is common in college classrooms, for example, psychological theories are discussed in psychology lessons, marketing and public relationship theories in communication courses, and so on. The participants claimed that they did not expect students to recite the theoretical statements, but rather to relate or apply those theories in life, as Teacher 4 put it:

> *Students learned cognitive theories in personality psychology. They learned it in theoretical way, which means they learned what the theory was about and how the theory related to their daily life. In this lesson, the theory would turn to an application that I could explain some extreme and abnormal behaviours.* (Teacher 4)

Findings from the video data show that the main content in psychology lessons was theoretical knowledge. In the lessons, teachers explained psychology vocabulary and terminology and their concepts to support understanding of the theories. Theoretical knowledge also appeared in the Food Service Management lesson, while Teacher 7 talked about the interlocking and interrelated roles of managers. Although Teacher 7 did not explicitly point out that the content was a theory, what she introduced was from a theoretical point of view.

4.5.3.2 Strategic concepts

The last type of knowledge described by the participants is strategic concepts. I put strategic concepts in the category of conceptual knowledge instead of declarative knowledge or procedural knowledge, because when the participants mentioned 'strategic concepts', 'skills' or 'planning', they referred to knowledge as being not only about 'what' and 'how', but also being about understanding the correlation between various concepts and understanding why one strategy is applied over the others in different situations. For example, when Teacher 2 talked about her public relations and advertising practices lesson, she said:

> *This subject is to learn strategic points, to learn how to plan advertising-related things ... I think it's relatively abstract because learning strategies, such as marketing strategies… is something conceptual, for example, how to distinguish between market segments or how to identify selling points*. (Teacher 2)

In spite of what Teacher 2 said, when analysing recordings dealing with the same subject in another participant's class, there were no strategic concepts introduced in that particular lesson. In that lesson, Teacher 3 focused on introducing public relations concepts and distinguishing the differences between public relations and advertising instead of teaching strategic knowledge.

Without being mentioned in the VSRIs, strategic concepts were also found in Teacher 5's research methods in psychology and Teacher 7's Food Service Management lessons. While explaining concepts and using examples to illustrate research methods skills, Teacher 5 also explained the concepts involved in using different strategies as well as the rationales behind the concepts and the different outcomes involved. In the food service management lesson, Teacher 7 talked about strategic planning and explained how the concepts of theoretical considerations could be implemented in food service management practices.

4.6 Instructional explanation strategies to scaffold new knowledge

Having some ideas of the knowledge types the college teachers taught in their lessons, let us now examine the strategies they used to help support students' understanding. From the one hundred codes derived from the VSRI data (see Appendix 15), nineteen codes which are listed in Table 4.5 are about the methods the participants used to teach new knowledge in their lessons.

Table 4.5 Explanation strategies identified from the first stage of axial coding from VSRI data

Code no.	Codes about strategies teachers used in their lessons	Teachers / Number of time mentioned the strategies in VSRIs								Total no.
		T1	T2	T3	T4	T5	T6	T7	T8	
3	Things happen w/o specific skills (counterexamples)		1							1
5	Use visual image (show concepts)	1		2	2	1				6
6	Use daily life examples	3	1	2	1			2	1	10
10	Use examples	5	4	10	2	3	1	3	4	32
15	Activity	5								5
19	Explanation (telling)	1	1		1	1			6	10
27	Prior knowledge	2		1	4					7
31	Use common mistakes / counterexamples								2	2
35	Use illustrations/diagrams/drawings						1		1	2
40	Demonstration/role play/acting	3	2							5
46	Use video /movie clips/ news clips	1	2	3	7	4	1	4		22
61	Use cases/ scenario		5	1	5	7		1		19
63	Misconceptions (counterexamples)				1					1
67	Use Cantonese/Chinese		1	1	1	1	1			5
74	Use charts /tables				3	1		1	1	6
80	Use written text on ppt - Explain concepts by using text		1	1		1	1			4
81	Use body language/ gesture/movement				1					1
82	Comparison and contrast	2		2	2	1		1	1	9
93	Visualization		1	1	2	1	1	1	2	9

The results of this stage of axial coding were then grouped together in the second stage of axial coding, whereby the emergent codes grouped under each theme were categorized into different strategies. For example, when I analysed the transcripts, *using daily life examples, using cases*, and *using counterexamples* were put into different codes. However, according to the participants, these different methods were used to give examples to support understanding. Therefore, they were all grouped together under the strategy of *using examples*. The same rationale was applied to other categorizations. *Use of videos, pictures, diagrams* and *charts* were grouped in the category of *using visual aids*. After some revision, I came up with eight types of explanation strategies as shown in Table 4.6.

Table 4.6 Categorization of explanation strategies from the second stage of axial coding

Strategies of explanations	Strategies coded from the interview data	No. of participants mentioned
Using examples	Using daily life examples	6
	Using cases	5
	Using counterexamples	3
Visualization / visual aids	Using videos /movie clips/ news clips	7
	Using pictures/images (show concepts)	4
	Using diagrams/drawings/illustrations	2
	Using charts /tables	4
Comparisons	Use comparison and contrast	6
Building on Prior knowledge	Prior knowledge	3
Using activities	Using activities	1
Teacher demonstrations	Acting/ role play, demonstration	2
	Body gestures/ movements	1
Using first language	Using Cantonese /Chinese	5
Verbal explanations	Explain by telling	5
	Using written texts	4

Besides the VSRIs data, the video recording analysis also provided further information about the use of these explanation strategies in supporting the understanding of declarative, procedural and conceptual knowledge and across the nine subject areas under investigation. The findings showing the distribution of explanation strategies the participants used to explain different types of knowledge identified in the video analysis of nine subject lessons can be found in Appendix 18 and 19. For example, from the video of the Graphic Design lesson, Teacher 1 taught three types of knowledge including word meanings, concepts of subject-related words and terminology, and skill concepts. When he explained word meaning, he used students' primary language and some daily life examples while when he explained skill concepts, he used pictures and spoken explanation to support understanding.

Evolved from the findings presented in Appendix 18 and 19, a table showing the relationship of explanation strategies and the types of knowledge was generated and attached in Appendix 20. The video data basically revealed the same explanation strategies as those discussed in the VSRIs. Yet, *using models/sampling*, which was not mentioned in the VSRIs, was identified from the video data as an additional strategy to give examples. Furthermore, the teachers talked about using cases which could be further divided into hypothetical scenarios and specific cases. Likewise, pictures/images were found to be used for two different purposes - giving examples and showing concepts. The ticks in the table indicate the types of strategy used to explain different knowledge types. For instance, daily life examples, prior knowledge, body gesture, first language and verbal explanations were the strategies used to explain dictionary-type meanings of English words. In general, the teachers used more types of strategies to explain declarative knowledge then procedural and conceptual knowledge, and verbal explanations were used to explain all knowledge types.

Though the major research focus target on what explanation strategies and how these strategies support understanding, knowing the frequency of each strategy used in each lesson provides not only more understanding of the distribution of the strategies in relation to different subject lesson, but also the weighting of explanation strategies in comparison to other scaffolding strategies in later discussion. The findings from the video data regarding the strategies used to support understanding in the nine different subject lessons are tabulated and presented in Appendix 21. The left columns of the table list the explanation strategies identified from the data. The numbers represent the number of time each strategies used in each lesson. For example, Teacher 1 used daily life examples ten times in his Graphic Design lesson. The last two columns show the total numbers of subject classes that used the strategies and the total numbers of strategies used in all nine lessons.

We can see from Appendix 21 that all subject teachers applied different types of strategies in their lessons. Yet, there were differences in the number of strategies used in different classes. Some strategies were used more frequent in some subject lesson. For examples, in Graphic Design lesson, Teacher 1 used ten daily life examples but no hypothetical example while when teaching research methods, Teacher 5 used seventeen hypothetical examples but not daily life example. Furthermore, there is no direct correlation between the total number of types of strategies and the total number of strategies used in each lesson. For instances, the frequency of strategies Teacher 5 used was ninety-five times; but she used seven types only. This happened because though Teacher 5 used a lot of strategies, she focused on only seven types. In contrast, the total number of time explanation strategies used in Teacher 3's lesson was fifty-seven times but she used thirty types of strategies in that lesson.

The following discussions will look at individual types of explanation strategies in relation to teaching different types of knowledge and different subject areas as shown in the above two tables. Each of these strategies will be discussed together with quotations from the participants from the VSRIs and supportive evidence found from the video recordings and class observation to explore the strategies the college teachers applied in their teaching practices.

4.6.1 *Using Examples*

The video findings, as shown in both Appendix 20 and 21, show that examples were commonly used when teaching all three types of knowledge in all nine subject lessons. In discussing teaching strategies in the VSRIs, all of the participants frequently brought up the idea of using examples. They shared many ways in which they use examples when trying to explain new concepts to their students, and explained the reasons why they selected those examples.

4.6.1.1 Daily life examples

Daily life examples, which refer to the use of objects or issues in students' daily life experience, were used to support understanding of words, concepts and theoretical knowledge, but not when teaching procedural knowledge. These examples appeared in the eight different subject areas where concepts were the major focus in class. In Graphic Design in which concepts covered the whole lesson, ten out of eleven examples the teacher used was daily life examples. The VSRIs data shows that the most important criterion for selecting or creating examples was that the examples should be close to the students' life experience, and all participants mentioned 'daily life elements' and 'something close to students' daily life'.

Teacher 3 provided her views on using materials that were close to the students' lives in her Public Relations and Advertising lesson:

> *Sometimes, there are some very good overseas examples, but they could not understand it…I prefer to choose examples that are closely related to the students*. (Teacher 3)

The teachers purposely chose to use examples that were related to students' life experience because they realised that examples with unfamiliar context may not help explain or support understanding. Teacher 1, who taught Graphic Design and Public Speaking, also emphasized the importance of using daily life examples.

> *I use something more daily life, something they know, to bring students into the concept*. (Teacher 1)

The following scene was captured in the video recording of Teacher 1's graphic design lesson: when Teacher 1 introduced the concepts of denotation and connotation, he used the Roman letter *A* as an example. He told the students that the denotation of the symbol *A* has a literal and stable meaning that could not be represented by another symbol such as *B*. Then he took out one student's work, wrote down a letter *A* on it and asked if the letter *A* on the assignment could be interpreted as the first in the alphabet. Some students shook their heads and one said that the letter *A* in that application meant good performance. Lastly, he explained to the students that the meaning behind the letter *A* on an assignment is its connotation in that specific context.

This example supported the explanation of both concepts and the students immediately picked up on the idea. They started to give responses to Teacher 1, for examples, roses could represent love and romance, to show their understanding. The rationale Teacher 1 held was that using daily life examples encourages students to think more instead of waiting for model answers from their teachers. When asked to explain why he used a student's assignment, the letter *A* and the pictures of rose and cross, he said,

> *I feel that it is more important for the students to voice the answer than for the teacher to give them a model answer*. (Teacher 1)

From Teacher 1's point of view, using daily life examples to support explanation of concepts is a way to inspire them to think more and combat the problem of the students often asking for model answers.

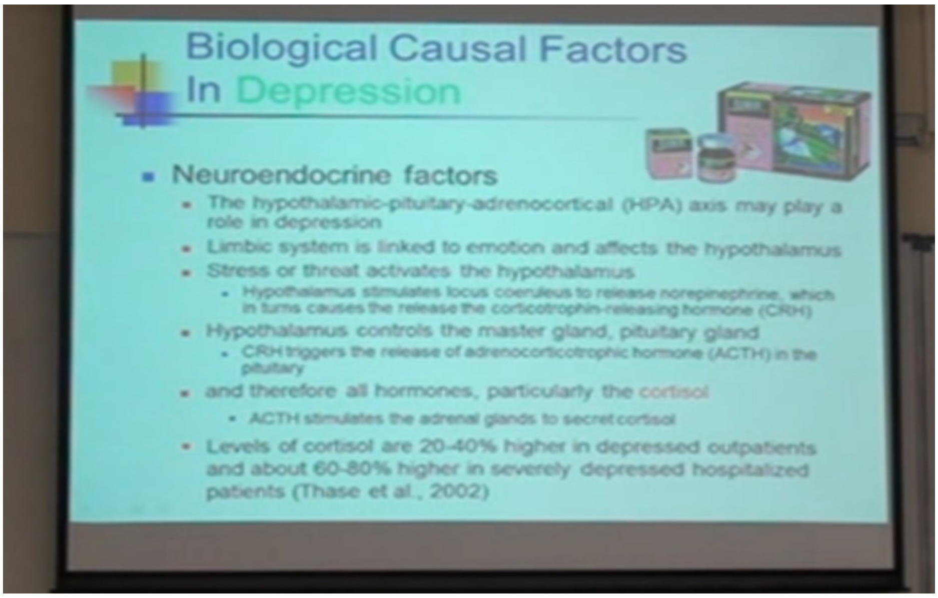
Teacher 7 also made use of daily life examples to get students involved in the learning process while she explained new concepts. In the Food Service Management class, all the examples used were local brands and food products found in Hong Kong. For instance, when explaining the concept of franchising, she used 7-11, the most popular convenience store in Hong Kong, as an example. She claimed that using familiar brands aroused more interest in the students and helped them give feedback, as they connected the concepts with things around them.

Daily life examples also help with memorization according to Teacher 5:

> *[When it is] relevant to their daily life, it lets them know there are these kinds of people, and how they can solve these problems when they meet…When they remember the examples, they remember the concepts*. (Teacher 5)

The skilful use of familiar items can support understanding of the way subject knowledge is related to daily life and at the same time facilitate learning by retaining students' attention. When explaining the causes of depression and their relationship with cortisol levels, Teacher 4 put up a PowerPoint slide with a picture of local Chinese food supplement, as shown in Figure 4.1. The supplement was well-known among the students, and one of their TV commercials emphasizes that their product can lower cortisol levels and thus boost the user's mood and energy level. By using this picture, Teacher 4 easily explained the connection between the product and the theories at hand, facilitating understanding and giving a stronger impression of the new concepts. Also, adding this kind of 'gimmick', as Teacher 4 called it, could input some interesting elements to a theory-heavy lesson.

Figure 4.1 An image of a health product shown on a PowerPoint slide



4.6.1.2 Hypothetical scenarios

Hypothetical scenarios refer to examples created by the college teachers to explain concepts. According to the video analysis, the participants used them to explain the subject-related terminology, object concepts, skill concepts, behaviour concepts, theories and strategic concepts. They were found in lessons that focused particularly on theories, strategic concepts and skill concepts, such as Abnormal Psychology, Research Methods in Psychology and Interpersonal Communication respectively.

Creating scenarios was one frequently-used strategies in psychology lessons. Teacher 4 did not use the word 'scenario' in the interview, but when he was asked how he explained psychological concepts, he said:

A real example would be how some patients had certain kinds of thoughts. But when it comes to elaborating, I refer back to the students. (Teacher 4)

What he means here is that he fitted the concepts into a daily life situation or a hypothetical scenario to help students understand how different patients would think in different ways in different scenarios. Here is an example captured from Teacher 4's lesson. He wanted to explain the psychological behavioural concept of 'all-or-none reasoning', so he created a scenario in which he was in a relationship with a girl called Bonnie. He said,

Bonnie, how much of the time do you feel happy or not happy? Bonnie says, 'well, I have good time with you. 80 to 90% of time with you, I'm very happy.' So do you think we have very good relationship? 80 to 90% of the time we feel happy. Normal people think it's happy. But depressed people look at it from a different angle: "10 to 20% of time that we are together you don't feel happy. If you don't feel happy, please go. It means you don't love me. If you don't totally love me, you don't love me. If you don't love every part of me, you don't love me. If are not always happy, we are not happy. This is what we meant by all-or-none.
(Teacher 4, Abnormal Psychology)

In Teacher 5's lesson, she explained some research concepts by creating scenarios that could possibly happen in a research study. For example, when she explained the term *selection bias*, she provided a scenario about a 'quit smoking' group:

If you post an ad on newspaper to recruit participants saying that you are 'inviting all volunteers to join my quit smoking group', and if they agree to join your study, basically they already want to quit – they have the motivation to quit. So their performance will be much better than the general population. If you say that 'this group is an experiment, please join if you are interested' and they come, then they want to quit. Those who do not want to quit would not join your programme. So, this is selection bias. The participants who join the study, *the volunteers who join the study, may create a certain bias in the results.* (Teacher 5, Research Methods in Psychology)

The frequency of using hypothetical scenarios in Interpersonal Communication was not as much as the above two psychology-related classes, yet over the course of the VSRIs, the word 'scenario' was only mentioned by Teacher 2 when she talked about how she explained concepts in the communications lesson. She stressed that though students were not required to perform the communication skills, the course still expected them to know the concepts of those skills and apply the skills in assessment questions. Therefore, she used scenarios to explain how these skills could be applied in different situations. In the interview, she provided an example that when she taught active listening skills, she would use a scenario that the students needed to talk to a friend who has just broken up with a significant other. She said that there were two benefits of using scenarios.

To get them to listen to me. Another reason is for application – if you ask them ten times, and they recite the things, still useless. We must use some scenarios, and [they] know how to apply them; the whole course is like this. (Teacher 2)

Learning by rote and recitation was one of the concerns held by the college teachers. We see that Teacher 2 took this concern into account – using scenarios to explain concepts would help the students avoid learning by memorization alone.

Teacher 4 used scenarios to explain psychological terminology and behaviours, Teacher 5 used scenarios to explain not only what techniques and strategic concepts in research method meant and how the concepts could be applied, but also how the applications could affect research results and the research rationale, while Teacher 2 used scenarios to explain how communication skills could be applied in social situations. In other words, using scenarios is an explanation strategy to teach declarative, procedural and conceptual knowledge.

4.6.1.3 Specific cases

Specific cases refer to cases happened in real contexts, such as news report cases, research cases and medical cases. Similar to hypothetical scenarios, specific cases were used to explain declarative, procedural and conceptual knowledge. Teacher 2, who also taught public relations courses, claimed that using cases to illustrate abstract and conceptual elements in public relations marketing strategies was essential in her public relations and marketing lessons.

> *Using cases is very important. You use cases to help them understand how to distinguish different concepts.* (Teacher 2)

She said that the students would not understand how to analyse a marketing situation if she simply told them what the marketing strategies were. For instance, students need to know how to identify different market segments, how to find target audiences, how to take different factors into consideration like income, lifestyle, personality and values. She added that using cases of product brands that were familiar to the students also helped facilitate understanding and arouse their interest in learning.

> *Since they know all these products, these are things that they come into contact with in their lives… then as they have seen, they would understand easier and be more interested.* (Teacher 2)

Teacher 4, in his psychology lessons, also used cases to help students understand mental illnesses.

> *Looking at cases in this course is very important. Even though they can visualize those cases, usually these cases are not near them. So I often read the newspaper, and when I find anything related to certain illnesses, I show these news clippings to them. Then they can easily link these up with what they have learned.* (Teacher 4)

Teacher 6's Food Service Management lesson provides another example. She explained in the VSRI that the students may not consider what factors should be taken into account when starting a business. Using the video to show a specific case of a well-known herbal drink brand, *Hung Fook Tong*, and the brands transformation from a traditional herbal drink shop to a more contemporary image to expand their customer base; she explained both strategic management processes and concepts. Here is an extract from her video:

Teacher 6:	*Can you bring out some of the ideas from the video you've just watched? What were the external factors that caused Hung Fook Tong to reform?*
A student:	*The customers think that herbal tea is old-fashioned*
Teacher 6:	*The customers think that herbal tea is old-fashioned. Then what kinds of people do not drink herbal tea?*
Students:	*Young people.*
Teacher 6:	*Young people don't drink it as they feel it's old-fashioned. So if their customer base targets only elderly customers, it's too narrow. They want to expand the market, so that young people and even children would not think [the herbal drink tastes] bitter. Then the market would be bigger.*

(Teacher 6, Food Service Management)

Teacher 6 made use of the herbal drink company as an on-going example throughout the lesson, using it to explain everything from vocabulary to strategic planning. She claimed that using well-known brands related to students' lives and social situations would support understanding and get students involved in the lessons.

Apart from using secondary sources, Teacher 5 shared research cases she had come across in the course of her psychological research.

> *If I had met those kinds of patients before, then I share the cases, tell them what I saw, and what symptoms they showed us. If there is something that I haven't seen, then we use videos to see the cases.* (Teacher 5)

4.6.1.4 Counterexamples

There is evidence from the data that the college teachers not only provide the correct information, but also use negation in their explanations. Counterexamples refer to cases or situations that use incorrect concepts or missing skills. The participants use the counterexamples to explain declarative concepts and procedural knowledge. When teaching concepts of listening skills in the Interpersonal Communication lesson, Teacher 2 showed a documentary about a real case of a child with Asperger's syndrome. They explained that the students felt they knew how to talk to and listen to people and did not have any concept of how missing these fundamental skills could seriously affect one's life. The example allowed the students to understand how what they normally took for granted in the communication process could present difficulties and cause a lot of trouble for a patient in their interpersonal relationships.

In their psychology lessons, Teacher 4 also used counterexamples to explain and clarify various misconceptions. He liked selecting movie clips, since the people who made the movies usually had no background in psychology and he felt these productions were good examples through which he could clarify inaccurate concepts.

> *There are a lot of misconceptions in movies. Sometimes I choose particular movie producers that have not studied abnormal psychology and may hold certain misunderstandings. Sometimes, I purposefully use them to clarify these misunderstandings.* (Teacher 4)

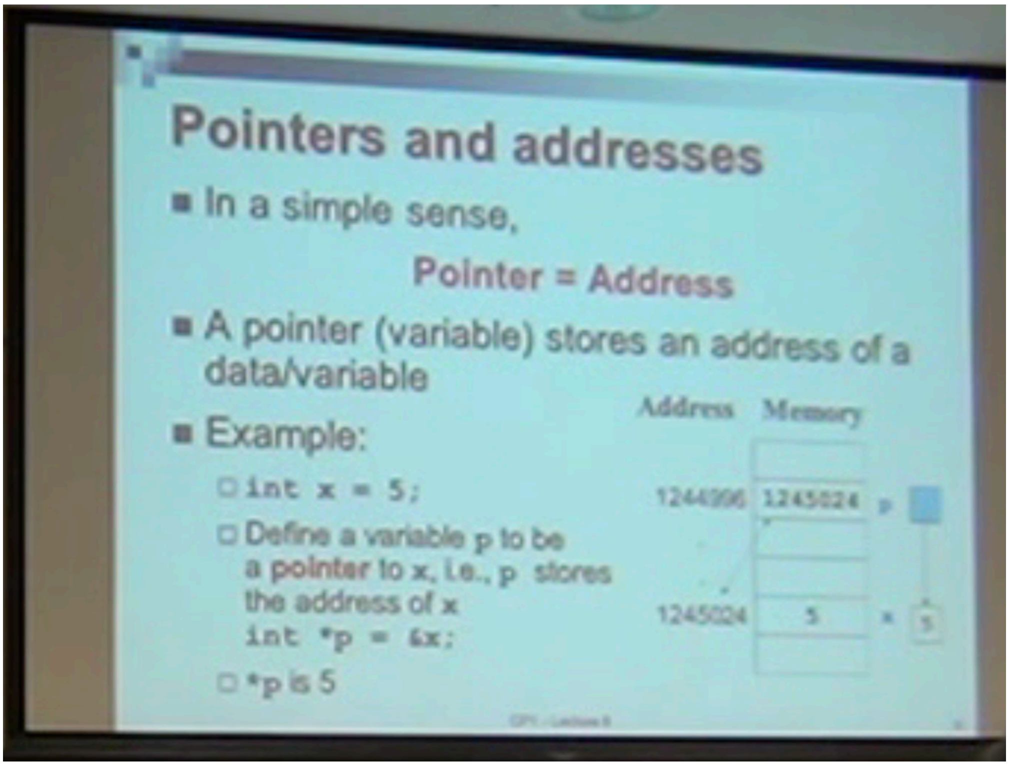
When dealing with technical skills using computer language, Teacher 8 uses counterexamples and explains to the students what mistakes they made and how they can avoid making those mistakes when they apply the skills when writing computer programs.

> *I want to show some common mistakes. Before they try things out, I tell them 'those are mistakes and don't do it wrong again'. Then they can avoid making those common mistakes.* (Teacher 8)

4.6.1.5 Using models/sampling

Using models and sampling as examples was a strategy that was not mentioned in the VSRIs but was found for explaining procedural knowledge when the video data were analysed. This kind of examples only appeared in Graphic Design, Public Speaking and most in the Computer Programming lesson. Teacher 1 showed graphic design samples and used himself as a performing model of public speaker in his two subject lessons, while Teacher 8 showed samples of computer statements, as shown in Figure 4.2 for instance, and then he verbalized the development of those statements to explain how specific computer programming language should be used for particular purposes. It was then expected that the students would follow the model statements to write their computer programmes.

Figure 4.2 A model example and diagram illustration in Teacher 8's computer class



4.6.2 *Using visual aids*

Visualization was another technique commonly used by all participants across all courses to explain concepts. It refers to using videos, images, diagrams and charts instead of words. Although showing words on a screen is also technically making use of visual aids, I put this method into the verbal explanation categories, as written words are a kind of verbal communication (Steinberg, 2007). The teachers used various types of visual aids to support students' understanding of declarative concepts in particular, and also procedural and conceptual knowledge.

4.6.2.1 Videos

Except for Teacher 8 in computer programming, all other participants used videos to support the explanation of concepts. Teacher 4 explained that movies were used throughout the abnormal psychology course because many of the course concepts are illustrated in movies. In one of the classes observed, for example, after verbally explaining the concept of *delusion*, he showed movie clips in which the character was portrayed as suffering from that mental disorder. He pointed out in the VSRI that the concept of delusion is difficult to explain in words, but the movie clips clearly showed the symptoms of a patient with schizophrenia suffering from delusions. Teacher 4 believed the clips not only gave a strong impression of the concept to the students, but also made the idea easier to understand for students of all cognitive levels.

> *The usage of video caters to those whose cognitive availability is not so high. Through the case, they can understand the concepts much easier*. (Teacher 4)

He mentioned that movies help the students visualize the behaviour concepts he had presented on PowerPoint. In addition, he added video clips also helped him overcome limitations on teaching time.

> *It's very dramatic, because a five-minute talk could be replaced by a two-minutes clip. I also consider the efficiency…using pictures can replace a very lengthy explanation*. (Teacher 4)

Teacher 5 was observed to use a scene in the movie *As Good as it Gets* (Brooks, 1997) in which the character Melvin Udall keeps using hot water and many pieces of soap to wash his hands to illustrate *obsessive compulsive disorder* (OCD). She explained this later in the VSRI:

> *In fact, the students would feel scared to see so many words, but the video gives them the basic concept, showing them that OCD patients could have those characteristics*. (Teacher 5)

The use of video clips was thought to be similarly essential in teaching advertising, given that TV commercials are important in the advertising industry and digital video advertising is the fastest-growing advertising medium today. Thus, in the advertising and public relations course, using videos to facilitate explanations of different concepts, effects and strategies was considered unavoidable.

As mentioned above, many parts of the study of biology, such as the structure of DNA, is conceptual to students –they do not actually see DNA in their daily lives. Animation provides a more direct way to visualize the structure and biological processes of DNA.

> *Since animations move, the students more or less learn how DNA splits, how the enzyme moves on the DNA, and then produces RNA, which means making protein*. (Teacher 6)

Videos can also demonstrate skill concepts. In a lesson on communication skills, Teacher 2 used videos to demonstrate different listening skills. She played a video of an impatient nurse listening to a patient. The video demonstrated poor listening skills in order to support her explanation of good listening skills. When she was asked what she considered when preparing the lesson, she said,

> *I think about how to arouse student interest. Since this topic (listening skills) was very simple, they would think it was all common sense. But I want to find some cases to demonstrate different skills, I found something related to the listening process to demonstrate to the students*. (Teacher 2)

So, using videos can help catch student attention, show examples of both appropriate and inappropriate skills in different scenarios which may be otherwise difficult to demonstrate in the classroom setting.

4.6.2.2 Pictures/images

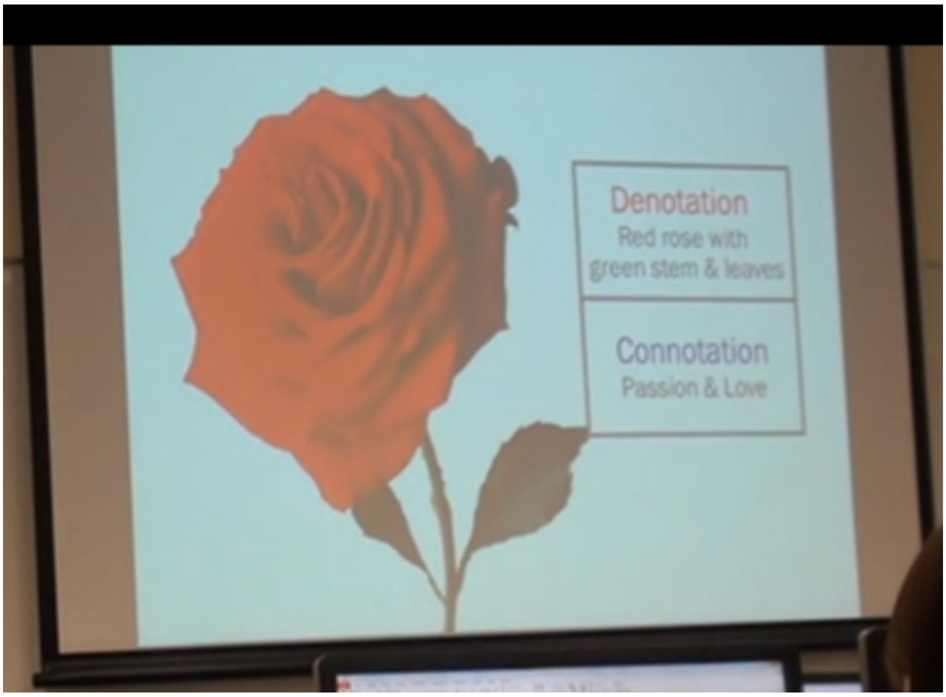
Pictures and images also featured frequently in efforts to support teachers' explanations. The video data reveal that seven college teachers in the study relied on pictures and diagrams to explain new ideas.

Both Teacher 2 and Teacher 3's classes used visual images illustrating many examples of creative advertisements and innovative PR events via pictures. When teaching students about different kinds of print ads, Teacher 2 showed the students examples from a local newspaper and photos of print ads from some magazines, as in Figure 4.3. Using pictures was the most direct way to illustrate different types of advertising.

Figure 4.3 An example of advertisement using 'consecutive page layout' shown on the screen

Pictures were also particularly important in the graphic design course. Teacher 1 put many pictures on a screen to help illustrate concepts in the field. For instance, he used pictures of various items to help the students understand concepts of *denotation* and *connotation*, such as the association between a rose and love (Figure 4.4).

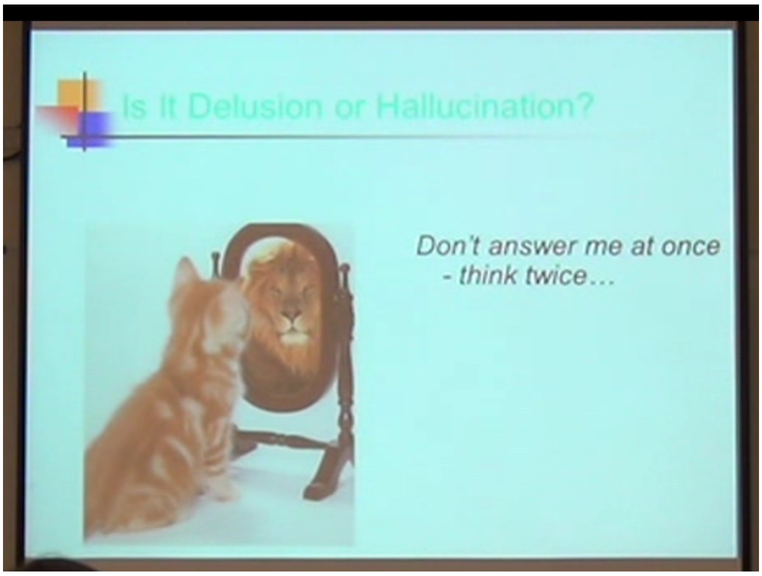
Figure 4.4 A picture of a rose Teacher 1 used to explain the concepts of 'denotation' and 'connotation'



The findings also reveal that pictures can serve different purposes: examples and tools through which teachers can elaborate on concepts. For example, in the Public Relations and Advertising lessons, the teachers used images to explain concepts of objects while the Graphic Design lesson used images to explain concepts of subject-related words.

Teacher 4 was observed to use pictures to support their explanations of new knowledge; but unlike in graphic design and advertising, the pictures in the psychology lesson was not the main teaching tools. They only provided visual support and embellishment for wordy PowerPoint slides; or they were used to check understanding and clarify concepts. For example, Teacher 4 asked the students whether the image shown in Figure 4.5 represents *delusion* or *hallucination*, and then clarified those concepts further.

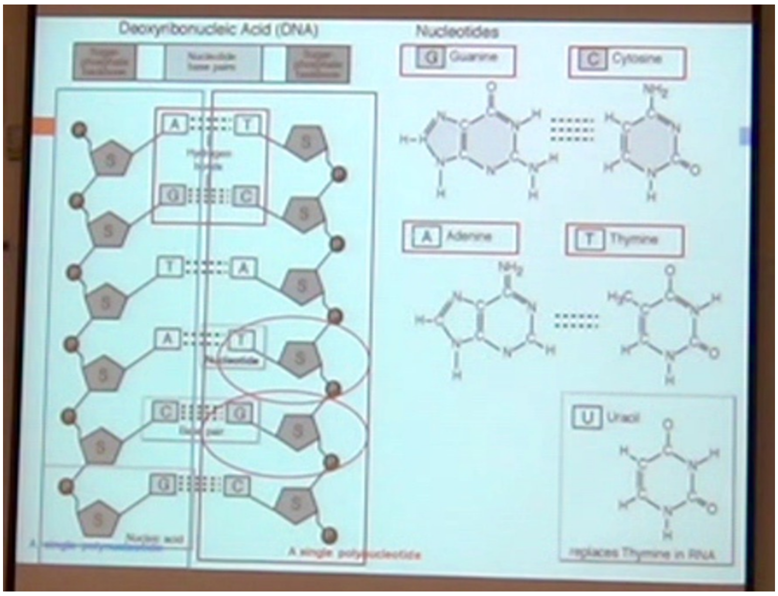
Figure 4.5 A picture that Teacher 4 used to illustrate the concepts of 'delusion' and 'hallucination'



4.6.2.3 Diagrams, charts and tables

In biology lessons, visual images were provided mainly in the form of diagrams and charts, as shown in Figure 4.6. These images played an important role in illustrating biological structures and processes. Since many biological components are invisible without a microscope, Teacher 7 claimed that diagrams and charts help visualize the components and effectively support explanations.

Figure 4.6 Structural diagrams of DNA showed in Teacher 7's biology lesson



Charts appeared a lot, not only in biology lessons, but also in psychology, food service management and computer programming. When explaining the process of DNA transcription, Teacher 7 used flow charts to support the explanations. When Teacher 4 discussed statistical data in relation to psychological illnesses and theories, he used bar charts and tables like the examples in Figure 4.7 and 4.8.

Figure 4.7 A bar chart Teacher 4 used to explain causal factors in schizophrenia

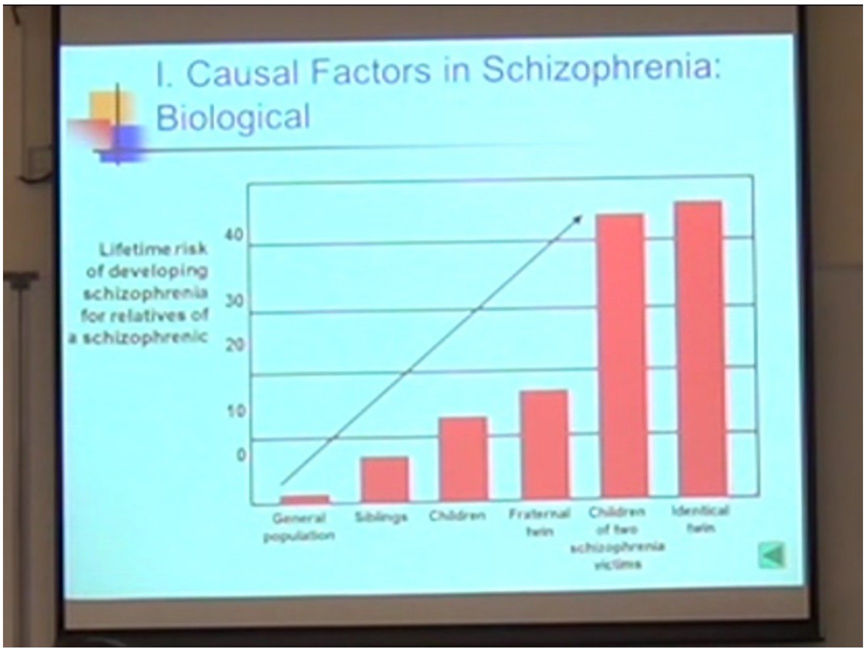
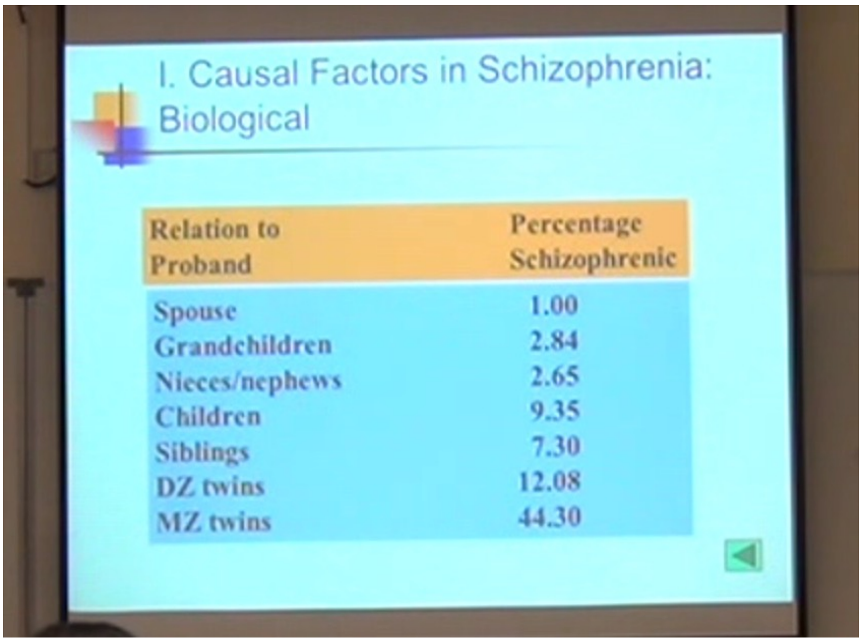


Figure 4.8 A table Teacher 4 used to explain causal factors in schizophrenia

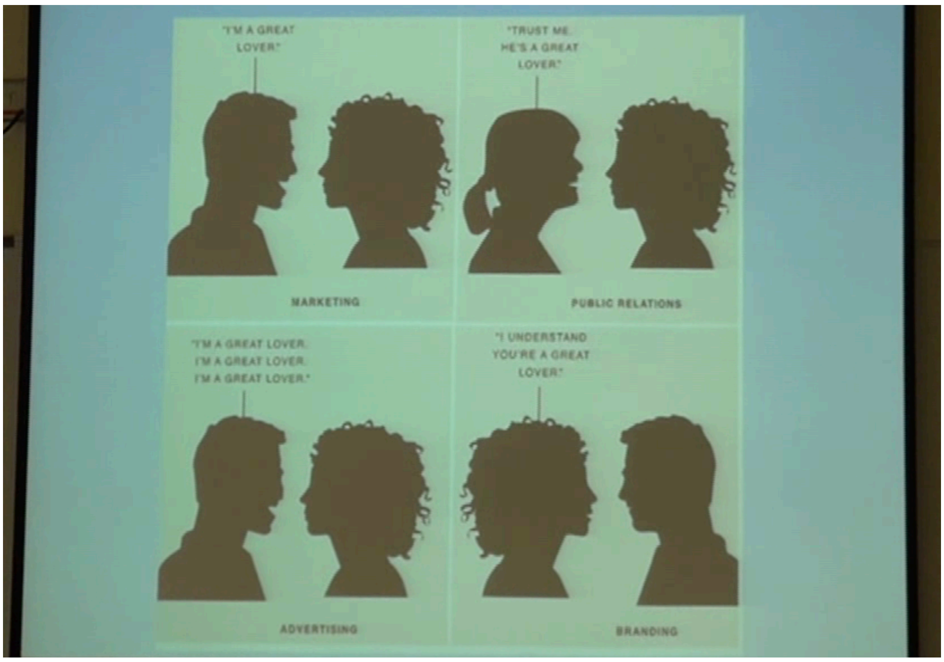


4.6.3 *Making comparisons*

Despite not being mentioned in the VSRIs, making comparisons and contrast is another strategy which was identified in the video analysis. From Appendix 20 and 21, we can see that making comparisons was used by seven teachers to explain and clarify declarative concepts.

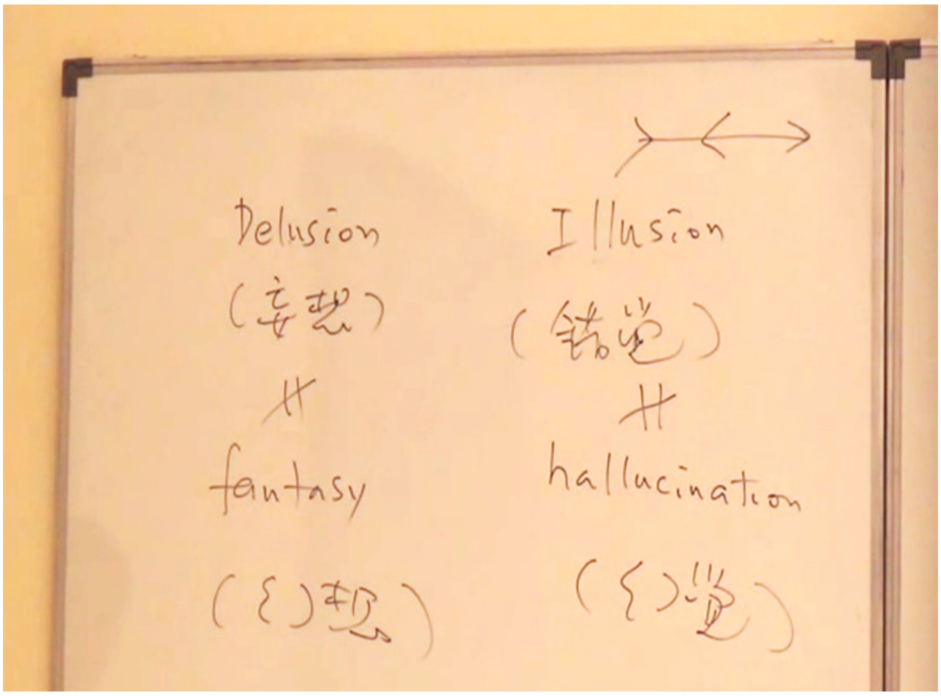
Teacher 3 used the strategy to contrast the four different concepts: credibility in public relations, marketing, advertising and branding. The illustrations in Figure 4.9 were created by Neumeier (2007) to demonstrate the four concepts through human relationships. In the lesson, Teacher 3 asked the students to think about the differences between them before moving onto theoretical explanations. She did not want to explain the concepts by telling as she believed that the students would not understand and may end up just memorizing the concepts. She found it more effective to stimulate students' thinking and support her explanations of the four similar concepts by using pictures which depict human relationships to illustrate these concepts.

Figure 4.9 Illustrations Teacher 3 used to explain the differences between marketing, PR, advertising and branding



Similarly, in the psychology lesson, Teacher 4 contrasted 'illusion', 'fantasy' and 'hallucination' with 'delusion', as shown in Figure 4.10. He explained that since both the English spelling and the Chinese phrases for the words are to a certain extent similar, this might cause confusion for the students. Thus, when he taught the concept of 'delusion', he decided to explain it through the meaning of the word and the symptoms of the illness, and by contrasting it with three other similar concepts to help the students to differentiate between them and avoid misunderstanding.

Figure 4.10 Four related concepts with Chinese translations written on the whiteboard for comparison



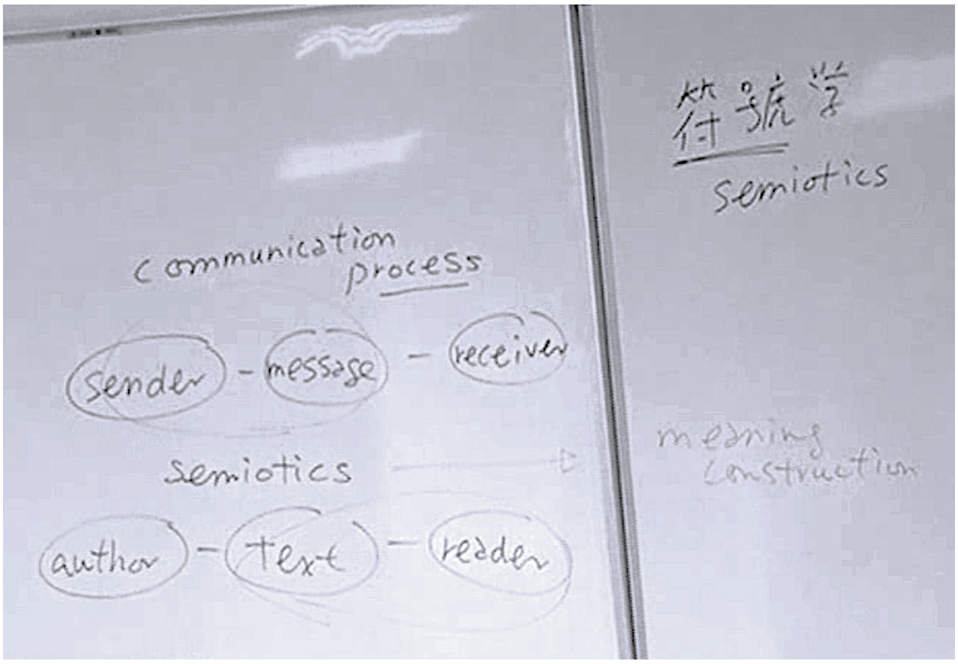
4.6.4 ***Building on prior knowledge***

As has been discussed previously, prior knowledge has an important role to play in both learning and the process of scaffolding. Yet the VSRIs data shows that only two participants gave credit to the students' prior knowledge during the teaching process. Teacher 1 believed that prior knowledge was necessary for the students to pick up new knowledge and to create new ideas:

The concepts I mentioned could only be consolidated when people were in touch with it before. So having curiosity and knowing about things around us can help generate new things. They may not be able to reach this level, so perhaps they need to learn and create new things through their prior knowledge. (Teacher 1)

For example, Teacher 1 drew on the whiteboard when introducing the concept of semiotics as shown in Figure 4.11, a captured photo from the video data.

Figure 4.11 Illustrations Teacher 1 drawn on the whiteboard to explain the concepts of 'semiotics'



Teacher 1 introduced semiotics by writing a Chinese translation on the board alongside the English meaning. He then brought up a communication process that the students had learned in another public speaking course and contrasted its focus with the ideas of semiotics. As public speaking was a core course that all students had to take, most of them had learned the concept of communication processes before. By using this prior knowledge, Teacher 1 compared and contrasted the new concept of semiotics with the communication process. This illustration skilfully facilitated the students' understanding of the similarities and differences between the two processes.

Teacher 4 also mentioned that in psychology, many concepts are interconnected, so bringing in prior subject knowledge to connect with the new information helps students see the connections among the concepts.

> *I would try to make them connect the knowledge they learned before…I would tell them those two things were related, and hope that they could recall the things they had learned.* (Teacher 4)

Teacher 4 emphasized that psychological terminologies were a great challenge for the college students. He, thus, placed a lot of effort on teaching the meanings and concepts of the terminologies. For example, when Teacher 4 explained the word *echolalia*, he brought up the word *echo* in both English and Cantonese before giving a role play. Since the word and concept of echo are familiar to the students, the students soon connected the idea of echo to the newly introduced word *echolalia*. Similarly, when the word *asociality* was introduced, he drew on students' lexical knowledge and connected it with the related lexis *socialise*.

Although only two participants mentioned prior knowledge during the VSRIs, it was not difficult to find that prior knowledge, including both daily life knowledge and subject knowledge, were used in verbal explanations in the video analysis. For example, Teacher 3 recalled the definition of public relations that the students had learned when looking at the subject in more detail; while Teacher 5 reminded the students about their prior experience on a field trip to explain strategic planning concepts; and Teacher 6 used pictures of different species familiar to students to introduce the concepts of internal and external fertilization. According to the video analysis, the participants brought up prior knowledge mainly in the process of explaining word meanings and concepts. Though prior knowledge has been deemed to be essential in knowledge construction, as discussed in the literature review; in fact, it was not frequently used in college classrooms.

4.6.5 *Using activities*

Teacher 1 was the only participant who used activities to explain concepts. Instead of telling the students the meaning of 'culturally specific' or showing pictures or symbols, he taught the concepts through an activity in which the students could experience the meaning of the concept. During the activity, he divided the students into six groups and asked them to write down words that related to two colours, red and blue, on the whiteboard.

The students thus developed the materials to be used, and Teacher 1 made use of their words to explain the concept. Afterward, he discussed the words and how they related to colours, meanings and culture in the students' generation. Teacher 1 explained that the wide variety of items the students had provided was a testament to the many changes and social trends that had occurred during their generation. The activity allowed the students to learn about both the concept of 'culturally specific' and the meaning of it via the items they provided.

> *When I taught the concept, I hoped to do it through application, something close to them. I wanted the students to learn their experience.* (Teacher 1)

In another activity, Teacher 1 then put all the students together, moved them around to form different combinations, and explained the concept of colour association. This allowed the students to experience the meaning and feeling generated by different combinations of colour schemes. Since the concepts involved were abstract, the students got the chance to directly feel these effects.

Although using activities was not a common strategy, Teacher 1 demonstrated how activities can effectively explain abstract concepts. He emphasized that the activity generated students' interest in understanding concepts and increased their sensitivity to elements around them. This ultimately got the students involved in thinking and participating in the learning process. By making use of the students' experience and items from their daily lives, his intention was to take 'knowledge out of the textbook' and show students that knowledge exists everywhere in life.

4.6.6 *Teacher's demonstrations*

I refer to teacher's demonstrations as a kind of strategy whereby the participants use their bodies to support student understanding of concepts, including acting, role-play, demonstration and use of body gestures. Over the VSRIs, Teacher 1 was again the only participant who discussed performing demonstrations in class. He claimed that in a public speaking lesson, his way of teaching was a demonstration.

> *For speech delivery, for example, clear pronunciation, voice variation…in fact, there is no demonstration found in books. So, that's why the role of a teachers is that of a demonstrator. That means our performance shows what good speech delivery is.* (Teacher 1)

As shown in Table 4.10, through the video analysis, four more participants were found using their bodies to support their teaching. Similar to Teacher 1's public speaking class, the research methods lessons involved a lot of skill and strategic concepts. Teacher 5, while creating hypothetical scenarios to explain the use of various research skills, role-played and thought aloud frequently to explain the strategic influence of those skills, for instance, what proper manners meant in a questionnaire research, what would be the feelings generated by improper researcher manners on research subjects and the possible effects on a study.

Body language and demonstrations were not necessarily used only for the purpose of delivering skill-based concepts. Teacher 4 often acted and role-played to teach terminology and concepts of psychological behaviours in his psychology lesson. For example, when he explained the meaning of *neologism*, he acted as a thought-disordered person talking to himself on a train, mumbling and shouting things without meaning. When he explained the word *echolalia*, he role-played an echolalia patient talking to a psychiatrist where the patient keeps repeating the psychiatrist's questions.

Body language was also found by Teacher 3 to support the understanding of dictionary-meanings of English words. When she told her students that the definitions of public relations they were learning were more in-depth then those in the introductory part of the course, she waved her hand above her head and then below her chest to show the meaning of the words *shallow* and *deeper*. Although using body gesture is not necessary a demonstration, it served the same function in the lessons to support understanding. Therefore, I put this type of strategy in this category.

4.6.7 *Using the students' first language*

Using English as a medium of instruction was frequently a challenge for the teachers because the students' general English proficiency was relatively weak. English was therefore a barrier hindering their learning and understanding, and overcoming this barrier was always a consideration for the teachers.

To facilitate their understanding, providing Chinese meanings for the English words was a common practice in the classrooms. Although only five participants mentioned this type of support, the video recordings and class observations showed that seven participants used some Chinese – written, spoken or both – to clarify the meanings of some words.

Four of the teachers said that they explain some words to ensure that students understand the main ideas, and giving their students the Chinese meanings of new words was an efficient way to teach them.

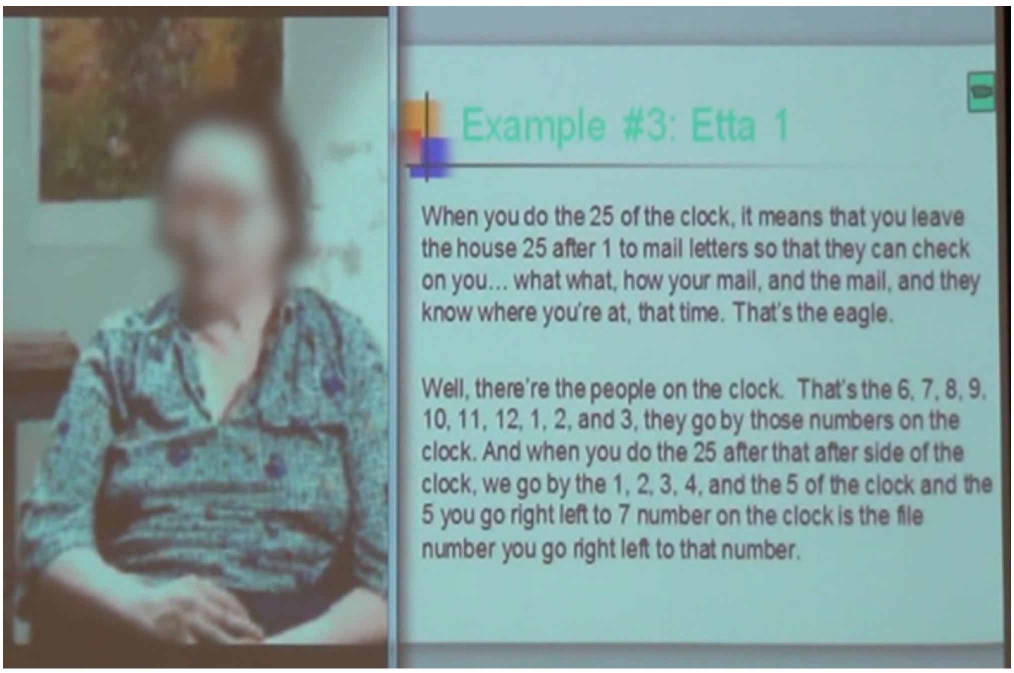
> *Using Cantonese was a quick way to let the students know the meaning of a word*. (Teacher 3)

> *Many terms, such as medical terms, I feel that if I don't use Cantonese, with their English proficiency level, they may not be able to follow the lesson*. (Teacher 5)

In spite of the effectiveness of using a primary language, as English was the college's official medium of instruction, the teachers were required to use English most of the time in the classroom. To ensure all of the students with different English levels could keep up with the lessons, Teacher 5 chose to use simple words when teaching, while Teacher 4 emphasized specific terminology and repeated key words throughout the course to help the students understand the course materials.

When using English language videos, Teacher 6 would explain the concept once in English and then in Cantonese to support students' understanding of the video clips; whereas Teacher 4 provided an English transcript to facilitate. Understanding a native English speaker using a normal speaking pace seemed very difficult for most students. Figure 4.12 shows a screen capture of one of Teacher 4's lessons. The left side shows a video of a schizophrenia patient, with the right side displaying a transcript of what the patient was saying. The transcript acted as a support for the students to understand the mental condition of a patient through what she is saying. He then verbally translated the English transcript into Cantonese to further support understanding.

Figure 4.12 English transcription alongside the video clip about a schizophrenia patient



4.6.8 *Verbal explanations*

Verbal explanations refer to both spoken and written explanations, i.e. teachers' speech and written text shown on PowerPoint slides. All of the teachers talked most of the time in class and used numerous written slides containing information and explanations. In the VSRIs, however, the participants rarely mentioned verbal explanations as a technique to support the teaching of concepts.

Using PowerPoint was a common practice in the college, and all the teachers used the program. Therefore, another type of verbal explanation, which I categorized as *written explanation on the PowerPoint*, addresses to the situation that teachers designed their PowerPoint with written explanations and they referred to those explanations to support understanding. The findings illustrated in Appendix 21 indicated that all teachers used the written explanation, but there were only four participants discussed using written explanations as an important teaching tool. Teacher 2 mentioned it when she answered a question about the function of the words on a PowerPoint slide.

> *Since that was a lecture, explaining concepts was surely needed.* (Teacher 2)

Both Teacher 3 and Teacher 5 saw written PowerPoint text as a support to guide them through lessons. However, Teacher 3 preferred to use fewer words and asked the students to take notes, whereas Teacher 5 chose to use lengthy text so that the students could use copies of the slides for revision. Teacher 6 was the only participant who clearly described the use of written text on slides as a strategy, together with diagrams, to support her explanation of the subject content.

Obviously, explaining by telling was the most frequently used strategy in providing and explaining information, covering over 30% of total number of explanation strategies used in all nine classes in the video analysis. Since the length of talking is not the research focus, the numbers shown in Appendix 21 recorded the frequency in terms of how many times they explained by telling instead of how much time they talked.

Spoken explanation is an unavoidable teaching mode, but again, only four participants mentioned 'explaining' in their VSRIs. Teacher 8 was the only participant who emphasized explanations believing that verbal explanation was the main means of teaching computer knowledge because he said that some concepts in computer programming, such as *pointers*, could not be visualized by using tables and diagrams. Thus, he spent a lot of time on explaining every concept and procedure very slowly and in great detail with some programming models as examples and . When examining the video data, I noticed what he meant 'slowly and in great detail' was indeed using the think aloud technique as he verbalized the thinking process of using the computer language to develop specific programming models.

The word 'explanation' was only mentioned once in the VSRIs with the other three participants. Teacher 1 said he would pick some words and explain the concepts before moving onto other activities. Teacher 2 said she explained the new concepts after the class discussion activity. Teacher 4 said he explained the charts he used in class.

Despite only a few participants mentioning and discussing this teaching mode, verbal explanation was observed to be the dominant method used in all subject areas and all knowledge types. For instance, Teacher 1 did not mention using verbal explanations in the VSRI, but the video data showed that he spoke most of the time in his public speaking lesson on persuasive speech. Though public speaking was a skill-based course in which the students learned how to give different types of speeches to become good public speakers, there were many new concepts such as ethics and psychological challenges in persuasion which required clear explanations.

Similarly, both Teacher 2 and 3 explained the concepts involved in public relations via verbal explanations. Both of them explained the meanings of new ideas by rephrasing the terminology and phrases shown on the PowerPoint slides. They also brought in examples to support their explanations. In visits to Teacher 4 and 5's psychology lessons, telling was the major teaching activity. Both talked through the whole lesson and explained most of the ideas verbally with some support from video clips, pictures and charts.

Explanation is one of central ideas of this study, and my observations showed that all of the participants use both verbal and written explanations, to generate understanding of new knowledge. Verbal explanations were observed to be essential to all of the participants' lessons. The teachers explained new ideas by telling students the meanings of the ideas and giving various examples. However, the fact that little attention was paid in the interviews to verbal explanations may imply that the teachers did not treat verbal explanations as a specific teaching tool.

4.7 The degree of the use of instructional explanation strategies in college classrooms

The analysis of the video data not only tells us the types of explanation strategies the teachers used in their lessons; by studying the patterns and frequency of explanation strategies together with other scaffolding strategies in the lessons, the role of explanations in the classroom can also be revealed. After analysing the nine lessons, the findings were summarized in Table 4.7. In the video analysis, seven other scaffolding strategies were also identified, including recalling previous learned knowledge, providing directions, questioning, giving feedback, giving instructions and arranging class activities. At the start of a lesson or when moving to a new topic, six teachers revisited knowledge covered in the previous lessons so as to continue the scaffolding on related content. Five of them also provided learning directions through outlining the lesson contents or giving hints for students to think and discuss. In eight recorded lessons, teachers asked questions to stimulate students' thinking, inviting students' involvement in learning and checking for understanding. Yet, not many teachers gave explicit acknowledgment to students' answers and feedback. In four classes, teachers arranged activities or discussions so that students could work on the new knowledge, and thus they gave instructions as well. The most important message the findings delivers is the contrasting weight of the use of explanation strategies and other scaffolding strategies. The total number of explanation strategies was 686 while the total number of other scaffolding strategies found was only 105, which represents the dominant role of explanation strategies in all subject lessons in this study.

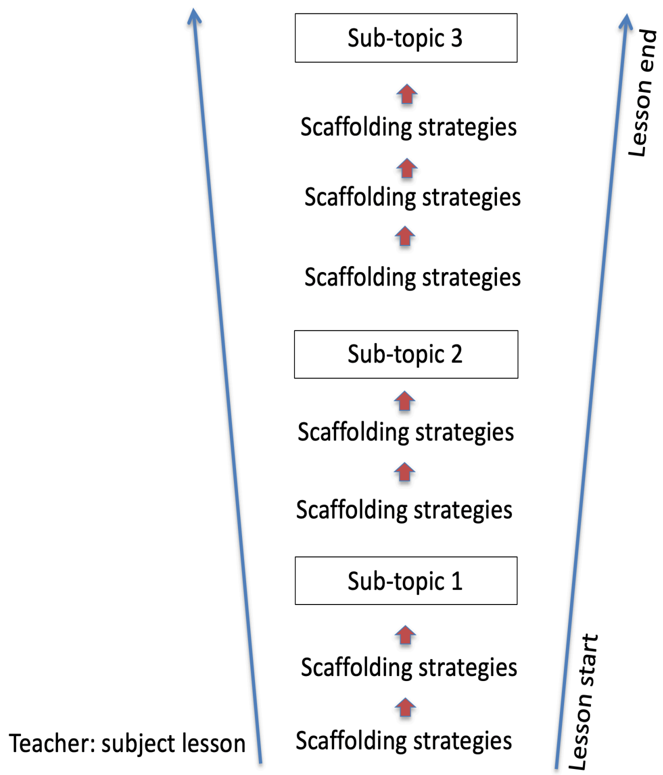
Table 4.7 Summary of the frequency of explanation strategies and other scaffolding strategies used in nine subject lessons (from video data)

Scaffolding strategies		**Teachers/ Subject lessons/ Number of times explanation & other scaffolding strategies used in the lessons**									**Total number of scaffolding strategies**	**Total number of explanation strategies & other scaffolding strategies**
		T1	**T1**	**T2**	**T3**	**T4**	**T5**	**T6**	**T7**	**T8**		
		Graphic design	**Public speaking**	**Interpersonal communication**	**Public relations & advertisin g**	**Abnormal psycholog y**	**Research methods in psycholog y**	**General biology**	**Food service management**	**Computer programming**		
Explanation strategies	Using examples	11	13	12	27	27	31	8	19	20	168	686
	Using visual aids	8	3	4	14	14	0	20	6	13	82	
	Making comparison	1	1	1	3	2	0	0	2	2	12	
	Building on prior knowledge	5	1	3	1	2		2	2	1	17	
	Using activities	2									1	
	Teacher demonstrations		6		2	6	7		1		22	
	Using first language	1	2	1	4	13	20	18	23		82	
	Verbal explanation	22	52	20	21	64	37	26	28	32	302	
Other scaffolding strategies	Eliciting/ recalling knowledge taught in the previous lesson		1	1	2		1	1	1		7	105
	Providing learning directions		1	3	3				2	1	10	
	Questioning	9	9	6	9	1	3	13	9		59	
	Giving feedback	1	3	3	2			3	3		14	
	Giving verbal instructions	2		3	1				1		7	
	In class activities /discussions about the new taught knowledge	2		3	1				1		7	

In the video analysis, seven other scaffolding strategies were also identified, including recalling previous learned knowledge, providing directions, questioning, giving feedback, giving instructions and arranging class activities. At the start of a lesson or when moving to a new topic, six teachers revisited knowledge covered in the previous lessons so as to continue the scaffolding on related content. Five of them also provided learning directions through outlining the lesson contents or giving hints for students to think and discuss. In eight recorded lessons, teachers asked questions to stimulate students' thinking, inviting students' involvement in learning and checking for understanding. Yet, not many teachers gave explicit acknowledgment to students' answers and feedback. In four classes, teachers arranged activities or discussions so that students could work on the new knowledge, and thus they gave instructions as well. The most important message Table 4.7 delivers is the contrasting weight of the use of explanation strategies and other scaffolding strategies. The total number of explanation strategies was 686 while the total number of other scaffolding strategies found was only 105, which represents the dominant role of explanation strategies in all subject lessons in this study.

To understanding scaffolding structure of the lessons and the distributions of scaffolding strategies, the video analysis was transformed into the diagrams as the sample shown in Figure 4.13. Each diagram presents the scaffolding activities used by the teachers in their lessons as they moved from one sub-topic to another. These diagrams should be read from the bottom up, as indicated by the arrows on each side. The boxes represent the sub-topics that the teachers planned to teach in their lessons, as identified from the video data. Underneath each sub-topic are listed the scaffolding strategies used to build student understanding. These diagrams visualize the scaffolding strategy patterns and the weighting of explanations compared with other strategies used in the lessons.

Figure 4.13 Representation of the structure of scaffolding in recorded lessons



The following discussion provides an overview of the scaffolding structure reflected from these diagrams, which informs the role of explanation in relation to other scaffolding strategies. The full set of nine diagrams appear in Appendices 22 to 30. Four diagrams are used as examples to illustrate the patterns discussed in Section 4.7.1 and Section 4.7.2.

Table 4.7 shows that Teacher 4 and 8 only used one of the other scaffolding strategies once in the recorded lessons. As mentioned earlier, Teacher 8 saw spoken explanation as the primary mean of teaching. Indeed, in the Computer Programming lesson about the concept and application of *arrays in six sub-topics*, giving explanations was the only scaffolding strategy after providing the lesson outline at the beginning of the lesson. (see Appendix 30). Teacher 4's lesson covered fourteen sub-topics related to schizophrenia, but he only asked one question (see arrow), as indicated in Appendix 26.

The findings reflect that the number of sub-topics in a lesson had no correlation to the number of the type of strategies used. For another example, Teacher 5 went through ten sub-topics in her research methods class, but she asked three questions in total as shown in Appendix 27. Most of time, she provided scaffolding for new knowledge by giving explanations through specific cases, hypothetical scenarios, role-play and verbal explanations.

Teacher 1 asked a relatively larger number of questions, in particular at the start of the Public Speaking lesson. These questions got the students involved in the lesson; he then spent the rest of the time providing explanations of the concepts on which the lesson focused. Still, though he provided direction and elicited prior knowledge at the beginning of the lesson to continue the scaffolding process, as shown in Appendix 23, giving explanations was the only scaffolding activity used to teach nine out of twelve sub-topics.

In contrast, during the General Biology lesson depicted in Appendix 28, Teacher 6 asked questions throughout the lesson while explaining new knowledge. Though class observations showed that the students rarely responded to these questions, the teacher's intention was to stimulate students' thinking and invite their involvement in the lesson. One unique feature of Teacher 6's lesson was that there were relatively few written explanations displayed on the screen. Instead, most of the screen content consisted of visual images, including biological illustrations and diagrams. Distinct from other lessons, where explanations were mostly both written and spoken, the explanations in Teacher 6's lesson were mostly delivered in spoken form.

Another feature indicated from Table 4.7 is that teachers employed activities in their lessons used more different types of scaffolding strategies, for example, Teacher 2, 3 and 7 in particular (also see Appendices 24, 25 and 29). As observed during the class observations, the teachers gave instructions, and then walked around the classroom and provided students with scaffolding during peer-group discussions by giving feedback, hints or directions to facilitate students' thinking and dialogue.

Despite the fact that the other scaffolding strategies were not frequently used, and not all teachers used all the strategies; interactions among these strategies were still noticed. From the illustrated diagrams, two of these other scaffolding strategies, questioning and activities, appeared to have specific interactions and patterns with explanations. In the next two sections, related diagrams and examples from video data will be used to illustrate those interactions and patterns being discussed.

4.7.1 Interactions between explanations and questioning

Questions can be classified into lower or higher order categories. Questions asked for the purpose of recalling information are low-order questions, whereas high-order questions require the application of higher-order thinking – i.e. students need to apply, analyse, synthesize and evaluate knowledge (Fusco, 2012; Kerry, 2002; Marsh, 2004). Since questioning is not the scope of this study, an analysis of the types, structures and functions of questions will not be discussed in detail. What I intend to examine are the patterns of interaction between explanations and questioning.

In this study, not all questions interacted with explanations. At the beginning of a lesson or at the start of a new topic, questioning was often used to arouse student interest, establish a learning point, allowing them to recall previously-taught subject knowledge or for brainstorming purposes. For example, as illustrated in Appendix 25, Teacher 3 asked students about knowledge learned previously in the course when she started a new topic, public relations (PR). Here is an extract from the transcribed video analysis:

> *She (T3) moved on to a new area – PR – and told the students that was the second area covered by the course.*
> *She asked what the students had learned in the previous lesson. When no student responded, she recalled teaching materials used in a past lesson which mentioned PR, and told students that she would build up new knowledge from that point.*
> (Teacher 3, Public Relations and Advertising)

Similarly, at the beginning of an Interpersonal Communication lesson, Teacher 2 asked questions about the knowledge learned in the previous lesson to help students recall prior knowledge. She then put a brainstorming question up on the screen to start discussion on a new topic (see arrows 1 and 2 in Appendix 24).

> *She (T2) posted a question, 'How to be a good listener?' on the screen and asked students if they were good listeners.*
> *One student responded that he was not because he interrupted when people were talking. She elaborated on the answer.*
> *She continued to give more hints, saying that giving support is another point. She then encouraged students to think how support could be shown. One student said 'nodding'. She agreed and elaborated.*
> (Teacher 2, Interpersonal Communication)

Both of the above examples demonstrate the use of questioning to "[engage] students with their prior knowledge and [enable] teachers to determine the starting point for future lessons" (Fusco, 2012, p.98). While Teacher 3 elicited prior knowledge taught in the subject, Teacher 2 simulated students' prior knowledge gained through daily experience. Facilitating connections between the familiar and the unfamiliar is a key scaffolding strategy.

Questions were often used to help students recall newly-taught knowledge at the end of a lesson. For instance, Teacher 2 asked her students to tell her the listening skills that were covered in the lesson (see arrow 3 in Appendix 24), while Teacher 6 asked students "where does gene replication happen?" before the class was dismissed.

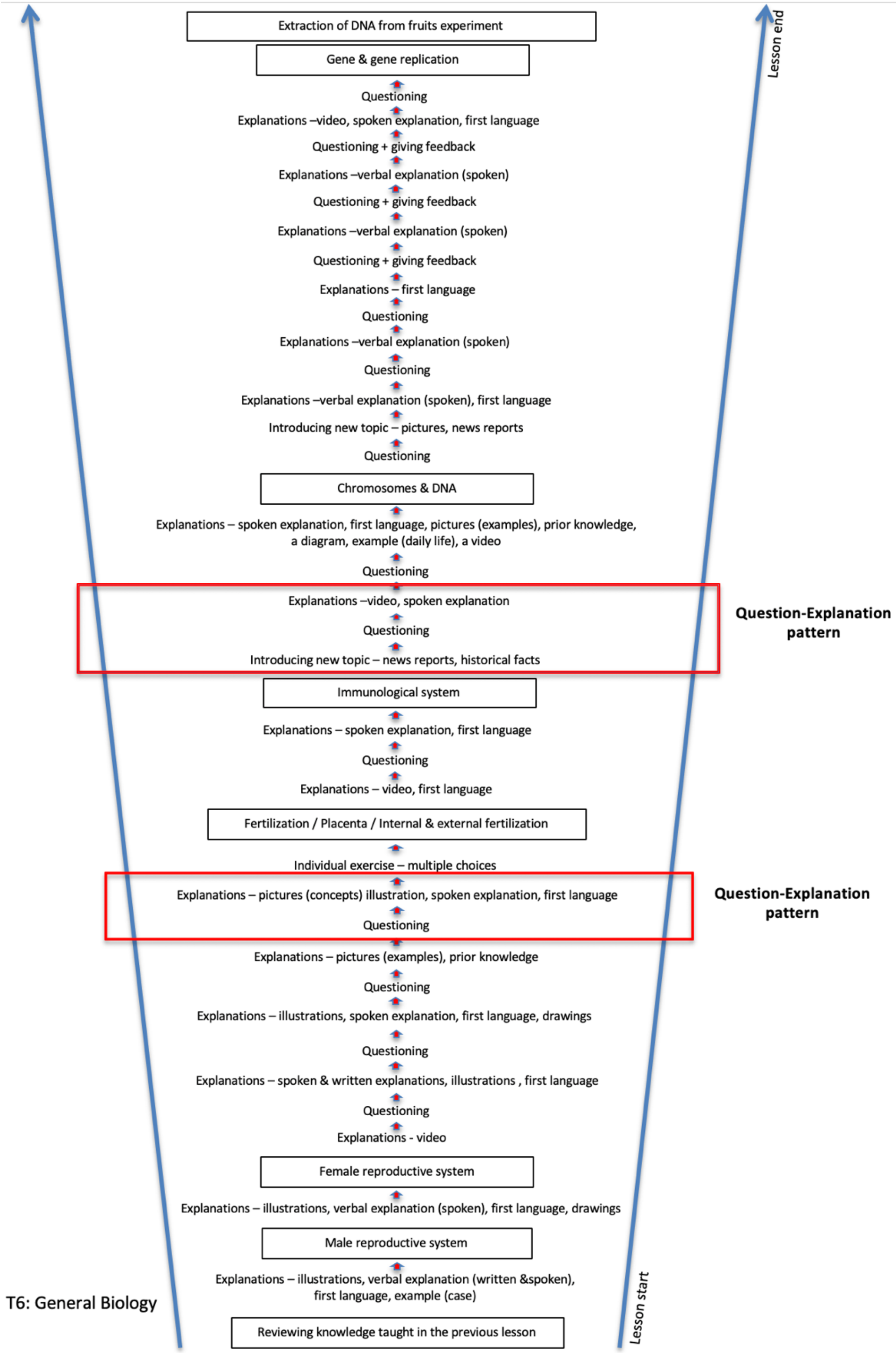
To understand the patterns of how explaining and questioning interact, I examined the moments when questions were used throughout the scaffolding process in relation to the relevant explanations and discovered two distinct patterns.

The first pattern involved a situation in which teachers introduced a new item and then asked questions before giving explanations. These items could be concepts presented through images, diagrams, or words or terminology related to a subject area. Here is an example from one of Teacher 6's lessons:

> *She (T6) introduced a term – 'apoptosis' – by showing two pictures of foetus' hands. She asked the students why there were spaces between the fingers.*
> *No response from the students.*
> *Then she showed an illustration and informed the students of a process called apoptosis. She explained the meaning of apoptosis in English. One student indicated that she did not understand. Teacher 6 explained again in Cantonese.*
> (Teacher 6, General Biology)

On another occasion, Teacher 6 introduced a new topic – DNA – without giving any explanations. After introducing the topic, Teacher 6 then asked a question about DNA, encouraging students to make guesses and then providing more detailed explanations through an animated video. The two occasions where this pattern occurred in Teacher 6's lesson are highlighted and labelled '*Question-Explanation pattern*' in Figure 4.14. I observed that teachers received no, or very few, responses when asking questions before giving explanations. However, this pattern was also adopted in three other classes to stimulate students' curiosity, elicit related knowledge and encourage their creative thinking (see Appendices 22, 23 and 29).

Figure 4.14 The Question-Explanation pattern identified in the scaffolding structure of Teacher 6's Biology lesson



The second pattern was seen in a situation whereby teachers asked questions in the middle of a series of explanations on one concept. The following transcript, taken from Teacher 5's lesson, recorded the moment when she explained the meaning of a new research design terminology called 'between-subject design' and asked students to evaluate the problem in that research design. She then followed this by giving further explanations that responded to her question and the topic.

> *She (T5) pointed to the written description on the PowerPoint and explained the meaning 'between-subject design'.*
> *She then asked, "what is the biggest problem in 'between-subject design?'".*
> *No response.*
> *She explained the meaning of 'between-subject design' again and how this might be a problem in research by rephrasing the text information on the PowerPoint in Cantonese and by using her study as an example.*
> (Teacher 5, Research Methods in Psychology)

From Figure 4.15, we can see that Teacher 5 asked three questions, all of which adopted the pattern labelled as '*Explanation-Question-Explanation pattern*'.

In this pattern, after providing explanations on new subject knowledge, the teachers raised questions from time to time to facilitate higher-order thinking. In the above example, the question asked was an evaluation question that required students to evaluate possible problems after learning a new concept.

This '*Explanation-Question-Explanation*' pattern was used in eight classes where questions were used in the scaffolding process. Besides evaluation questions, like the one given in the above example, other higher-order questions including application questions, analytical questions, questions requiring synthesis and evaluation questions as suggested in Kerry (2002), were also found and are listed in Table 4.12.

Figure 4.15 The Explanation-Question-Explanation pattern identified in the scaffolding structure of Teacher 5's Research Methods in Psychology lesson

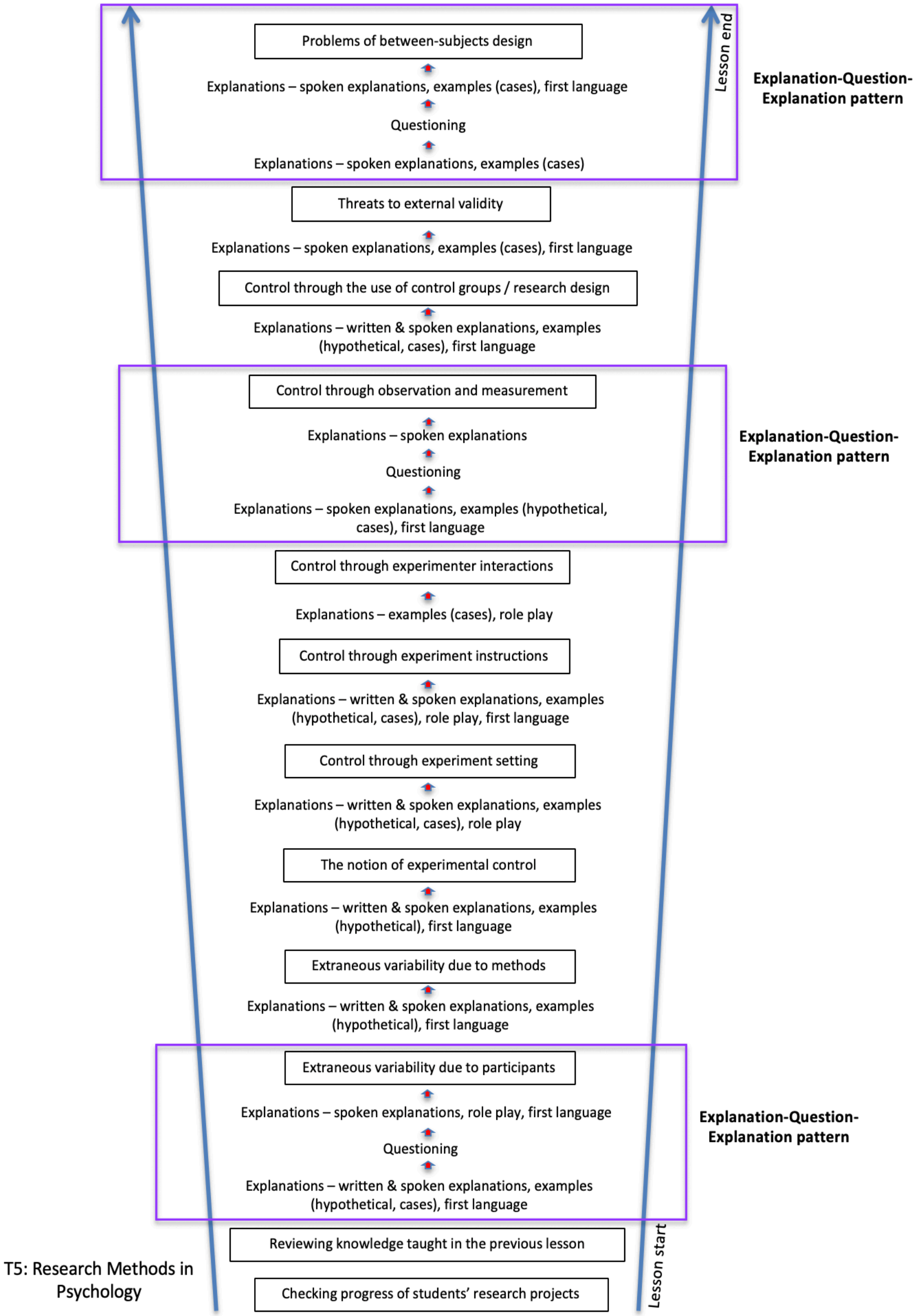


Table 4.8 Three types of higher-order questions and examples identified in three subject lessons

Question types	Examples
Application question	After explaining the meaning of polysemy through using visual images and spoken explanations, Teacher 1 asked the students what they had to do if they wanted to fix the meaning of an image. (Teacher 1, Graphic Design lesson)
Analytical question	When discussing strategic planning in relation to economic factors, Teacher 7 asked students to think about the reason why the sales of lipstick increases during economic struggles. (Teacher 7, Food Service Management lesson)
Synthesis question	After explaining the meanings of delusion and hallucination, Teacher 4 showed a picture of a cat seeing itself as a lion in a mirror (see Figure 4.15) and asked students whether the picture represented delusion and hallucination. (Teacher 4, Abnormal Psychology lesson)

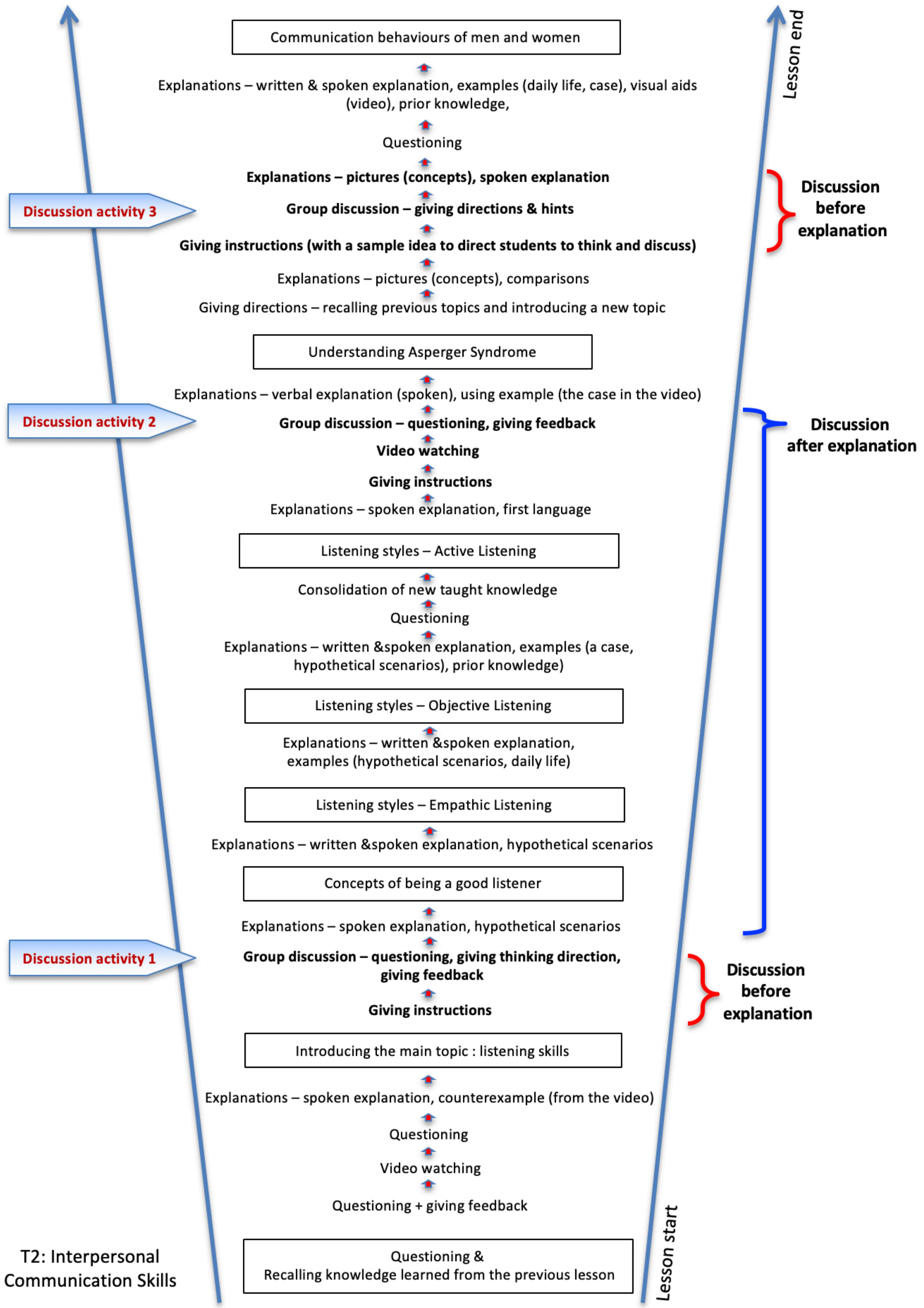
Questioning allows teachers to check for student understanding, confusion or misconception in order to assess their learning progress and make decisions about whether they need to add, modify or implement different explanation strategies (Fisher & Frey, 2010). In the above video transcript, Teacher 5 received no response after asking the question, and thus she explained again, using the students' first language and a specific case for support.

4.7.2 Interaction between explanations and class activities

Using activities was an instructional explanation strategy employed in Teacher 1's Graphic Design lesson, with two activities forming a major part of the explanations given (see Section 4.6.5). In three other classes, activities, including peer-group discussions and drama, were found to give scaffolding support in different ways.

Two activities were arranged before new knowledge was explained. In Teacher 2's Interpersonal Communication class, she arranged three peer-group discussions, labelled in Figure 4.16, two of which were carried out before explaining the major concepts – listening skills and the communication behaviours of men and women – in detail. Another example is found in Teacher 7's lesson illustrated in Appendix 29.

Figure 4.16 Arrangement of peer discussion activities in Teacher 2's Interpersonal Communication lesson

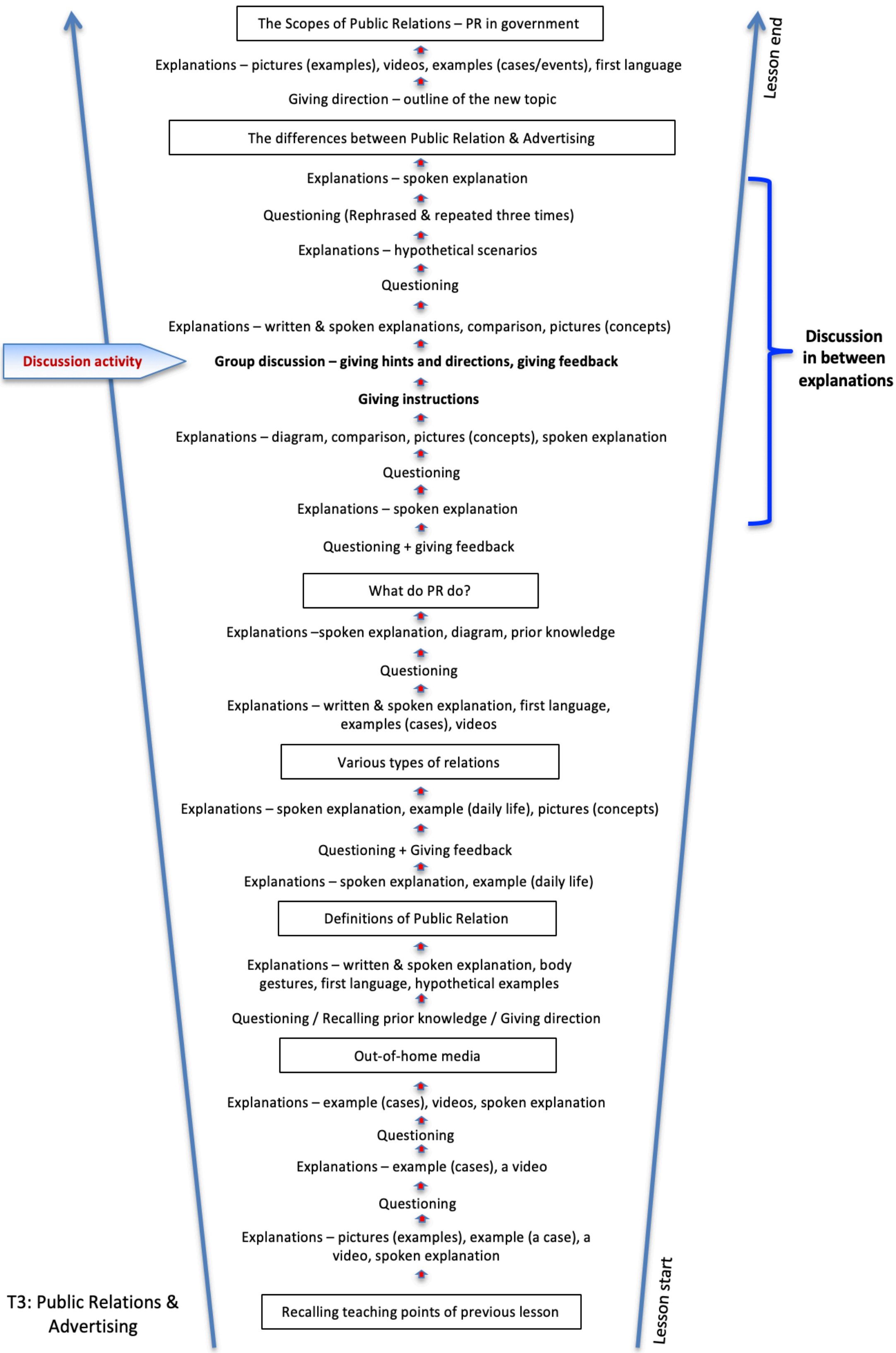


As Teacher 2 mentioned in her interview that listening skills, which are similar to the 'making complaints' topic in Teacher 7's lesson, were a 'common sense concept' for the students. Thus, instead of reciting a list of skills to the students, she devoted time to a group discussion that helped them think about listening skills from their experience. This was done to invite the students' participation, arouse their interest and stimulate their prior knowledge before providing explanations which used the context and elaborated on ideas arising from the discussions.

The second was a peer-discussion activity which came after finishing a specific topic, i.e. after all planned explanations were given. For example, after covering all sub-topics on listening skills, Teacher 2 introduced the term Asperger's Syndrome (AS) and explained the difficulties in social communication that an individual with AS may face through a documentary video. The students were then instructed to integrate all the interpersonal communication concepts covered into an analytic discussion on AS. This peer discussion provided an opportunity for the students to revisit the taught concepts and apply them to a real-life situation. The activity indicated a withdrawal of the scaffolding and provided room for students to work.

The third type of activity arrangement revealed by the data is having a peer discussion activity organized in the middle of explanations. As indicated in Figure 4.17, under the topic *The Difference Between Public Relations and Advertising*, Teacher 3 explained and compared the two concepts through visual images and diagrams and supported them through spoken explanations. Afterwards, the students were requested to discuss a list of areas associated with these differences. Explanations resumed after the discussion, and the teacher explained the related concepts in detail. During the explanation process, she invited students to contribute ideas derived from their discussions and asked 'why' and 'how' questions to stimulate students' higher-order thinking. This arrangement provided a break for learners to review, construct and share their understanding of the concepts explained in the first part of the lesson, and encouraged their involvement and stimulated their critical and creative thinking on the topic. This arrangement may also help them identify areas of unknown knowledge or confusion, thereby increasing their curiosity to find out more in further explanations.

Figure 4.17 Arrangement of peer discussion activity in Teacher 3's Public Relations & Advertising lesson



4.8 Conclusion

The semi-structured interview data uncovered college teachers' perceptions on learning environment, their roles and students' learning attitudes. Most believed that students were exam-oriented or grade-oriented and attributed this attitude to the exam-oriented education system and parental pressure. Owing to the learning habits developed in students' school years, the pressure of the tight curriculum, their language proficiency and logical thinking skills, the teachers felt that the students were heavily reliant on them, 'passive' for not asking or answering questions, rarely seeking information on their own, and did not want to work on the assignments any more than necessary. Teachers' perceptions are generally in line with the socio-cultural background discussed in Chapter 1, confirming the fact that the exam-oriented culture and parents' instrumental attitude have been influencing students in Hong Kong at all levels.

The VSRI and video data revealed that declarative, procedural and conceptual knowledge appeared in the nine recorded lessons. Discovering these knowledge types provides evidence that the three major types of knowledge which require explanations were covered in the classrooms. Moreover, the identification of the twelve sub-types of knowledge were also essential for revealing in a fine-tuned way models of explanation strategies used to explain different knowledge types. Further analysis of VSRIs and video data explored eight sets of instructional explanation strategies together with eighteen sub-types of them.

These strategies were applied by the teachers throughout their lessons to support understanding of the three principal types of knowledge across the subject areas. The data indicate that declarative knowledge, particularly concepts, was the major knowledge type in the college classroom while verbal explanation was the primary and dominant strategy in all classrooms. The data also tell us that even though the contents of the courses involved practical and factual information, when the students try to understand new ideas remote from their life experience or which could not be 'seen';

those ideas became conceptual challenging to the students and explanations became necessary.

Obviously, giving explanations was paramount in the lessons where explanation was basically the only scaffolding strategy that teachers talked through the lessons after providing an overview at the beginning or asked only one question in a three-hour lesson. In the other lessons, where a mixture of scaffolding strategies was used, explanations still played the most prominent role in the teaching process. This concludes that explanations play a significant role in college classrooms where teachers apply different strategies to explain declarative, procedural and conceptual knowledge in order to support understanding and learning.

After this chapter's analysis two sets of data, participant interviews and video records of the lessons, the next chapter conducts further discussions of the results and illustrates how these results answer the research questions.

CHAPTER 5 ANALYSIS AND DISCUSSION

5.1 Introduction

This chapter aims to discuss the findings in relation to the three research questions. To establish the background to the principal data on instructional practice, I start with answering Research Question 1 on teachers' perceptions since teachers' perceptions and concerns are directly related to the rationales behind their teaching approaches and are reflected in the use of instructional explanation strategies. Afterwards, the key discussion focuses on how knowledge is explained (RQ2) and how instructional explanation strategies support understanding (RQ3) which are further explored and discussed in response to answer those two research questions. Since this study has proposed for instructional explanation a new definition, findings emerging from the naturalistic data included new insights which had not been covered in the previous research and literature review. Therefore, to facilitate the interpretation of the data, during the data analysis, further additional literature was explored as newly identified strategies emerged from the data. This helped to refine understanding and contributed to the development of a new model regarding the approaches to instructional explanation strategies.

5.2 The use of instructional explanation strategies in responding to teachers' perceptions

This section addresses the three sub-questions under RQ1 to explore the teachers' perceptions, to examine the influences of these perceptions to their teaching strategies and to understand how teaching strategies for instructional explanations reflect the way the college teachers respond to their perceptions of students' learning in Hong Kong.

5.2.1 *College teachers' perceptions of teaching and students' learning in Hong Kong*

Perceptions of students as relatively grade-oriented, passive and dependent dominated teachers' thinking. These perceptions reflect the general learning culture in Hong Kong as presented in Chapter 1 and their experience with the students. The teachers generally believed that learning was no longer a serious pursuit for these students as students do not take the learning of new knowledge seriously, only seeking shortcuts which allow them to collect enough material to memorize for the examinations. They were reluctant to explore knowledge outside class, to try tackling problems on their own and did not provide many responses to their teachers. They expected the teachers to give them information and solutions to problems, and only to teach subject content which would be assessed. The desire for successful model answers, presumably to emulate, seems all pervasive, and that reflects the anxiety experienced by the students owing to the exam system and the high stakes experienced by the students. Although the teachers deeply believed that the ultimate goal of learning is for a better self and not just for a grade, they also realized that the students being grade-oriented was unavoidable since only good grades would offer them a second chance to enter a degree programme.

Majority of students tended to sit quietly listening to their teachers, with heavy reliance on teacher input. Tight, heavy curricula and many assessments have resulted in high pressure on students, teachers and schools. From the moment the students start school at an early age, they are situated in a rote learning environment and their primary study aim is to prepare for various examinations. Students continue to expect the same kind of teaching approaches and so naturally continue to apply their learned habits. Teachers are thus victims of washback from these demands.

The quietness of students was perceived as a passive attitude in learning. Under a frequently-changing education system and a heavy curriculum, a 'force-feeding' teaching style was the most common approach observed. The students did not have time to think, ask and discuss, all they could do was simply try to swallow and memorize everything delivered by the teachers. They also believed that the students had been discouraged from speaking up by their previous learning experiences – the teachers in their primary and secondary schools did not appreciate talkative students while their peers censored active class members. The teachers attributed this to a collectivist Chinese culture that emphasizes humility and a quiet personality.

The perceived students' abilities in terms of weak logical and critical thinking, which the teachers suggested were also factors behind passive and dependent behaviours, could be the negative consequence of 'spoon-feeding' learning experiences. Together with the lack of English language proficiency, they relied heavily on memorization. The teachers felt that this weakness also restrained the students from asking questions, as they felt they could not express their ideas clearly in a second language. When the subject knowledge does not match the students' cognitive level, they need more time to make sense of the new information.

Parents' high expectations for children's obedience and academic results, according to the college teachers, pose high pressure on children and lead to their grade-oriented attitudes, their insecurity when not following instructions and their fear to make mistakes. Being obedient and preventing mistakes to avoid punishments, using material rewards in return for good examination results and emphasizing future rewards not only distort values in pursuing knowledge and personal achievement but also affect children's motivation for learning. Motivation for learning becomes extrinsic and instrumental. Controlling parents who motivate their children by rewards or threats of penalties and neglect of children's interest and inner needs may diminish their intrinsic motivation (Ryan & Deci, 2000a; Reeve, 2009). Though extrinsic and instrumental motivations could bring positive influence in learning, lack of intrinsic motivation, as Hoffman (2015) suggests, would lower learners' effort and lead to the use of shallow approaches in learning.

5.2.2 *Effects of teacher perceptions on their strategies*

Teachers' perceptions of teaching directly affect their actual teaching behaviour and strategies (Hativa, 2000; Richards & Lockhart,1996). With these perceptions in mind

- comprehending the social, cultural and education environment, understanding student needs and concerns, and realizing the constraints and limitations they were facing - the teachers expressed their ambition in achieving their perceived meanings of education. They not only saw themselves as being knowledge and information providers, but also as facilitators and motivators who support students through their academic development with positive values and attitudes. The data shows that the teachers facilitated and motivated their students through leading them to see the connection between prior knowledge, subject content and the practical world, arousing their interest in the subject, building their confidence, and seeking to promote positive mind-sets for both learning and personal growth.

The application of multiple explanation strategies reflects that even though the teachers had heavy workloads and limited lesson times, they attempted to strike a balance between the tight schedules and their perceived roles to teach and motivate students well. The evidence shows that they did not simply tell the students about the subject contents; instead, the teachers used many different resources to facilitate teaching and motivate learning through arousing the students' interest and involving them in the learning process. When explaining subject knowledge, the teachers made use of a lot of examples, pictures, diagrams, video clips and artifacts from daily life, which were supported by verbal explanations in both English and Cantonese. They also used activities, role-play and demonstrations. These strategies addressed the students' different senses, providing both audio and visual stimulation, which, according to the participants, could arouse interest and draw their attention. The strategies not only promote intrinsic motivation (Ur, 1996), but also stimulate students' senses resulting in more memorable and effective learning (Beard & Wilson, 2005).

Despite the variety of strategies used in the explanation processes, the dominant role of teachers was to talk most of the time with relatively few class activities in which students could work with their peers, apply, revisit and construct new learned knowledge. This could lead to a debate about the orientations of teaching approaches, highlighting the inconsistency of teachers' perceived roles as facilitator and the transmissive mode of teaching in practice. Indeed, the fact that giving explanations was the primary teaching activity in all classes under investigation may represent the underplaying of a student-centred approach. However, the findings show that declarative knowledge was the major type of knowledge experienced in the college classrooms, providing novice learners with some fundamental knowledge of different specific academic areas.

As argued in Chapter 2, an effective student-centred approach is not simply about giving time for student activities, but also the presentation style, the choice of materials, the design of explanations and the implementation of student activities should be catered for effectively and appropriately based upon students' learning stages when learning different types of knowledge. In other words, even if a teacher takes the central role of talking when giving direct instruction and explanations, it does not mean the teacher is entirely adopting a teacher-centred approach. The findings show that even though providing instructional explanations was the primary scaffolding strategy in their lessons, the college teachers applied various strategies tailored specifically for their students with careful consideration of the students' incentives, lesson content and the social environment.

Another point I argued previously is that teacher-centred and student-centred should not be seen as two individual and mutually exclusive approaches but two orientations on a spectrum, and teachers should apply different approaches based upon the needs of teaching stages and goals. Although the college teachers did not use the terms teacher-centred and student-centred during the interviews, their idea about shifting their roles between information provider, facilitator and motivator reflects their awareness of the complexity of applying different approaches in the teaching process. Indeed, four college teachers demonstrated the change of roles shifting their teaching style on the spectrum in between these orientations. For example, Teacher 2 arranged three student group discussion activities (see Figure 4.1.6 on p.219) and thus shifting the teaching approaches in response to the nature of teaching and learning tasks.

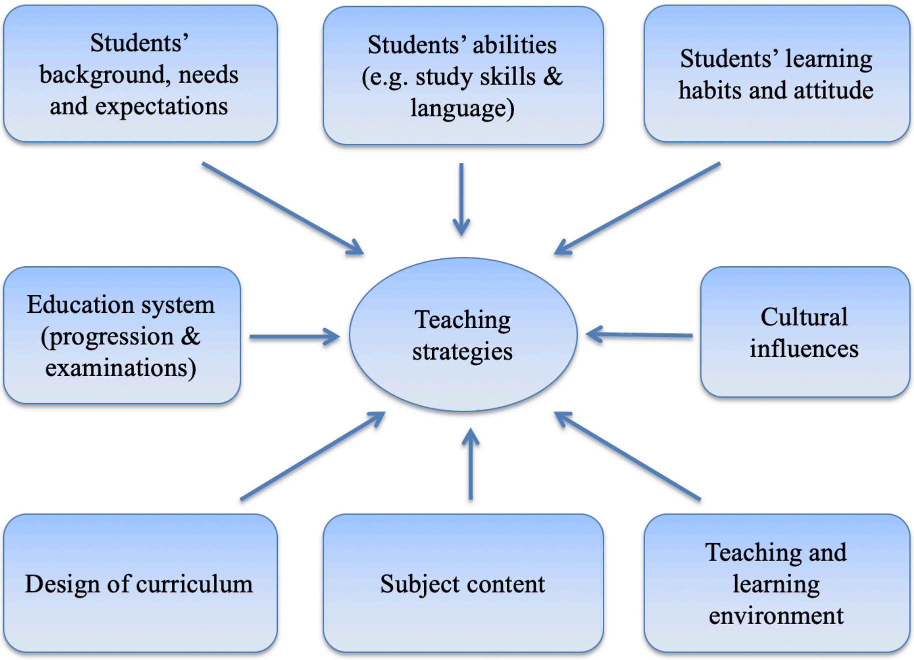
The result also supports my argument that teachers who intend to place 'blame on students' do not mean they would adopt level 1 style of teaching as proposed by Biggs and Tang (2011) as discussed in Section 2.3. It is true that the teachers generally perceived their students as passive, dependent, exam-oriented, with low intrinsic motivation and weak cognitive and language abilities. However, evidence shows that these perceptions do not make the college teachers solely an information provider. The teachers shifted their roles to deliver information (Level 1), explain knowledge (Level 2) and engage students in class activities (Level 3). This may indicate the idea that a teacher having level 1 type of thinking would only adopt level 1 type of teaching role oversimplifies the connection between teacher thinking and teaching approaches. This study reveals that the teachers engaged themselves in all three levels of thinking and teaching styles. While they blamed students, they also focused on how information can be transmitted and how teaching strategies support learning and understanding.

When the college teachers implemented student activities in the middle of the lesson, the application of the teacher-centred and student-centred approaches were more distinctive. This means when new knowledge was presented, teachers were the presenters who transfer information to student participants using teacher-centred approach. When students were taking part in activities, student-centred approach was adopted. In the activities, students were giving space for constructing the newly acquired knowledge and teachers were the facilitators supporting students to learn, and thus facilitating both social and cognitive constructivist modes of learning. On other occasions where teachers were taking up the predominant role of explaining new knowledge, interaction and facilitation appeared to be quite often non-verbal in nature, dependent on the teacher reading signs of comprehension, incomprehension or engagement of students. It is undeniable that verbal interactions between teachers and students were very few in number, yet non-verbal interactions did sometimes occur throughout the teaching time. Teachers picked up messages from observing students' behaviours, such as students' laughter, eye contact, their silence in response to questions or noises made indicating enjoyment, attentiveness, confusion, boredom or dissatisfaction, and then responded these messages with various teaching and explanation strategies.

As mentioned in the literature review, verbal communication is not the only classroom interaction channel but also participants' non-verbal behaviours (Malamak-Thomas, 1987), but also teachers responding to non-verbal messages delivered from students' actions and reactions in terms of applying, changing and modifying various teaching and explanation strategies indicates the existence of communication in the classrooms. Even though students may not have much chance to verbally contribute their ideas and discuss with other class participants, the act of teachers as the more knowledgeable others providing explanations is a scaffolding support facilitating learners' cognitive construction. An active construction process involves not only social interactions but also cognitive activities, which implies the active role of students' mental processes in connection to incoming concepts and prior knowledge. Therefore, instructional explanation strategies tailored for the purpose of supporting understanding are indeed student-centred, and they facilitate interactions between new concepts and students' existing schemata.

The findings reveal that on the one hand, the teachers understood the reality of the situation that the students' ultimate aim was to achieve good results to continue their studies in university. On the other hand, they also realized the difficulties inherent in motivating students who had developed passive and dependent learning attitudes that could hinder their learning. At the same time, they were also restricted by the curriculum and the constraints of space and time. The situation that the teachers found themselves in – spending most of their time explaining new knowledge from one topic to another and from the beginning of lessons to the end – reflects that there was not enough time and space for the teachers to use other scaffolding techniques; indeed, they did not have the physical resources to deliver all they needed to teach to fulfill the course requirements. The strategies they used, as described by the teachers and quantified by this study, were specifically targeted to this group of students and facilitated subject content learning while supporting students as they learned the new knowledge. In other words, the teachers' perspectives of their students and the education environment, together with other institutional concerns such as the course curriculum design, the actual teaching environment and the subject content, directly affect their design of lessons and the strategies they used to teach and explain the content of their courses. Figure 5.1 summarizes the concerns the college teachers considered when teaching this specific group of students.

Figure 5.1 Teachers' considerations when designing their teaching strategies



5.2.3 *College teachers' recognition of instructional explanations as a significant scaffolding and teaching strategies*

This study shows that the college teachers used a variety of teaching strategies to motivate students and facilitate learning in response to their perceptions of student attitudes and teacher roles. All the teachers in this study acknowledged the importance of strategies that supported the understanding of subject content; and they all agreed that reaching understanding was basically the common goal behind using each strategy. This was reflected in their detailed consideration of the design and application of teaching strategies. However, while the teachers were asked to introduce and discuss strategies for teaching new knowledge, the act of explaining was barely mentioned in the interviews, and there was no sign that explanations were included in any of the teaching strategies that they mentioned during the interviews. When they brought up the word 'explanation', the teachers referred to the word only in the context of 'telling'. The omission of instructional explanation in the interviews suggests that the teachers in this study generally did not perceive their teaching strategies to be explanation strategies, paralleling with the general pedagogical concept of explanation as mentioned in Section 2.6. Furthermore, it suggests that instructional explanation was not considered, or at least not regarded as, a specific teaching strategy that they presented as relevant and vital in the interview.

Nevertheless, in practice, providing explanations was the predominant teaching activity observed, with the teachers spending a lot of time in each lesson not only on 'telling' but also on implementing various strategies to explain the subject content. Although the teachers did not expressly recognize explanation strategies as a significant scaffolding and teaching strategy, explanation strategies were used abundantly in their scaffolding and teaching processes. In the following sections, these strategies, in terms of what they are and how they support understanding, will be discussed in relation to the other two research questions.

5.3 Explaining new knowledge in class

This section is divided into two to address the two sub-questions under RQ2 regarding the kinds of knowledge college teachers explain in classes and the strategies the teachers used to explain these types of knowledge in practice, each discussed in turn below.

5.3.1 *Types of knowledge college teachers explain in classes*

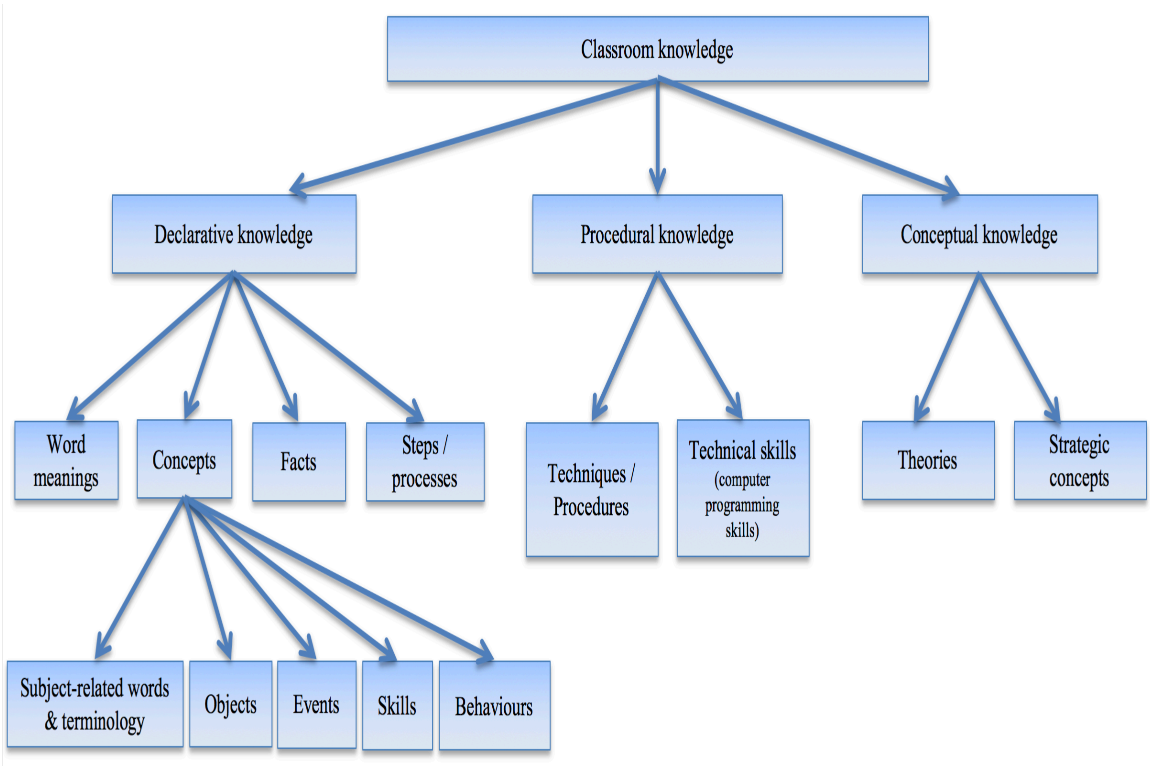
In this study, the three knowledge types suggested by Byrnes (1999) – declarative, procedural and conceptual knowledge – were found in classes through interviews, video recordings and class observation of nine subject lessons under investigation. In those lessons, three focused only on declarative knowledge, three included declarative and procedural knowledge, and three covered all three types of knowledge as summarized in Table 5.1.

Table 5.1 Types of knowledge covered in different subject lessons

Subject lessons	Types of knowledge
Graphic Design Public Relations and advertising General Biology	Declarative
Public Speaking Interpersonal Communication Computer Programming	Declarative Procedural
Abnormal Psychology Research Methods in Psychology Food Service Management	Declarative Procedural Conceptual

The analysis started from the interview data in which the participants talked about the kinds of knowledge they taught in class, and then moved onto video data analysis. I found that the knowledge types could be divided into twelve types in total: eight types of declarative, two types of procedural and two types of conceptual knowledge as illustrated in Figure 5.2.

Figure 5.2 Types of knowledge observed in the college classrooms



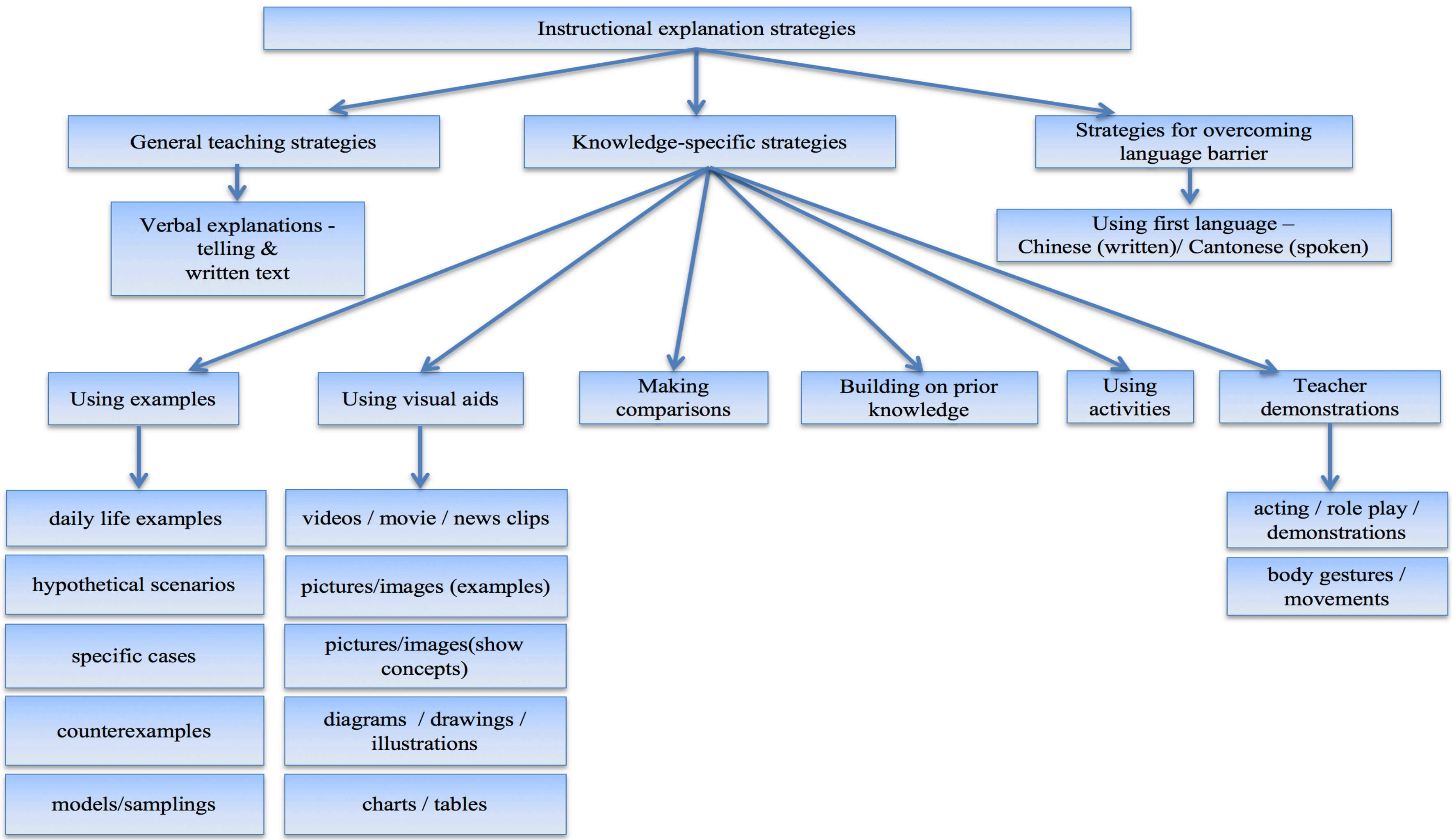
Declarative knowledge was found to be the most dominant type of knowledge across the different subject areas. This matches with the education goal of the college, i.e. providing fundamental knowledge of academic subjects in higher education to prepare students to pass exams and continue their studies in universities. Concepts of subject-related words and terminology, objects, events, skills, and behaviours, facts and knowledge of steps and processes were declarative knowledge frequently explained in the college classrooms. The college curricula also included skills-based and theory-based lessons in which procedural knowledge and conceptual knowledge appeared to be further advanced, built on the declarative knowledge. These lessons included, for example, giving a speech in a public speaking lesson, carrying out a psychological research study in a research methods lesson, understanding theories in psychology and learning strategic concepts in food service management classes.

5.3.2 *Teacher strategies to explain types of knowledge in practice*

'Explaining through telling' was widely considered the only type of explanation strategy in the literature I reviewed. Even though some studies described the components of explanation as discussed in Section 2.4, their categorization focused merely on spoken explanation. Although the study of classroom discourse is significant to explore instructional explanations from a linguistic perspective, this research looked at teaching strategies that perform the function of giving instructional explanations and analysed the data through the lenses of learning theories. So, a discreet linguistic analysis was not adopted. In the strategies that provided scaffolding support for understanding new knowledge and the development of students' schema in the lessons observed, spoken explanation was not the only instructional explanation strategy used. Therefore, the analysis process did not involve verbatim transcription of video data but detailed descriptions of teaching activities instead (See Section 3.5.2 for explanation of the methodology).

In the previous chapter, the analysis of the interview data and the video recordings revealed a total of eight major types of instructional explanation strategies, and some of these strategies could be further broken down into several sub-types. Furthermore, the findings also reveal that the applications of these eight types of instructional explanation strategies are closely related to the types of knowledge that the college teachers needed to explain and the purpose of using the strategies. Figure 5.3 illustrates the categorization of instructional explanation strategies. The eight types of instructional explanation strategies can be further categorized into general teaching strategies, knowledge-specific strategies and strategies for overcoming language barriers.

Figure 5.3 Categorization of instructional explanation strategies



5.3.2.1 General teaching instructional explanation strategies

Talking was found to be the major teaching activity in the college classrooms. Fisher and Frey (2014) argue that telling students new information does not qualify as teaching. They believe that "the key to quality teaching is explaining" (p.20) and that teachers need to verbalize their "cognitive processes and metacognitive thinking" (p.20). The data show that the teachers in the present study talked through their lessons, providing explanations about the subject content. When discussing explanatory strategies, there is a tendency to focus solely or principally on spoken explanation. However, in this study, I found that spoken forms of explanation appeared in two different but adjoining roles in teaching.

Spoken explanation was solely used in the scaffolding process whereby the teachers rephrased, or paraphrased, new concepts and theoretical statements using simple words and expressions. In these spoken explanations, the teachers also provided definitions, descriptions and elaborations as strategies also suggested by Price and Nelson (2014). When other explanation strategies were employed, such as using examples, making connections to prior knowledge and comparisons, spoken explanations took on a secondary, supplementary role which involved linking the examples, the prior knowledge or the comparative elements with the new knowledge. In other words, my study suggests that instructional explanations do not simply involve 'telling', or verbally explaining. Yet, spoken explanation is essential to build connections between the other explanation strategies and support understanding.

Written explanation serves different purposes to spoken explanations. All study participants used the same practice of written explanation: they projected written information on the screen using PowerPoint and then provided detailed spoken explanation to support that information. Studies that I reviewed found that some teachers relied on reading word-for-word from PowerPoint slides without giving students much attention. Since concluding the data analysis, other studies were found demonstrating that this practice could demotivate students and create negative learning effects (Voss, 2004; Limia, Mohammad & Chin, 2013). In this study, all the college teachers did not simply read the written information and explanations; they were observed to provide much more detailed explanations, in spoken form and through other explanation strategies. In terms of the purpose of these explanations, the teachers did not treat written explanation on the screen as the main medium used to deliver new knowledge. Their written explanation provided visual references which both the teachers and the students could follow during the lessons. They also provided support for understanding the spoken explanation, particularly for students with a lower English listening ability or vocabulary proficiency.

As both talking and showing written texts on PowerPoint slides are normal practices in college classrooms, verbal explanations, i.e. both spoken and written explanations, were not found to be a selective strategy for any specific type of knowledge; meaning that no matter what the teachers taught, they talked and used written explanation. Thus, verbal explanation was a general explanation strategy used in teaching.

5.3.2.2 Instructional explanation strategies for overcoming language barriers

As the medium of instruction in the college was English, the college teachers taught in English and all materials were presented in English. Although students in Hong Kong begin learning English in kindergarten or even nursery school, as Lo and Lo (2014) point out, teachers also use a lot of Chinese to support student understanding of subject content; and while students at school have usually learned English for communication purposes, they have often not been trained to use academic English language for higher education. The English proficiency of the students is often a concern for their teachers, given that use of English in all their classes frequently presents a major obstacle to many students. Therefore, code switching is frequent in support of learners.

College classrooms that are awash with the English language present a challenge to both students and teachers. Some Hong Kong university students expressed in Evans and Morrison's (2011) study, reviewed in Chapter 2, that they would prefer teachers to use Cantonese, as they found it easier to understand the content of subjects and thus learned more effectively. In order to overcome this challenge and support their students' understanding, seven teachers in this study also used some Cantonese to explain the meanings of certain words and complicated concepts through translating their English explanation into Cantonese or code-switching between two languages, as the teachers believed that this language barrier hindered learning and understanding. This strategy was not used as a general teaching strategy nor used specifically for any particular type of knowledge. Using the students' primary language, therefore, was identified as an explanation strategy for overcoming language barriers.

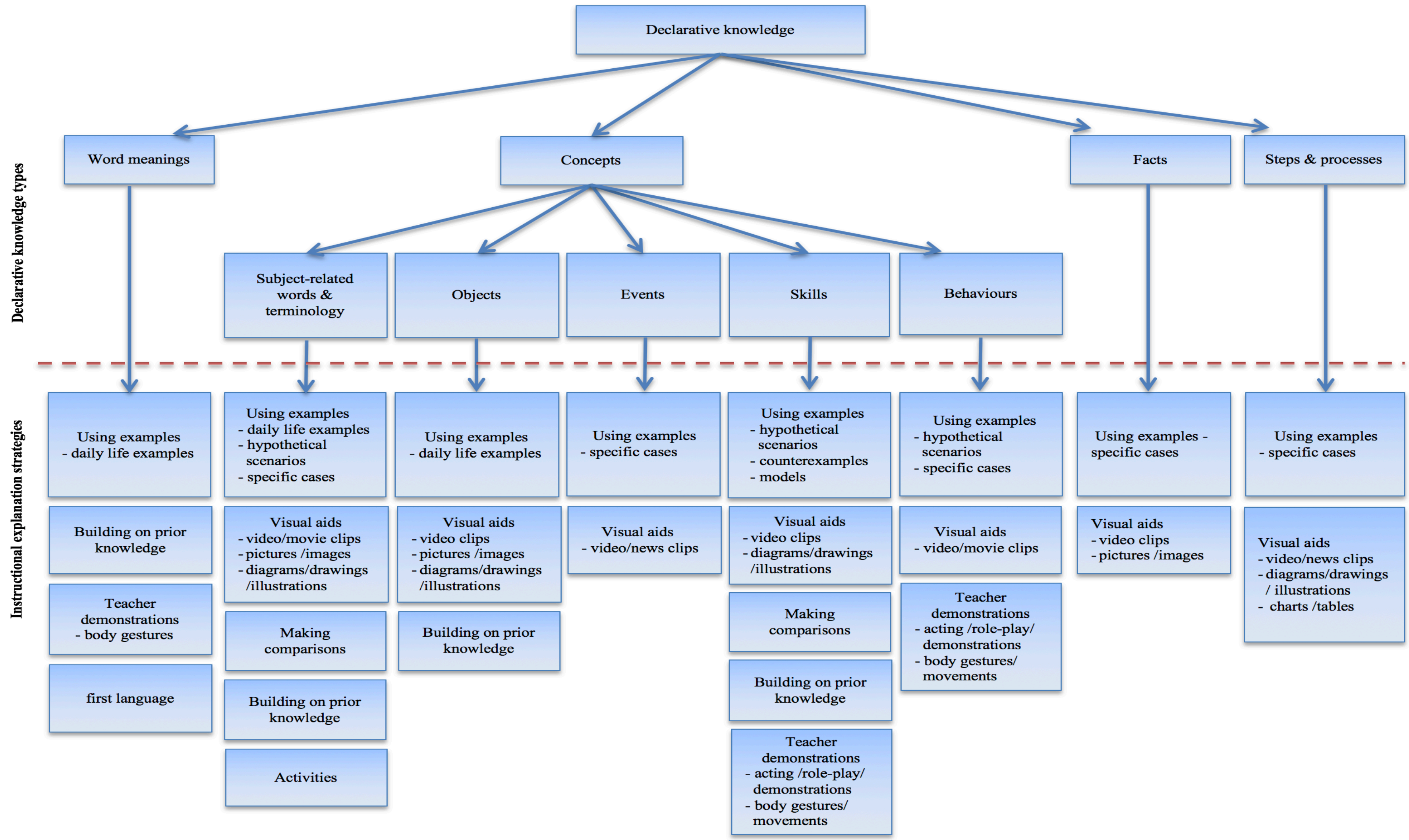
5.3.2.3 Knowledge-specific explanation strategies

All teachers who participated in the study claimed that their primary consideration for choosing a particular explanation strategy was to make new knowledge easy for the students to understand. What they did not notice was that the strategies they chose were also highly related to the types of knowledge they taught. The findings of this study reflect the claim that "knowledge of subject matter and strategies for explaining are often closely connected" (Wragg & Brown, 1993, p.32). By analysing the types of instructional explanation strategies used and how they were applied in the various lessons, six strategies were classified as knowledge-specific explanation strategies, the reason being that those strategies were chosen specifically to support the understanding of different types of new knowledge. I will now provide a detailed discussion of the connections between the different strategies used to support the understanding of different types of knowledge.

- ***Explanation strategies for declarative knowledge***

Declarative knowledge is the foundation of procedural knowledge and conceptual knowledge. Therefore, the strategies used for explaining declarative knowledge support the understanding of 'what something is' in order to lay the groundwork for other types of knowledge. The kinds of declarative knowledge found in this study fall into four areas – word meanings, facts, concepts and procedures. Figure 5.4 illustrates the instructional strategies these college teachers used to explain different types of declarative knowledge, as identified from the analysis.

Figure 5.4 Instructional explanation strategies for different types of declarative knowledge



In the process of explaining declarative knowledge, the teachers in this study used examples and visual aids, made comparisons, built on prior knowledge, and used activities and demonstrations. The discussion below will shed further light on how those instructional explanation strategies could facilitate understanding while learning declarative knowledge.

- Explanation strategies for declarative knowledge - Word meanings

As mentioned earlier, understanding subject content presented in English is a significant challenge for many college students. In this study, though some teachers occasionally used Cantonese to support understanding, English was still the dominant language used in the classrooms. When facing a group of students with different levels of English proficiency, the teachers needed to ensure all their students could understand the words used to be able to follow what the teachers said. Thus, understanding the meaning of English words was prioritized by the teachers to ensure that the students could understand the lessons and the knowledge being delivered. The act of providing word meanings during the teaching process indicates that the teachers foresaw possible difficulties the students may have had in this respect and thus provided support to help the students understand unfamiliar English words.

The five strategies used to explain word meanings were using examples, building on prior knowledge, teacher demonstrations, paraphrasing through written and spoken explanations, and providing Chinese translations of the English words in question. When using examples, the teachers tended to select examples which were related to students' daily lives. These examples were normally provided through telling. They also used body gestures or movements to support understanding of word meanings. There were also cases where the teachers did not provide word meanings directly, rather they asked the students to figure out the meaning of words via paraphrasing, i.e. descriptions with related words with which the students were familiar. For example, the teacher in the public speaking lesson explained the word *impromptu* as 'little or no preparation' while *extemporaneous* was paraphrased as 'prepared and practised in advance'. Though the teacher did not ask any question to check understanding, the students responded with a nod of head and wrote down the meaning on their printed materials.

Stahl and Nagy (2009), as mentioned in Chapter 2, suggest several methods for providing information on the definitions of words. Table 5.2 shows the similarities and differences in their suggestions versus the strategies identified in this study.

Table 5.2 Strategies for explaining word meanings

Stahl and Nagy (2009)	Strategies identified in this study
• Teaching synonyms • Teaching antonyms • Rewriting definitions • Providing examples • Providing non-examples • Discussing the differences between the new word and related words	• Using daily life examples • Using pictures/images • Using body gestures • Using students' first language (in Cantonese) • Using written and spoken explanation (in English)

Comparing the two sets of strategies above, the teachers in this study employed one strategy recommended by Stahl and Nagy (2009): daily life examples. However, the teachers in this study did not use synonyms, antonyms, non-examples, ask the students to rewrite definitions or discuss the differences between new words and related words. Since the purpose of explaining word meanings was to provide a quick and direct reference to help students follow the teaching content, the strategies employed by the teachers gave dictionary-type meanings only. As such, asking the students to rewrite the definitions of words was not a quick strategy, given that it requires more time for students to learn a single word. Also, if potential antonyms, synonyms and non-examples are unfamiliar to students, using these strategies may create confusion (Stahl & Nagy, 2009). Thus, using English synonyms or antonyms is not as direct a strategy as providing the Chinese meanings of the English words requiring explanation of the dictionary-type meanings. Adopting the bilingual approach by making use of students' primary language in the learning context where English was a medium of instruction, providing the

Chinese meanings was claimed by the teachers to be the most direct way to explain English words.

However, the teachers cannot use much Chinese during their classes. Other strategies were therefore necessary to support learning. The teachers in this study emphasized the rationale that any materials, including examples and visual aids, should be related and connected to students' daily lives. This idea clearly indicates the teachers' intentions to connect new words with existing knowledge; intentions reflected in both the prepared materials and in their use of body gestures. When a teacher waved her hand above her head and then waved it below her chest to explain the words 'shallow' and 'deeper', she expected that the students already knew that the movement of her hand represented two layers, two levels or the concept of up and down – and that the students could connect these concepts to understand the two English words appeared in the middle of a long explanation about public relation. As observed, the students seemed to follow as they busily wrote down notes on their lesson materials. Without paying particular attention to the theoretical implication of these strategies, when explaining word meanings, the teachers facilitated assimilation by linking unfamiliar words to "a scheme or pattern already established" (Illeris, 2004, p.84).

- Explanation strategies for declarative knowledge - Concepts

Concepts were the most dominant type of declarative knowledge in all the college classrooms observed in this study. As revealed in the interviews, the teachers placed much emphasis on teaching concepts. They did not expect students to simply learn the meanings of words or to memorize facts. Instead, they used various explanation strategies to help students make sense of the new information being taught.

Although all teachers used the same word 'concept', and although all explanation strategies identified in the study were used to explain concepts, there were differences in the choice of strategies used in the different lessons. The following discussions involve observations made and the use of strategies in explaining the five types of concept reported in the previous chapter.

- *Concepts of subject words and terminology*

Knowing the dictionary meanings of words as discussed above and learning the concepts of these words involved two different levels of understanding and thus required two sets of explanation strategies. In the classrooms visited, declarative concepts were first introduced in written form via words and terminology. In other words, to teach declarative concepts was to explain these words and the terminology. For instance, before learning how graphic images and colours are used in graphic design, students needed to learn the concepts of words or terminology related to graphic design-based semiotic theory. Likewise, in the Abnormal Psychology lesson, the teacher explained the individual concepts of psychological words before fitting them into psychological theories.

Using examples was the most commonly-used strategy to explain concepts of theoretical words and terminology. The teachers intended to explain concepts through meanings derived from everyday experiences; these could be anything related to the students' lives. Using the letter *A* as a representation of a grade on a student assignment to explain the concept *symbolic meaning* was one such example. Showing an image of a rose to explain the concept of *connotation* in the Graphic Design lesson, as mentioned in the previous chapter, was another. The rose was not an example of connotation, and thus students did not assimilate connotation as a kind of rose but rather through the common perceptions of roses; thus, the concept of connotation was connected and explained, and the students accommodated this connection to construct a new piece of knowledge.

The Graphic Design teacher showed us that examples could also be developed through student activities. The teacher explained the term *culturally specific* by asking students to put down items representing different colours in their lives, and then pointed out items that reflected culture, generation and background. In another activity, students were asked to form groups with their peers according to the colours of their outfits – through this exercise, the students came to understand the term *colour tone*. In these activities, examples were generated by the students based on their own cultural background and life experience. Furthermore, these activities not only involved students in the scaffolding process, but also allowed explanations to be implemented in their activities.

For terminology related to subjects involving relationships between different participants or stakeholders in various social and research contexts, specific cases and hypothetical scenarios were chosen for the purposes of explanation. For instance, when teaching public relations, the teacher made use of the college itself as a specific example through which different public relations were explained, whereas another teacher created many hypothetical research scenarios and cases to explain terminology about research methods. These cases were not illustrative cases, as in the explanation of the previous types of declarative concepts, as these cases did not directly illustrate facts, events, skills or behaviours. Instead, the concepts were explained by applying them to a specific situation, which, according to Lynn Jr.'s (1999) classification, is a *concept-application case*, since the case was used "to enable students to attempt an application of a specific concept" (Lynn Jr., 1999, p.109). By making use of the college as a case that the students are familiar with, the teacher explained the concepts of different relationships to support understanding.

Besides borrowing examples for explanation purposes, discussing the correlation of related prior knowledge and making comparisons with other concepts was found to be another two strategies for explanation. The teachers would compare and contrast different concepts of related words or terminology. In the case where the psychological terms *delusion* and *hallucination* were explained, Teacher 4 brought up two other words, *illusion* and *fantasy*, as comparisons. In the interview, this teacher revealed that the purpose of these comparisons was to clarify the concepts of the words and to avoid possible confusion. This raises another question however: is making comparisons between concepts in this case an act of clarification or explanation? Walton (2007) discusses that in speech act theory, the acts of clarification and explanation are similar in nature, and clarification can be defined as "a species of explanation" (p.252). Yet, he distinguishes that an act of explanation is usually initiated by the explainer, aiming to support understanding of a subject that the listener lacks; while clarification is a response to a second party who requests further information to remove obscurity and create better understanding of any ambiguity previously put forward by the explainer (Walton, 2007, 2016).

In Teacher 4's case, though the teacher used the word 'clarify' to describe his act, he did not respond to any lack of understanding expressed or revealed by the students regarding what he had said during the explanation process. Instead, he aimed to explain the meaning of words and provided analysis of the differences between confusing concepts. Removing possible confusion regarding the concepts of words was the teacher's main concern and was a part of his planned explanation process. By contrasting the concepts of different words, the teachers further supported and reinforced the students' understanding of the targeted concepts by telling the students what something is not. By using the word *fantasy*, the teacher explained what delusion is not; by using the word *illusion*, he explained what hallucination is not. Telling *what something is not* is one of the most commonly-used methods of giving definitions. It is also called negation. This refers back to Price and Nelson (2014), who say that giving definitions via explaining the meaning of words or terms and giving comparisons by discussing what something is like or not like are both components of explanation. Thus, I see that in this scenario, Teacher 4 was using the technique of clarifying through comparing different concepts to give explanations to create better understanding of the two psychological words *delusion* and *hallucination*.

- *Object concepts*

Echoing Merrill, Tennyson and Posey (1992), the teachers taught object concepts by showing the objects themselves, using visual aids to explain object concepts. In Public Relations and Advertising in particular, the teachers explained concepts regarding different types of media and advertising layouts by using examples of existing layouts. They used numerous images and video clips to explain what those concepts represented. One teacher made use of local newspapers to show the concepts of different print advertising layouts, such as front-page ads, consecutive pages and gatefold ads. The strategy involved in showing these examples was to connect students' prior knowledge of things they had encountered in their daily lives to the concepts being taught. Advertising can be seen almost everywhere in our lives; but before taking this course, the students may not have known much about the concepts of public relations and advertising, and how these concepts are connected to the advertising they see every day. Showing objects via visual aids was the most direct way to teach object concepts.

- *Event concepts*

Event concepts refer to knowing what events are about. Taking two event concepts mentioned by Merrill, Tennyson and Posey (1992) as examples – a birthday party is an activity in which people celebrate someone's birthday, while digestion is a biological 'event' in which food is broken down into small pieces and absorbed into the body. In this college, the aim of explaining an event concept was to provide a general concept of the event instead of going into detail about its processes. For events, such as the fertilization process in the biology lesson, which required students to understand these processes, I categorized into concepts of skills and processes.

Only two examples of declarative event concepts were found in the Public Relations and Advertising course, where the teacher explained the concepts of PR (public relations) events and issue management. Since the course aimed to provide foundation concepts related to public relations and advertising, the curriculum did not require students to know the process of organizing events, and they simply needed to acquire concepts about what events are 'like'. From the video data, using examples of specific cases was one strategy employed. Instead of simply telling the students about PR events, the teacher showed videos of various PR events organised by well-known brands. When the teacher explained the term *issue management*, she began by explaining the concept of *issue* as being topics which concern the general public and by using a news clip of a Consumer Council report on bathroom paper as an example. She then moved on to explain the terminology *issue management* via a specific case about a local restaurant that changed their take-away containers after the release of a report on the toxicity of plastic containers.

Lynn Jr. (1999) calls cases like these *illustrative cases*, as they are not used to help the students make analyses or judgements and evaluations – rather they are simply used for illustrative purposes. These illustrative cases provided a "historical record of what happened" (Lynn Jr., 1999, p.109) to fulfil their didactic purpose without further creative and interactive discussion of the cases themselves. Though students may not have opportunity to participate in some industrial or government events, videos and photos provided visual experience for making sense of those event concepts and this building on their prior understanding.

- *Skill concepts*

Understanding skill concepts is not the same as being able to use skills, techniques and procedures in a routinized way. Knowing the steps or processes in declarative form refers to the knowledge of a process; while knowing the skills or techniques in procedural knowledge requires students to know how to apply and perform the related skills in a practical sense (Pintrich, McKeachie & Lin, 1990; Estep, 2005). Knowing skill concepts simply refers to understanding the concepts of words that refer to individual skills or techniques.

In many publications, skill teaching commonly takes place in the form of concept description. However, I would argue, for example, that simply reading the descriptions about *optimal volume* and *rate of speech* from a public speaking textbook would not allow learners to understand 'how loud is too loud' or 'how fast is too fast'. In this study, the teachers were not observed to explain skill concepts through written or spoken descriptions, but they used *performance modelling* (Roehler & Cantlon, 1997) through providing teacher demonstrations and showing video clips. For instance, Teacher 1 demonstrated monotone speech and played a video of a man giving a speech to show the meaning of using body language. From these demonstrations and clips, the students were able to make sense of the concepts of the skills to which the words referred, concepts which could hardly be understood from verbal explanations alone.

The differences in explanation strategies also indicate the differences in the various skills. To explain further, the public speaking skills addressed in the lessons were individual performance-based skills that the teacher could demonstrate by himself or by showing performances from other public speakers on video clips. Social communication skills, on the other hand, involve understanding various skills employed in social situations. Thus, the teacher selected video clips of social interactions or set up hypothetical social scenarios for demonstration when teaching listening skills such as showing a short interaction between a nurse and a patient, and creating a context in which the students were required to comfort a friend who had a relationship crisis. Even though the students were only required to understand and memorize different skill types, the teachers chose to set up social scenes for explanation purposes. The teachers had noticed that students normally had a faulty perception that they already had a working knowledge of social communication skills since they communicated with people every day. Moreover, the teachers' rationale was that simply giving direct instructions and explaining skill-related terminology would not make the students interested in learning. Using hypothetical scenarios made up by the teachers gave them the flexibility to set up more interesting contexts that were closer to the students' daily lives, while using video clips showing people's interactions would support understanding of these skills in a real-world communication setting.

- *Behaviour concepts*

This type of concepts includes concepts of terminology about people's psychological or neurological issues that are reflected in their behaviours and communication behaviours in social interactions. As observed, the teachers of psychology and communication classes showed the students the physical actions or reactions of people with these issues as they respond to the environment. As mentioned by one teacher in an interview, movies were a fruitful device for teaching abnormal psychology around the world, as many of these types of behaviour are depicted in the cinema. Shepard and Brew (2005) found that using movies in psychology classes facilitated deeper understanding of human behaviour and interactions, and greater understanding of psychological theories and concepts in counselling and communication skills training. Although their discussion focused on using movies to explain psychological theories, the same strategy was applied by four teachers in this study to explain psychological, neurological and communication behavioural concepts. Apart from movie clips, another strategy was to show video clips of patients with actual psychological disorders. In one Abnormal Psychology lesson, the teacher showed a video of a patient with a thought disorder talking to a psychiatrist. By watching and listening to the patient, the students were able to better understand the concept of a thought disorder. This strategy was also used in the Interpersonal Communication class, where the teacher explained the concept of Asperger's syndrome by playing a documentary showing the communication behaviour of a girl with this syndrome.

Specific cases were not necessarily presented through videos – news reports were also used. When explaining the concept of *delusion* in the Abnormal Psychology lesson, the teacher told the students about a news story where a man sued his dentist because he believed that the dentist had implanted a 'mini device' in his tooth. Again, this case helped students understand the concept behind the word 'delusion' via the reaction of the patient.

When there was no specific case or movie clip that could be used to explain concepts, the teachers would make up hypothetical scenarios to use as examples. This strategy appeared particularly frequently in Abnormal Psychology, Research Methods in Psychology and Interpersonal Communication lessons, in which many concepts were related to psychological or social situations. These hypothetical examples were created based on the criteria that the examples should be related to things that happen in daily life and that they should be interesting enough to get students' attention be easily memorable. These hypothetical scenarios were presented via verbal descriptions while some were presented via role-play. On several occasions, the teacher acted out the concepts of psychology-based words or terminology that referred to abnormal human behaviours.

Using illustrative cases was the major strategy used by the teachers in subjects of social science to explain psychological and neurological behavioural concepts. Whether the cases were real or hypothetical, and whether they were shown through telling, video clips or role-play, the teachers aimed to use or create cases that had the maximum illustrative power.

- Explanation strategies for declarative knowledge - Facts

One of the roles the teachers play in the classroom is that of information providers. Teachers provide factual knowledge that can help expand students' schema about a subject and the world, since it is the basis for both procedural and conceptual understanding. In this study, two lessons were found to focus on factual knowledge: Interpersonal Communication and General Biology. In the communication class, students learned the facts about neurological differences of males and females; and in the biology lessons, students learned facts about human bodies. The teachers in this study believed that factual information which is distant from students' experiences could be abstract to students and would thus require explanations. In turn, this implies that they did not simply expect students to memorize a dense body of information, but build new concepts that underlined the facts. In practice, when the teachers provided factual information, they also explained word meanings, concepts and procedures at the same time.

This study found that visualizing factual knowledge in terms of neurological patterns and biological structures was the major explanation method. Sree and Rao (2004) found that using audio-visual aids in science teaching could "give [students] better idea of real things" and "make learning experiences far more concrete" (p.138). These teachers used MRI scan images, structural diagrams and videos of endoscopic images and animations to teach biological facts. This also indicates that when dealing with scientific facts, 'showing' is a more effective and more popular explanation strategy than ‘telling’, echoing the visual approach recommended by Agarwal (2001) in biology teaching.

To conclude briefly, using visual aids was the strategy the teachers adopted to support understanding of factual knowledge. It must be mentioned that to ‘explain facts’ here does not mean to explain a fact as in explaining the fact that heat melts ice or the fact that China initiated the *Open Door Policy* in 1978. Rather, when dealing with scientific explanations, explaining facts may mean shedding light on a complicated causal relationship. The simple fact that heat can melt a piece of ice involves understanding the numerous chemical and physical relationships between temperature and ice molecules. Similarly, when explaining an event in a historical, economic and social context, other related or causal elements must also be explained and understood.

For the purposes of this study, the phrase ‘to explain facts’ is used to refer to the way the teachers explain what the facts were about, and support their students’ understanding of factual information. The strategies uncovered in this study show that facts (things which appear in reality) were used to explain factual declarative knowledge – i.e. showing students a structural image of a human cell allows them to visualize the real structure of it.

- <u>Explanation strategies for declarative knowledge - Steps and processes</u>

In the context of this study, the teachers rarely just explained the concept of an event; rather, they usually expected their students to learn about its steps or processes. I classified this type of declarative knowledge as ‘steps/processes’, which refers to knowledge that requires students to know what the steps are instead of knowing how to perform. Knowledge of this kind normally includes understanding a series of steps and processes – such as the steps of the protein formation process or the processes of hazard analysis and critical control points in food safety management.

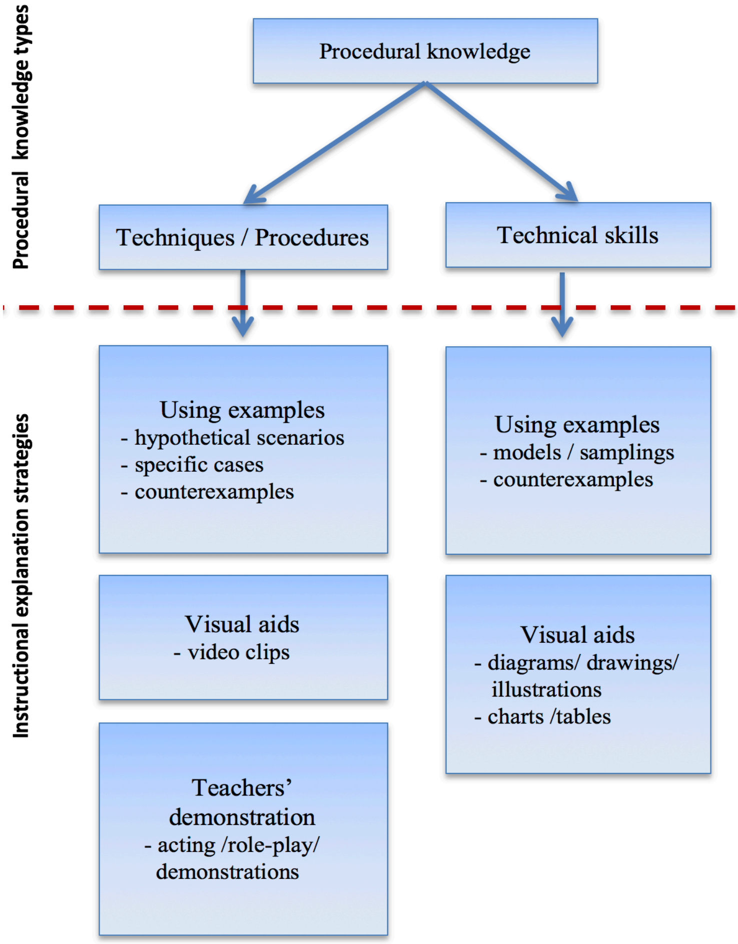
Using visual aids to teach biology is not a new strategy. In the 1950s, using audio-visual aids in biology started to gain attention. When projection devices were rather low-tech compared to the present, Reed (1954) already suggested that biology teachers use audio-visual aids, such as the projection of microscopic images, to promote efficiency in teaching.

Supported by high-technology devices in the college classroom, video animations, pictures and flow chart diagrams were the major teaching materials and the dominant explanation strategies used by the biology teacher to explain the steps and processes. As students cannot visualize biological elements and processes at the microscopic level, they often find biological concepts difficult to learn (Koba & Tweed, 2009). Visualization, therefore, takes a significant role in biology lessons to support understanding of biological features and procedures which cannot observed without high-tech devices. In addition, many biological processes take time to progress and are complicated, so using visual aids allows teachers to present the entire process in a short time (Agarwal, 2001). Spoken explanations in this case acted as a supplementary support to provide descriptions of the visual aids. However, in the Food Service Management lesson, explanations given in both written and spoken form were the major strategies used to explain food safety procedures; with the procedures listed in written form and then supported by verbal explanations of each of the steps.

- ***Explanation strategies for procedural knowledge***

This procedural knowledge section is divided into procedures/techniques and technical skills based on the nature of the learning outcomes. Figure 5.5 illustrates the instructional explanation strategies used by the teachers to explain procedural knowledge.

Figure 5.5 Instructional explanation strategies used for different procedural knowledge types



The teachers stated that teacher demonstrations were the most direct strategy used to explain what the students needed to do when their tasks involved physical body movement and speaking as observed in the Public Speaking class in which the teacher demonstrated techniques when giving a speech via performing those techniques in front of the students or showing video clips of other public speakers.

In the observed Research Methods in Psychology lesson, on one occasion the teacher explained the procedures of placebo control without demonstrating anything. She made use of an example from her previous research and explained how placebo control could be conducted. In this case, the teacher was considered to be teaching procedurally and not declaratively because her explanation "concerns how to use [the] strategies" (Pintrich, McKeachie & Lin, 1990, p.123). In fact, the nature of giving a speech is different from carrying out research: a research study requires more procedures and much more time. Nevertheless, the lesson observed focused on research design strategies instead of procedures; and thus, very limited information about how the teacher explained research procedures could be obtained.

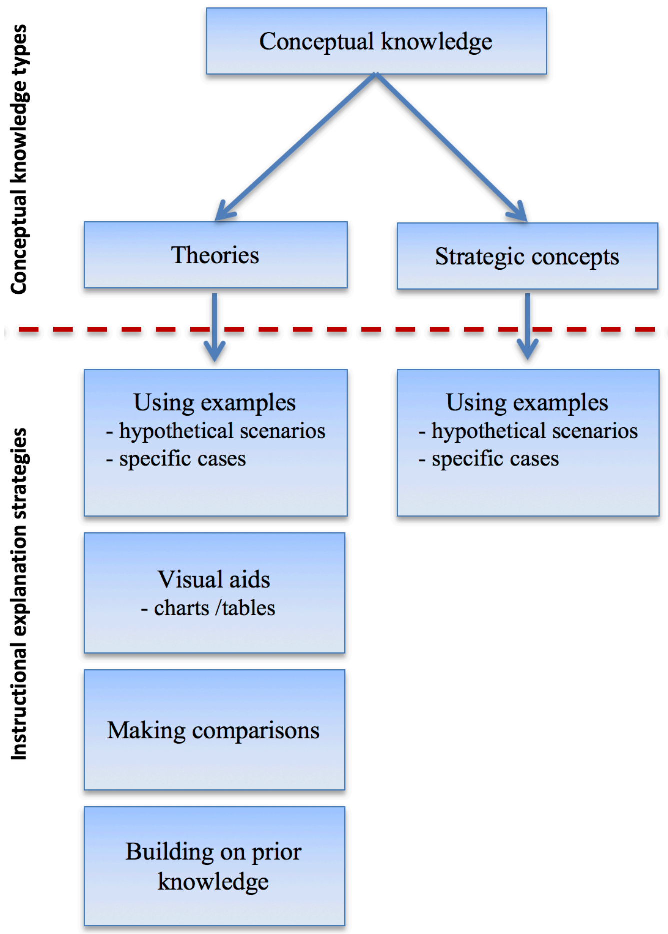
In spite of the above, I observed that the teachers were clear about the learning outcomes of each course and clearly distinguished whether the subject content should be taught at the declarative or procedural level. When the teachers explained processes declaratively, they tended to explain them through visual images and animations. When they taught procedural knowledge, they were keen on explaining it through performing modelling (Roehler & Cantlon, 1997) and/or cognitive modelling (Benson, 1997; Lane, 2012). The teacher in Public Speaking class used performing modelling to demonstrate public speaking skills and expected the students to practice the techniques and procedures of giving a speech outside their class. In the Research Methods in Psychology class, the teacher applied both performing and cognitive modelling through role-play and thinking aloud, demonstrating and explaining how and why different research techniques and procedures had to be done in specific ways and expecting the students could apply those in their mini research study.

Estep (2005) suggests that showing, describing and allowing learners to practice are the best ways to teach someone how to do something. The Computer Programming class was the only subject in this study where students received hands-on practice during the lesson. With a well-equipped computer laboratory at their disposal, the students learned to write different kinds of computer programs and were able to practice the techniques taught in the lessons. The strategies used to explain techniques dealing with technical procedures in the Computer Programming lessons were different from those used in the Public Speaking and Research Methods in Psychology lessons. The most distinctive difference was that teacher demonstrations were replaced by showing models or sampling through diagrams and charts (see Figure 4.2). Instead of using performing modelling, the Computer Programming teacher used cognitive modelling. He thought aloud while showing flow charts to explain the procedures and using models to demonstrate processes and outcomes. In addition, counterexamples were also used to show students the incorrect use of programming techniques to explain the reasons why some students did not obtain the intended results from the computer program and to explain the technical reasons behind this failure.

- ***Explanation strategies for conceptual knowledge***

Conceptual knowledge is the integration of declarative, as well as procedural, knowledge. In this study, the theories and strategic concepts identified from the data were categorized under conceptual knowledge, since both of them require understanding – not only of the concepts of every single term but also the connection among other concepts and how those concepts work together to develop specific strategies for specific outcomes. The kinds of instructional explanation strategies used to explain conceptual knowledge are illustrated in Figure 5.6.

Figure 5.6 Instructional explanation strategies for different types of conceptual knowledge



I noticed that while theories were embedded in all lessons, not all of these theories were explicitly taught. For instance, in the Graphic Design lesson, the teacher taught theoretical terminology but never informed the students he was teaching theories. Instead, most of the curriculum aimed to provide basic knowledge of each subject area and thus focused primarily on declarative knowledge.

In this study, the lesson in which theories were overtly taught was Abnormal Psychology. The teacher used a mixture of strategies including hypothetical scenarios and specific cases and showed charts and tables to link to prior learned declarative concepts to related theories. For example, he used a court case as an example to explain how psychologists distinguish between schizophrenic delusions and delusional disorders based on psychological theories. In his explanation, the teacher also made links to concepts about delusions that the students had learned earlier and made comparisons to different types of psychological disorders. Another example involved the teacher drawing a timeline when explaining the duration criteria for a diagnosis of schizophrenia from a theoretical perspective. On the six-month timeline, he provided a hypothetical example of a person suffering from delusions and hallucinations of different durations to explain how the theory defined schizophrenia in terms of duration of its symptoms. Also, the theory proposed that the closer the genes of two people are, if one person has schizophrenia, the other has a higher risk of developing the disease. To support understanding, the teacher explained the theory via a bar chart which presented the percentage chance of developing schizophrenia across different genetic relations in the general population, siblings and identical twins.

Statements that express theories embed much deeper meanings when they include a lot of research and long, complicated theorizing processes. When the Abnormal Psychology teacher explained one theory, he did not explain one statement representing the theory, but rather scaffolded the students by explaining many pieces of information which contributed to the theory. Simply explaining the words and terminology in the statements could only help students understand the concepts of individual items, but not the theories as a whole. Bringing up research findings via charts or tables was found to be a strategy that could help students see where the theoretical statements came from. The schizophrenia bar chart example explained above was an effective way to explain the statement via visual aids that also depicted previous research findings.

Not all theoretical statements could be explained through statistical information though. As observed in the Abnormal Psychology classes, many statements under a particular psychological theory required understanding of the connection between a particular psychological status and its influences on people's behaviours and reactions to the environment, research and clinical procedures, and diagnosis. The teacher chose to use many hypothetical scenarios that brought the wordy and abstract meanings behind each theoretical concepts or statements to life (An example can be found on p.185 in Section 4.6.1.2). He claimed that creating hypothetical examples could help connect difficult concepts to daily life situations that the students could easily understand. While there may be masses of studies or real cases related to the psychological theories, searching and selecting examples was not as easy as creating hypothetical examples tailored to the students' academic, social and cultural backgrounds. Therefore, he used more hypothetical examples than specific cases to explain theories.

Specific cases served another function: supporting understanding of how theories relate to reality. When using specific cases to explain concepts about psychological or neurological behaviours, the Abnormal Psychology teacher focused on the behaviours of patients with specific disorders; but when specific cases were used to explain theories, the attention lay on what the theories meant in real situations and how the theories affected the diagnosis and clinical judgment of psychological disorders. In the Abnormal Psychology lessons, hypothetical examples were used mainly during the scaffolding process to link theoretical concepts to the theories. Specific cases, on the other hand, were brought up after finishing a major part of a theory to support understanding of how these theories were implemented in real-life psychological practice.

Strategic concepts were categorized as a type of conceptual knowledge because students were not only expected to know the concepts and skills of the various strategies, but also understand what strategies could be applied in specific contexts and situations, and understand the reasons why the strategies should be used in such a way to achieve the intended outcomes. This process involves a thorough understanding of the related concepts and the relationship between them.

In the Food Service Management lessons, the students learned about strategic planning in the food industry and were expected to show their understanding in a written assessment discussing the use of strategies. In the Research Methods in Psychology lesson, the whole course focused mainly on the strategic concepts found in different research studies; here, the students were expected to learn the strategies and then apply them in their own research project. Using verbal explanations in English with some Cantonese support was still the major explanation strategy.

In the Research Methods in Psychology lesson, the teacher used a number of research scenarios to explain strategic concepts in research strategies. These scenarios, though hypothetical, were created based on possible research situations that the students may come across during their research projects or in future studies. The hypothetical research scenario about the change of measuring devices in a five-year heart-rate study provided a means for the teacher to explain the strategic concepts of instrumentation in relation to internal validity. This example allowed the students not only to understand the concept of instrumentation, but also the importance of using consistent research instruments to obtain trustworthy results.

On several occasions, hypothetical scenarios were provided to set the scene for demonstrations. When teaching the students ways to demonstrate to a research subject their professional demeanour and serious attitude to research, the teacher created a hypothetical surveying situation and role-played both the researcher and the participant, demonstrating a non-professional response and non-serious behaviour. In this example, while demonstrating the techniques, the teacher also implemented counterexamples showing 'what the technique is not' to contrast with the recommended techniques; this reinforced the understanding of not only how to properly conduct the techniques, but also the impacts of not using them properly in a research study.

Contrasting with the hypothetical scenarios used to explain declarative concepts and conceptual theoretical knowledge; hypothetical examples were expressed in terms of an incident or an anecdote from which the students learned knowledge from what the incident indicated. Hypothetical scenarios used to explain strategic concepts were similar to those used to explain procedural knowledge, in that the explanations aimed to set a scene in which the students could learn the application of the skills or strategies in a specific context. The difference between the hypothetical scenarios used to explain procedural knowledge and those used to explain strategic concepts is that the former focuses on the understanding of specific skills, while the latter requires critical understanding of all other strategic concepts and outcomes, including who, when, how, why as well as the pros and cons of the strategies.

Specific cases were another type of example that the teacher used to explain strategic concepts in research methods. All the cases she used concerned the teacher's previous research experience through which she explained the ways she designed and carried out her research based on different strategic concepts in psychological research in real clinical situations.

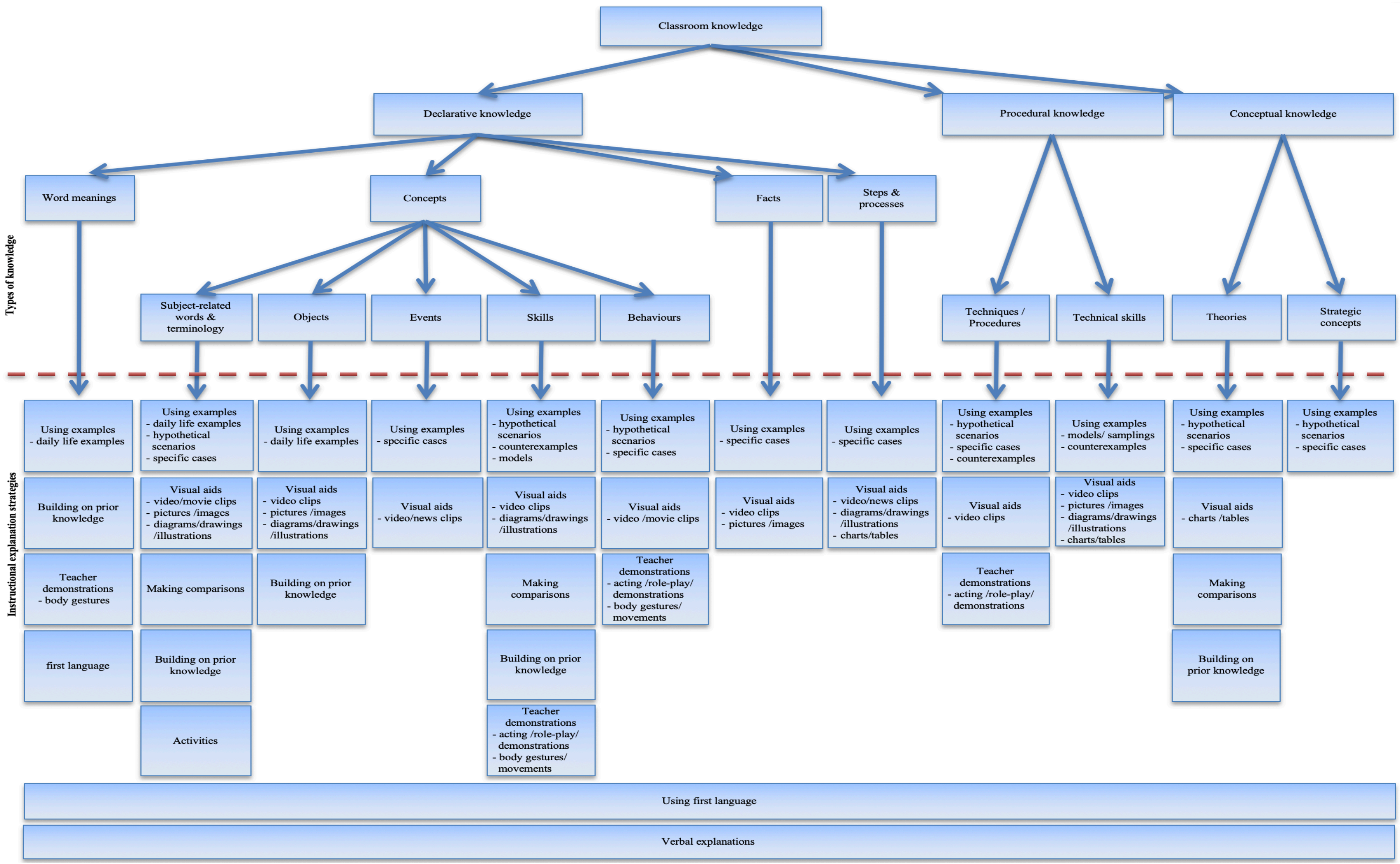
When a hypothetical example is created to support understanding, it can be categorized as an *exemplar case* which "is usually a brief episode that clearly epitomizes a concept or issue… [and] are used to concretize or operationalize 'theory' or intricate practices" (Carter, 1999, p.166). As observed in this study, while hypothetical scenarios supported understanding of individual strategic concepts, specific cases allowed the teachers to explain and connect individual and related strategic concepts by providing a fuller picture of those concepts. This reveals that both kinds of examples are exemplar cases, though the specific cases are more sophisticated.

Another subject where strategic concepts were taught was Food Service Management – in which strategic planning was part of the course syllabus. As recalled by Richardson and Ginter (1998), "the teaching of the strategic planning process is typically based on the case method" (p.1). The approach which they claim to be effective in teaching a master's degree class is similar to the strategies used by the college teacher, i.e. explaining strategic concepts through applying these concepts to a real case. However, owing to the different academic levels, students of Richardson and Ginter (1998) learned strategic planning through a series of activities in which they needed to communicate with an organization to collect information for analysis; while in the college classroom, the students only needed to understand how and why the strategic concepts were derived and correlated to different stakeholders through the case.

Since the organization being analysed for explanation purposes had no need for a strategic plan, hypothetical scenarios were created by the teacher to set up a lifelike context. In the Food Service Management lesson, a fusion of hypothetical and specific examples was found. When explaining strategic planning, the teacher used a well-known herbal drink company as a specific case to explain what, how and why every single factor involved in the strategic plan has significance, and how these factors correlate to the company and the local market. But even though the explanations were based on a real company, the explanatory contents were not the company's real strategic plan but rather a hypothetical situation. The teacher made use of a specific company so that everyone in the classroom familiar with their products could apply those strategic concepts as a hypothetical strategic plan-making situation. It did not matter if the cases were hypothetical or real, the cases were *concept-application cases*, since when discussing them, strategic concepts had to be applied and analysed in the specific situations (Lynn Jr., 1999).

Figure 5.7 provides a complete illustration of the types of knowledge identified in this study and the instructional explanation strategies that the teachers used to explain this knowledge. In summary, the traditional view of instructional explanations focuses only on spoken explanation. This study found that instructional explanations are not restricted to the act of telling and that strategies of explanation can involve more than giving definitions, descriptions, elaborations, examples or paraphrasing. Instead, a movie clip, an image or a role-play exercise could also act as an explanation strategy, while most of the time verbal explanations served a supportive and descriptive role, helping make sense of the connections between these instructional explanation strategies and the new knowledge being taught. The teachers used various strategies to explain different types of knowledge – using different kinds of examples, using visual aids, making comparisons, bringing up prior knowledge, using activities and giving demonstrations. Using first language was a common strategy to give dictionary-type meanings to English words, but it was not used as a strategy for other knowledge types, rather it appeared occasionally to support explanation of other types to ensure that students with a weaker English proficiency could also understand the subject knowledge during the scaffolding process. In every class, the teachers explained new knowledge through telling; however, when other instructional explanation strategies were used, most of the time the spoken explanations played a supplementary role to describe and make sense of what those strategies were trying to explain.

Figure 5.7 Summary of instructional explanation strategies the college teachers used to explain different knowledge types



5.4 Instructional explanations to support students' learning and understanding

This section responds to the sub-questions under RQ3, discussing in what ways and to what extent instructional explanations support students' learning and understanding in the scaffolding process in the college classrooms. The three sub-sections carry the discussion firstly revealing the three common approaches shared by instructional explanation strategies, then exploring how these approaches relate to those strategies, knowledge types and subject areas, and the role of instructional explanations in terms of scaffolding new knowledge in content-based lessons.

5.4.1 *Instructional explanatory approaches*

The previous section provides a detailed discussion on how the teachers in this study explain knowledge by using different types of instructional explanation strategies. To further understand how these instructional explanation strategies support understanding, selecting coding method was adopted to further identify the core explanatory approaches shared by those explanation strategies. Through analysing the features of strategies which represent specific explanatory approaches that facilitate understanding, I found that making use of familiar knowledge, applying new concepts in real or hypothetical contexts and explaining through showing visual images or moving pictures are three common features of explanation strategies identified in the study. These features represent three general approaches: familiarization, contextualization and visualization. Table 5.3 shows the distribution of explanation strategies that were used to support understanding of different types of knowledge in terms of familiarization, visualization and contextualization. In the tables, the letters 'F', 'V' and 'C' represent familiarization, visualization and contextualization respectively. In the following sub-sections, I first elaborate the nature of each individual approach and then move onto the discussion on how these approaches relate to the explanation strategies, the types of knowledge and distribution of these explanatory approaches in the nine subject lessons I analysed.

Table 5.3 Three explanatory approaches in relation to different knowledge types and instructional explanation strategies

Explanation strategies	Explanation strategies – subtypes	Types of knowledge / Different approaches of explanation strategies used to teach different knowledge types F = Familiarization; V = Visualization; C = Contextualization											
		Declarative								Procedural		Conceptual	
		Word meanings	Concepts					Facts	Steps / processes				
			Concepts of Subject-related words & terminology	Object concepts	Event concepts	Skill concepts	Behaviour concepts			Techniques/ Procedures	Technical skills (computer programming)	Theories	Strategic concepts
Using examples	daily life examples	F	F	F		F	F C					F C	
	hypothetical scenarios		F C			F C	F C			F C		F C	F C
	specific cases		C		C		V C		C	C		C	FVC
	counterexamples					C				C	C		
	models/ samplings					V C					V C		
Using visual aids	videos / movie clips/ new clips		V	V	V	V	V C	V	V	V			V
	pictures / images (example)		F V	F V									
	pictures/ images (show concepts)		F V				V C	V					
	diagrams / drawing / illustrations		V	V		V			V		V		V
	charts / tables								V			V	
Making comparisons	comparison & contrast		F			F							
Building on prior knowledge	prior knowledge	F	F	F		F						F	F
Using activities	activities		F C										
Teacher demonstrations	acting / role play / demonstrations					V C	V C			V C			V C
	body gestures / movements	F V				V	V						
Using students' first language	Cantonese / Chinese	F	F	F		F			F	F			F
Verbal explanations	spoken explanation - explain by telling	F	F	F	F	F	F	F	F	F	F	F	F
	written explanation on PowerPoint	F	F	F	F	F	F	F	F	F	F	F	F

5.4.1.1 Familiarization

The key to learning and understanding, according to schema theory, is the connection of prior knowledge and new knowledge. Therefore, explanations that can make these connections serve a scaffolding function to support the understanding of new knowledge. Among the twenty-one subtypes of explanation strategies, ten of them link the familiar with the unfamiliar. I call this approach 'familiarization'.

In Table 5.3, the strategies under this category are labelled with the letter 'F'. Using daily life examples can be classed as familiarization since familiar objects or contexts that occur in the students' daily lives are borrowed to explain unfamiliar words and concepts. These examples may be presented via telling or showing these items or events visually on a screen. Using pictures of familiar images serves the same function as daily life examples. Furthermore, the teachers also used words, skills and theories that the students had learned before in their explanations when explaining new concepts. These methods used the familiarization approach, since the teachers facilitated understanding by making a connection between prior knowledge and new ones. In addition, the activities used in Graphic Design lesson also adopted familiarization: instead of providing familiar context to the students, the students generated ideas they were familiar with, and the teacher explained the new concepts through those generated ideas.

The strategies above were mainly used to explain the lexical meanings of words and concepts of subject-related terminology. The last two explanation strategies in the familiarization category are 'using first language' and 'verbal explanations in both spoken and written forms'. When a teacher verbally explains a theoretical statement, they actually paraphrase the statement by using simple words and language patterns that the students already know. Similarly, when using students' first language to explain the lexical meaning of a word, teachers use a language that is familiar to the students. Therefore, although using the first language and verbal explanations do not bring in familiar items or contexts to the explanation, the approach of these strategies is to use the familiar to explain the unfamiliar.

5.4.1.2 Visualization

Visualization is another group of strategies that support understanding by showing learners what something is or how something is done. Gershon (2015) used the term *visual explanation* to refer to the use of visual aids in teaching; believing that learning through visual aids such as pictures, diagrams and charts is "particularly useful for explaining processes, connections, relationships and how things work" (p.187). However, the term does not have a fixed definition as it could refer to the use of illustration as an elaboration for written text (Saunders, 1994), or be used in the field of visual literacy to represent how machines understand visual representations (Les & Les, 2015).

This study shows that visualization gives meaning to words and objects, shows factual information, illustrates concepts and demonstrates specific skills and procedures. To be more specific, objects and physical facts, even at the microscopic level, such as the structure of DNA, can be explained through pictorial images and illustrations. Knowledge related to behaviours and skills is best explained through moving pictures or demonstrations. In Table 5.3, we can see that explanation through visualization appeared in all three types of knowledge explanation processes. The use of visualization was not restricted to using visual aids to show pictures, diagrams or movie clips – it also includes role-play and body gestures, as teacher demonstrations fulfil the same purpose, i.e. showing to explain. Instructional visual explanations facilitate assimilation when the images represent a piece of prior knowledge, such as showing different billboard advertisements to explain outside advertising. Instructional visual explanations can also be used to lead to the accommodation and construction of new knowledge. For instance, the use of an image of a cat facing a mirror showing a reflection of a lion was used to explain the concept of 'delusion' in the Abnormal Psychology lesson – the purpose of the image was not to connect the cat and the lion to any assimilated knowledge of animals, but to direct the students to accommodate a new concept.

5.4.1.3 Contextualization

The third group of explanation strategies supports understanding by putting students into specific contexts. Teaching and learning by putting students into various learning contexts so as to connect new knowledge to the learners' own experiences and the real world is a pedagogical approach called contextual teaching and learning which "motivates students to make connections between knowledge and its application to their lives" (Hudson & Whisler, 2007, p.54).

Teachers, when using a contextual teaching and learning approach, create or prepare a series of activities in which students learn and apply knowledge of specific contexts through first-person experiences. Lankard (1995) refers learning through contexts as *situated learning*, meaning that "knowledge and skills are taught in contexts that reflect how the knowledge will be used in real-life situations" (p.3). In spite of the fact that learning through contexts and situations was a constructivist approach that supported students as they learned through their ZPD (Hudson & Whisler, 2007), the concept of contextualization has never been linked with instructional explanations. However, the data showed that some instructional explanation strategies have a contextual approach which supports understanding of new knowledge. For instance, applying different research skills in authentic research cases to support understanding of the procedural and strategic concepts in research methods lesson, and making use of various hypothetical scenarios to explain psychological knowledge.

In terms of instructional explanation, knowledge could be explained through contexts embedded in hypothetical scenarios, specific cases, counterexamples and samplings in seven subject lessons. In the explanation of declarative knowledge, contexts support the explanation of word meanings and concepts in specific subject areas, knowledge of factual information, making sense of various types of human behaviours and learning about skills concepts in response to various social situations. Similarly, contexts delivered as hypothetical situations or specific cases were used to facilitate understanding of conceptual knowledge, as shown in Table 5.3.

Theories and strategic concepts involve complicated relationships between declarative concepts and their relationship to diverse realities. Contextualized explanations can help learners conceptualize abstract theoretical and strategic meanings through real cases or hypothetical scenarios developed from real life contexts related to a student's cultural and social background. When dealing with procedural knowledge, providing context for the understanding of skills, techniques and technical applications is essential for learners to make sense of the knowledge in relation to the actual application of the techniques and procedures.

5.4.2 Explanatory approaches in relation to knowledge types, explanation strategies and subject areas

The three explanatory approaches provide another window into how different instructional explanation strategies support the understanding of different types of knowledge. In this section, I want to look at the relationship between these three explanatory approaches and the explanation strategies, the types of knowledge and the subject lessons to develop the models of instructional explanation strategies in relation to different knowledge types and subject areas being analysed in this study.

5.4.2.1 Explanatory approaches and the instructional explanation strategies

Table 5.3 shows the analysis involving three sets of elements – explanatory approaches, instructional explanation strategies and knowledge types. In order to understand the relationship only between the three explanatory approaches and eighteen instructional explanation strategies, a table developed from Table 5.3 was evolved and attached in Appendix 31, showing the distribution of all instructional explanation strategies found in this study and their underlying approaches to explanation. The table shows that some strategies, such as using diagram and comparisons, support learning through one individual approach whereas some of them do it through the combination of two or three approaches, as for examples, using specific cases and video clips.

Figure 5.8 is the model illustrating the eight major instructional explanation strategies from the findings presented in Appendix 31. Each circle represents one specific approach. The strategies labelled in each zone indicate the embedded approaches they represent in that area. Strategies located in an overlapping zone support understanding through the combination of two or three approaches – using examples, for example. The diagram shows that four types of strategies – making comparisons, building on prior knowledge, verbal explanations and using a student's first language – support understanding through familiarization only. Other strategies, in contrast, involve the use of different approaches. For instance, teachers used examples to explain new knowledge through using familiar materials, specific yet unfamiliar contexts, familiarized contexts and visualized contexts, or through visualizing familiar contexts.

Figure 5.8 Explanatory approaches and instructional explanation strategies

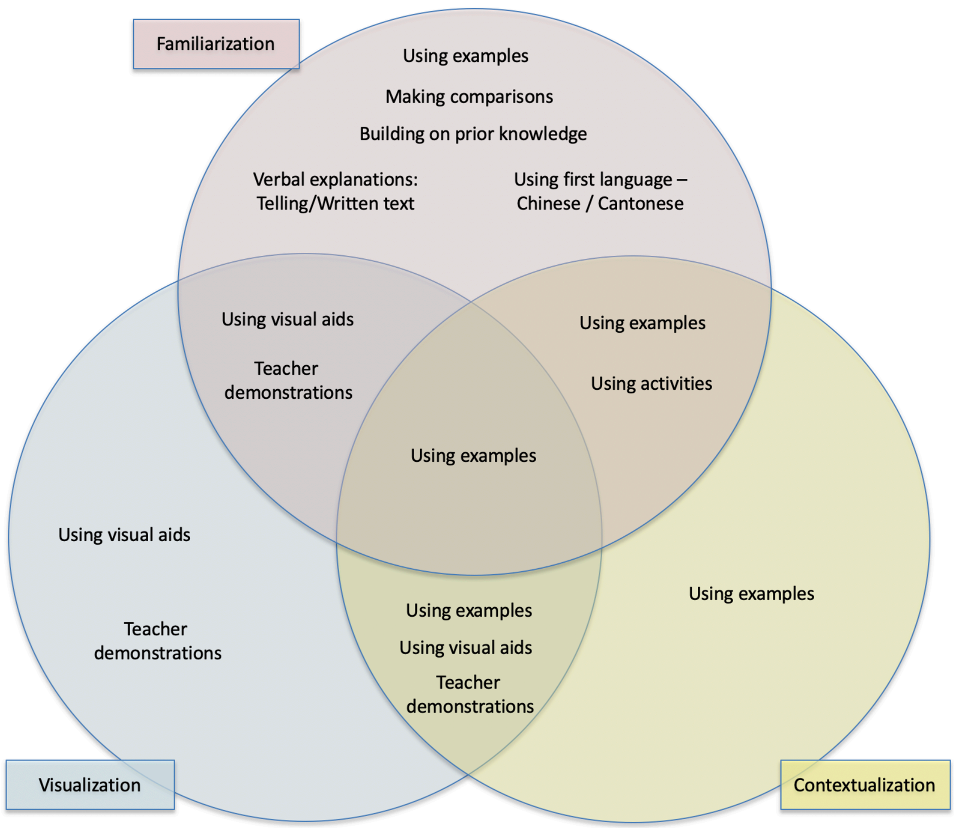
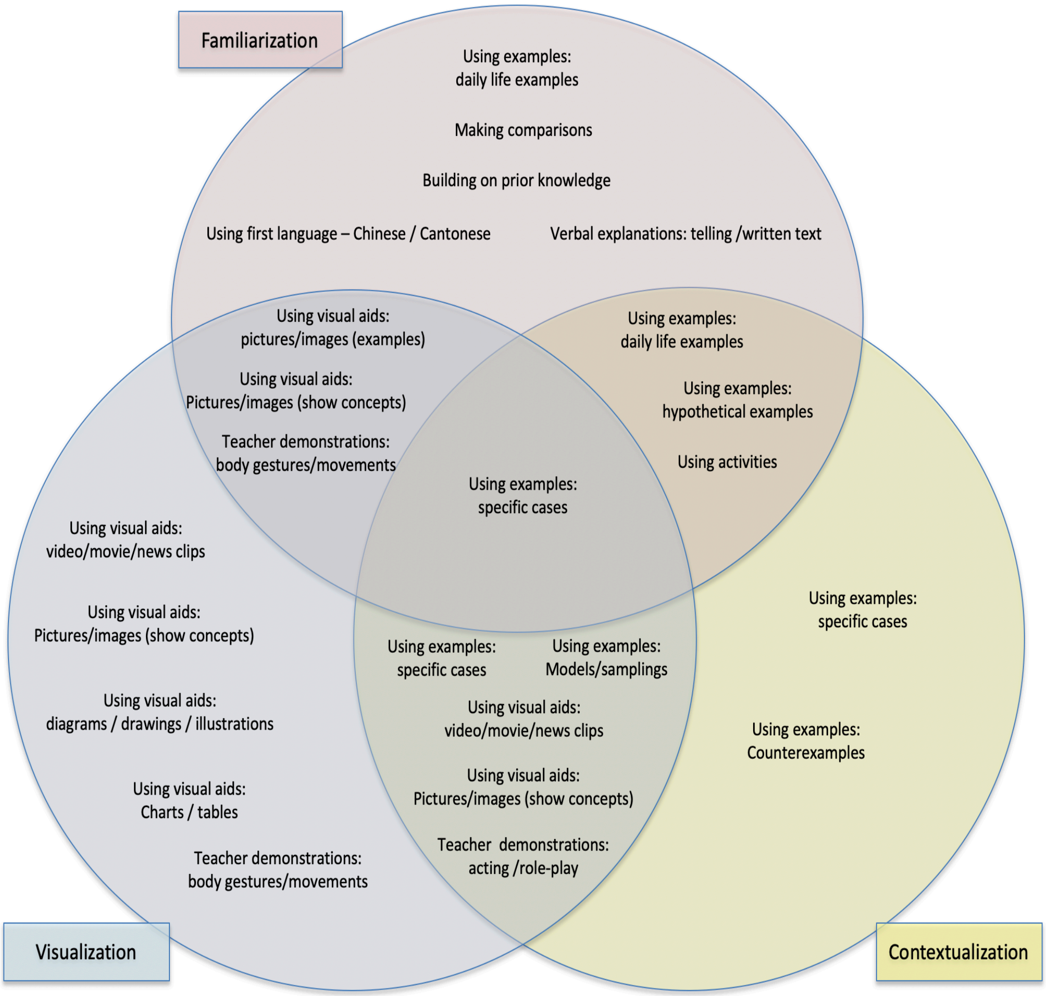


Figure 5.8, does not present a full picture however, since there are different types of examples, visual aids and teacher demonstrations. When expanded to all the sub-categories, another model presenting a fuller picture of the distribution of the full set of instructional explanation strategies emerges and is illustrated in Figure 5.9.

Figure 5.9 Explanatory approaches and instructional explanation strategies (with sub-categories)



This diagram provides a more detailed illustration of the approaches derived from individual explanation strategies. Different types of examples, visual aids and teacher demonstrations are found in different zones. Not all types of examples adopt explanatory approaches that involve familiarization – only *daily life examples* and *hypothetical examples* do. A daily life example may also involve a combination of both familiarization and contextualization – when teachers used familiar daily context as an example, for instance. Similarly, teachers created hypothetical examples based on contexts related to students' life experience to support understanding. The absence of hypothetical examples in the contextualization-only zone illustrates that no hypothetical examples were found using unfamiliar contexts. In contrast, specific cases support understanding via specific contexts with or without the use of visual aids and/or familiar elements. For examples, using a previous research case that the students had never experienced to explain research concepts (Contextualization only), playing a video clip of a patient with a mental disorder in a specific context to support understanding of a behavioural psychology concept (Combination of visualization and contextualization) or showing a video documentary of a well-known company to explain strategic planning (Combination of familiarization, visualization and contextualization) .

The same interpretation can be applied to all the other explanation strategies in the diagrams. There are six types of visual aid strategies and only two of them, including the use of diagrams/drawing/illustrations and using charts/tables, explain knowledge through visualization. The other four consist of different combinations of the three explanatory approaches. The approaches used by the teachers to explain concepts by showing pictures/images could be solely visualization, or visualizing contexts or visualizing familiar contents. When pictures/images were used to show examples, of objects in particular, the teachers only appeared to adopt an approach in which familiarization and visualization appeared at the same time, i.e. visualizing familiar items. Likewise, two types of teacher demonstration strategies can be read in the same way – *using body gestures/movements* aims to explain via showing, and could be familiar or new to the students, while *acting and role-play* explain new knowledge through specific context in the form of a role-play.

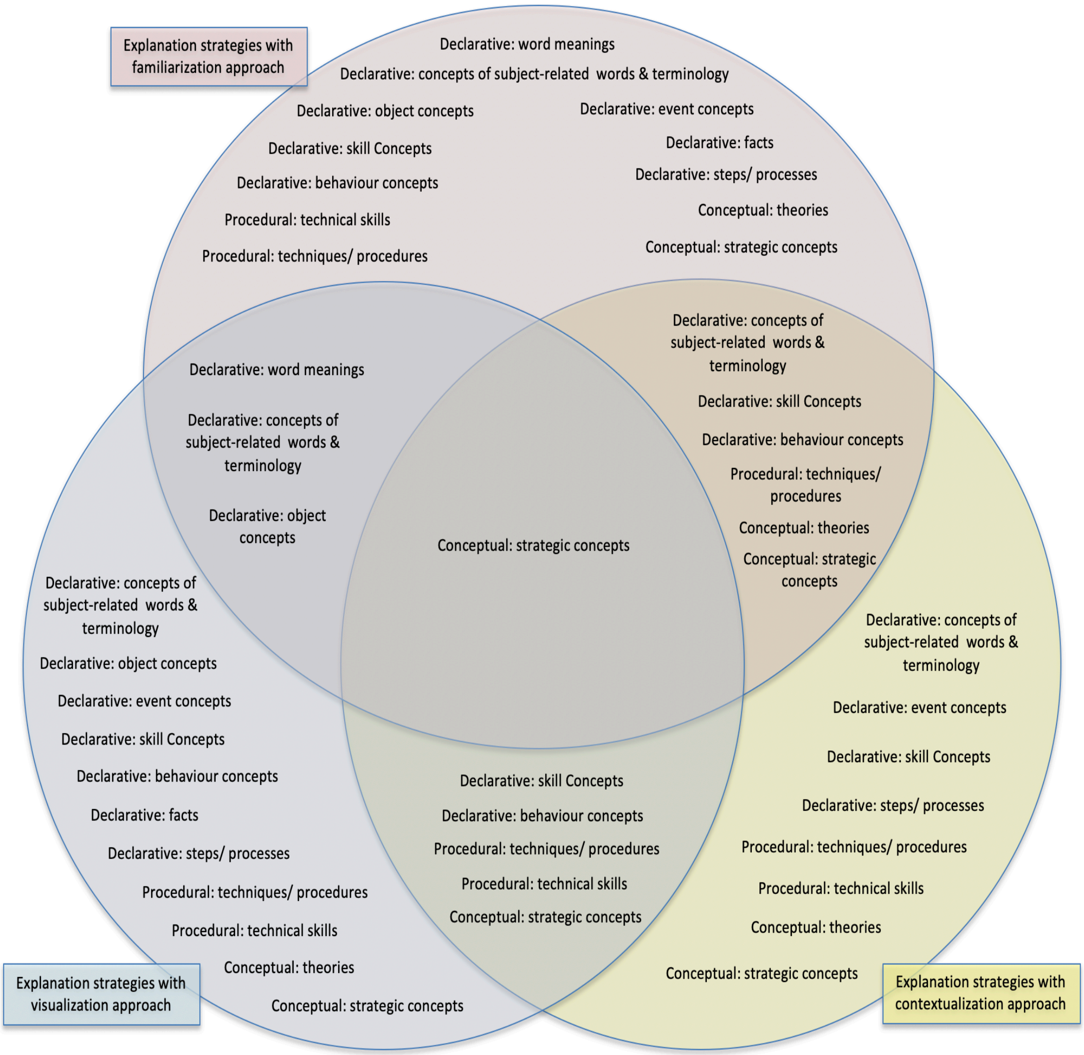
Figure 5.9 indicates that instructional explanation strategies support the understanding of new knowledge through single or multiple explanatory approaches. Some strategies may always have specific approaches. For example, building on prior knowledge, making comparisons with other existing knowledge and using first language always connect with the familiarization approach, whereas all types of visual aids are linked to visualization. However, I believe that the shared approaches of the strategies are fluid, and that the explanation strategies may appear in any of the overlapping areas when a strategy is used in a different way. Taking using news clips as an example, in this study, the news reports used by the teachers were not from well-known cases and were new to students. On the other hand, if a teacher used a news clip of a recent local news event that had attracted much attention, the use of news as a type of explanation strategy would fall in the zone of familiarization/visualization, as it has something in common with these two explanatory approaches.

5.4.2.2 Explanatory approaches and different types of knowledge

If the teachers in this study used different explanation strategies to support the understanding of different types of knowledge, and if understanding is expected to be attained through the explanatory approaches underlying in those strategies; it can be inferred that the teachers used different approaches to explain knowledge of different types. It can also be inferred that these strategies were the channels via which the approaches were applied. Also evolved from Table 5.3, the table in Appendix 32 shows the distribution of explanatory approaches that were identified from the explanation strategies to the support understanding of twelve different types of knowledge. The table shows that most of the approaches, either individual or in combination, could be used to explain three major knowledge types. However, the familiarization-visualization approach was an exception as it was used to explain procedural and conceptual knowledge, while the combination of familiarization-visualization-contextualization was the only approach identified from the strategies that explained strategic concepts in the Food Service Management.

The relationship between explanatory approaches and different knowledge types will be discussed below with Figure 5.10, an illustrative model developed from Appendix 32.

Figure 5.10 Distribution of different knowledge types explained by strategies with different explanatory approaches



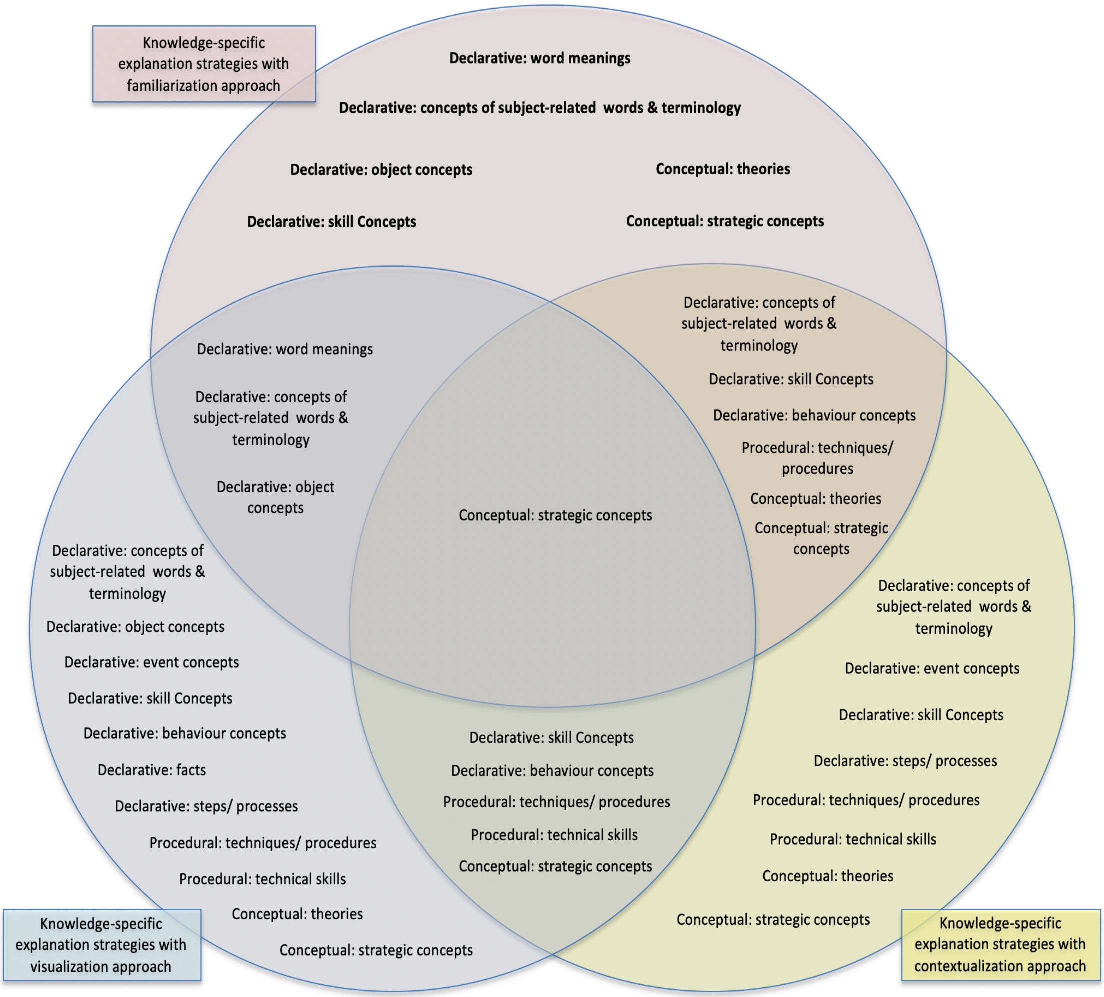
The three circles in Figure 5.10 symbolize the three explanation approaches. As shown in the diagram, all twelve types of knowledge can be explained simply through the familiarization approach, eleven types can be explained by using visualization, while eight of them can be explained via contextualization. The overlapping areas represent that two, or three, approaches were embedded a one single strategy used to explain the knowledge types. For example, *declarative word meanings* can be found in the familiarization area, but also in the overlap between familiarization and visualization; this means that the strategies which the teachers used to support understanding of word meanings were either through familiarization or through visualizing familiar materials;

not using visual aids only and also not using contextualization approach. To illustrate further, when the teachers explained an English word by providing a Chinese translation, familiarization was the only approach used in the explanation. However, the teachers could have also connected the words by showing a picture that represented the word meaning and then scaffolded the connection of the new word and the image through telling. In this case, the strategy would then involve both familiarization (spoken explanation) and visualization (showing pictures/images). Similarly, when explaining declarative object knowledge for instance, they can use familiarization, visualization or strategies embedded both of these approaches, and not contextualization.

In earlier sections, the instructional explanation strategies were separated into three groups: knowledge-specific instructional explanation strategies, general teaching instructional explanation strategies and instructional explanation strategies for overcoming language barriers. Since verbal explanations mainly refer to the rephrasing of new knowledge in written or in spoken forms for elaboration purpose and for the support of explanation strategies; while using the students' first language aims to overcome language barriers during the explanation process. Thus, these strategies were not selected particularly for specific types of knowledge. These two strategies, through their familiarization approach, pull all knowledge types into the zone of familiarization, as shown in Figure 5.10 above.

To gain a better idea of which approaches appeared in knowledge-specific explanation strategies, Figure 5.11 was developed without taking the use of first language and verbal explanations into account from Table 5.3. The relevant table in which the first language and verbal strategies were excluded can be found in Appendix 33.

Figure 5.11 Distribution of knowledge types explained by knowledge-specific explanation strategies with different explanatory approaches



In Figure 5.11, the circles are limited to the approaches identified from knowledge-specific explanation strategies. There are only six knowledge types (shown in bold text) located in the top zone. This means that only six knowledge types, instead of the twelve in Figure 5.10, were found to have been explained through knowledge-specific strategies using the familiarization approach. The other six types of knowledge, including the four types of declarative knowledge (event concepts, behaviour concepts, facts and steps/processes) and the two types of procedural knowledge (technical skills and techniques/procedures), appear in Figure 5.10 but are removed in Figure 5.11. This removal suggests that familiarization is not an individual approach the teachers applied in their knowledge-specific explanation strategies to support understanding of these six types of knowledge.

5.4.2.3 Explanatory approaches and subject lessons

Though this study does not intend to provide detailed analysis on instructional explanation strategies in relation to different academic subjects, it is worth having a general idea of whether the teachers selected particular types of strategies with particular explanatory approaches in lessons of specific subject areas. By synthesizing the approaches of explanation and the findings documented in Appendix 18 and 19, two tables that illustrate the distribution of different approaches across different subject lessons was generated and present in Table 5.4 and 5.5. Same as the previous tables in which the letter 'F', 'V' and 'C' represent three approaches – familiarization, visualization and contextualization, the letters in the tables indicate the approaches of the explanation strategies the teachers used to explained different types of knowledge in their lessons.

Table 5.4 includes the use of first language and verbal explanations, and thus the letter 'F' appears in all boxes indicating the use of strategies. As discussed above, the strategy of using first language aimed principally at language support while using verbal explanations was basically the strategies for general teaching purposes; therefore, I developed Table 5.5 in which first language and verbal explanations were excluded. This table shows that some teachers, when explaining some knowledge types, used only the strategies with one particular approach. For instance, visualization approach was used in Public Speaking lesson to explain concepts of subject-related words and terminology, and techniques in giving a speech, while this approach was also used to explain facts and processes in General Biology lesson. However, when looking at the last rows of both tables, we can see that all teachers applied strategies with all three explanatory approaches in their lessons. This indicates that the types of explanatory approaches were evenly distributed across different subject lessons, which also means the college teachers made use of familiarization, visualization and contextualization to support understanding to new knowledge of different types.

Table 5.4 Distribution of explanatory approaches corresponding to different types of knowledge in nine different lessons (inclusive of first language & verbal explanations)

Types of knowledge			Teacher/ Subject lesson/ Different approaches of explanation strategies used to teach different knowledge types in nine subject classes F = Familiarization; V = Visualization; C = Contextualization								
			T1	T1	T2	T3	T4	T5	T6	T7	T8
			Graphic design	Public speaking	Interpersonal communication	Public relations & advertising	Abnormal psychology	Research methods in psychology	General biology	Food service management	Computer programming
Declarative		Word meanings	F	F	F	FV	F	F	F	F	
	Concepts	Concepts of subject-related words & terminology	FVC	FV		FVC	FVC	FC	FVC	FVC	FV
		Object concepts				FV			FV		
		Event concepts				FVC					
		Skill concepts	FV	FVC	FVC						FV
		Behaviour concepts			FVC		FVC				
		Facts			FV				FV		
		Steps / processes							FV	FVC	
Procedural		Techniques / procedures		FV	FC			FVC		FVC	FV
		Technical skills (computer programming skills)									FVC
Conceptual		Theories					FVC				
		Strategic concepts						FVC		FVC	
Types of explanatory approaches used in each lesson			FVC	FVC	FVC	FVC	FCV	FVC	FVC	FVC	FVC

Table 5.5 Distribution of explanatory approaches corresponding to different types of knowledge in nine different lessons (exclusive of first language & verbal explanations)

Types of knowledge			Teacher/ Subject lesson/ Different approaches of explanation strategies used to teach different knowledge types in nine subject classes F = Familiarization; V = Visualization; C = Contextualization								
			T1	T1	T2	T3	T4	T5	T6	T7	T8
			Graphic design	Public speaking	Interpersonal communication	Public relations & advertising	Abnormal psychology	Research methods in psychology	General biology	Food service management	Computer programming
Declarative	Word meanings		F	F	F	FV	F	F	F	F	
Declarative	Concepts	Concepts of subject-related words & terminology	FVC	V		FVC	FVC	C	FVC	FVC	FV
Declarative	Concepts	Object concepts				FV			FV		
Declarative	Concepts	Event concepts				VC					
Declarative	Concepts	Skill concepts	FV	FVC	FVC						FV
Declarative	Concepts	Behaviour concepts			FVC		FVC				
Declarative	Facts				V				V		
Declarative	Steps / processes								V	VC	
Procedural	Techniques / procedures			V	FC			FVC		VC	V
Procedural	Technical skills (computer programming skills)										VC
Conceptual	Theories						FVC				
Conceptual	Strategic concepts							FVC		FVC	
Types of explanatory approaches used in each lesson			FVC	FVC	FVC	FVC	FVC	FVC	FVC	FVC	FVC

5.4.3 Role of instructional explanations to scaffold new knowledge

This study has brought to light the eight different groups of explanation strategies which provided different forms of instructional explanations to support understanding and learning of the different types of declarative, procedural and conceptual knowledge identified. In spite of the fact that the teachers did not recognize the strategies they used as being explanation strategies per se, the analysis of the video data reveals that giving explanations is the dominant and most fundamental activity in the college classroom with over ninety percent of scaffolding strategies being in fact explanation strategies. These strategies not only support understanding, but also carry out three out of five categories of scaffolding strategies, including involving students, modelling, and supporting cognitive structure and understanding, as discussed in the literature review Section 2.5.2.

Though other scaffolding strategies, such as questioning and activities, are not used as frequent as explanations, they interact with explanations. Asking questions before explaining on a new topic and during the process of explaining are two patterns when questioning is used, whereas activities could be arranged before, after or in the mid-way of a series of explanations. Nevertheless, even accounting for the fact that there are other scaffolding strategies for giving learning direction and progress checking, and the fact that offering explanations has always been overlooked in pedagogical literature, this study shows that explanations are the primary teaching activity and more frequently used than other scaffolding strategies.

In terms of scaffolding, the teachers used a mixture of explanation strategies that familiarized, visualized and contextualized new knowledge to support understanding and the construction of new schema. Each lesson contained a series of topics covering many pieces of knowledge and different types of knowledge, all of which were connected. From recalling content discussed in previous lessons, to building up word meanings and concepts, connecting them with other declarative knowledge and scaffolding up to procedural and conceptual knowledge; the teachers skilfully linked together pieces of knowledge as they worked to develop students' understanding from a declarative level to a conceptual one. During this process, they broke down the main subject topics into understandable parts, provided explanations for students to understand fundamental concepts, and gave step-by-step directions to connect those concepts to reach the instructional goals which were clearly stated at the start of each lesson. The use of examples and visual aids, and shifts between different explanation strategies effectively drew and retained students' attention and ignited their interest in learning. The teachers' demonstration of skills and provision of models also reduced the students' fear and frustration. Bringing up prior concepts for comparison during the explanations helped reduce possible misconceptions, discrepancies of ideas and uncertainty. All of these fulfil the functions of scaffolding listed in Wood, Bruner and Ross (1976), McKenzie (1999) and Zagranski, Whigham and Dardenne (2008), as discussed in the literature review (Section 2.5.2). Therefore, it can be said that instructional explanation strategies play not only a significant role, but also a dominant one in scaffolding learners through their ZPD in the classroom learning process, supporting understanding of new knowledge and facilitating students' interaction with teaching and learning.

5.5 Conclusion

The above discussion concludes the review of data in response to the inquiries of the study regarding teachers' perceptions, their strategies used for explanatory purposes and the approaches these strategies support understanding.

The teachers' perceptions reflect that the social culture, education systems and parents' styles for emphasizing on instrumental rewards promote extrinsic motivation of learning, while the college teachers, though realizing the situation, invested much endeavour to stimulate students' intrinsic motivation through careful pedagogic design and arrangement of explanation strategies.

Instructional explanation is not simply about telling but inclusive of a variety of strategies with purposes that not only support understanding but use different stimulations to motivate students. These strategies reflect teachers' considerations on various aspects when preparing and implementing their explanations including their perceptions of the entire teaching and learning environment, the content knowledge, as well as students' needs, wants, abilities, and interests.

The discussion also explores in detail the connections between different types of knowledge in different subject areas and the explanation strategies leading to a new perspective on the definition of instructional explanations and new insights to understand how these strategies support understanding of knowledge.

The most important finding is that the discussion brings to light the principle of instructional explanations which suggests that classroom knowledge is explained through familiarization, visualization and contextualization. The models evolved from the findings demonstrate the fact that although there are various combinations of strategies tailored for explaining different types of knowledge in different subject areas, instructional explanations are based on those three explanatory approaches. In the final chapter, I will summarize the results and discuss in more detail the contribution, implications and future directions that this study has indicated.

CHAPTER 6 CONCLUSION

6.1 Introduction

The previous chapter addresses the research questions through detailed discussion of the correlations between instructional explanation strategies and the types of knowledge and explanatory approaches that were derived from the research findings. This concluding chapter will review the study, beginning with a summary of the answers to the research questions, and then proceed to the study's contribution to knowledge, the implications, the limitations of the research process and recommended directions for future studies. Finally, some brief concluding remarks will be made.

6.2 Summary of the research questions

This qualitative case study aimed to answer the following questions:

1. How do the teaching strategies used during instructional explanations reflect the way that college teachers respond to their perceptions of teaching and students' learning in Hong Kong?
2. How is new knowledge explained in content-based lessons in community colleges in Hong Kong?
3. How do instructional explanations strategies scaffold and support students' knowledge understanding in college classrooms?

This study reveals that supporting students' understanding of subject knowledge was the primary motivation for every teacher in every classroom. The wide variety of ideas and materials used in the explanations given reflects the fact that the teachers made every endeavour to facilitate learning and increase students' intrinsic motivation by arousing their interest in the content of their subjects. The teachers realize the social and cultural pressure on the students and that getting a good grade for a second chance to enter university studies is students' primary goal. In addition, the exam-oriented and instrumental learning attitude as perceived by the college teachers could also be seen in the class visits, Despite these conditions, extrinsic motivational strategies were scarcely found. There was only one occasion in which a teacher applied an instrumental motivational strategy in order to attract students' attention by explicitly telling the students that the content would be tested. Instead, the teachers used examples related to students' social and cultural background, created interesting hypothetical examples, performed attention-grabbing role-play to gain students' focus and interest when explaining new knowledge.

As observed, the students seldom asked questions and did not actively respond to teachers' questions, but they participated well in small group discussions and class activities. This indicates that the students may be passive in giving individual responses owing to possible causes such as a lack of self-confidence and fear of losing *face*. However, they are not always passive in learning, in particular when they are engaged in peer learning activities. Indeed, the patterns of using questions and activities before, during and after the explanation process indicated the way in which the teachers responded to their students' passiveness and dependence – i.e. by inviting students' involvement and encouraging individual thinking and peer learning. Despite the fact that the teachers expressed reservations about the exam-oriented learning culture, parents' pressure and the students' attitudes and abilities, the teachers did not act purely as information deliverers. Instead, they adopted various pedagogic strategies and applied both teacher-centred and student-centred approaches to facilitate teaching and learning. In spite of students still being very concerned with their grades, not often giving responses in class and relying heavily on their teachers, teaching approaches and teacher strategies reflected the considerable effort teachers put into responding to the existing situation.

This study found that eight types of declarative knowledge, two types of procedural knowledge and two types of conceptual knowledge were used in content-based college classrooms in Hong Kong (see Figure 5.2). The teachers in this study explained these knowledge types using eight groups which covered a total of eighteen explanation strategies. Of the eight groups of strategies, *verbal explanations* were classified as *general teaching strategies* which provide spoken and written support in all lessons for all knowledge types, while *using students' first language* is a strategy that supports students' understanding of English. The other six groups of strategies were categorized as *knowledge-specific strategies* as they were selected, planned and applied specifically by the teachers to explain different types of knowledge (see Figure 5.3). The summary diagram (Figure 5.7) illustrates how the teachers used various strategies to explain different types of knowledge – using different kinds of examples, using visual aids, making comparisons, bringing up prior knowledge, using activities and giving demonstrations. The results show that examples and visual aids were by far the most frequently used strategies. The teachers selected examples from students' daily life experience to explain word meanings and concepts, along with recalling words the students had learned before, comparing them or using activities to get students involved in the process of generating existing knowledge. The teachers also borrowed specific authentic cases to explain factual information and procedural techniques. They also made use of specific cases and created hypothetical scenarios based on students' cultural and social backgrounds to explain the concepts of skills, human behaviour and conceptual knowledge. All the examples were presented through telling and through various visual aids including pictures and videos. Teachers' demonstrations and role-play were also used to bring the examples alive. Visual aids like animated videos were used to support the understanding of subject content that was 'factual yet invisible', like biological processes, while flow charts and graphic presentations helped explain correlations and connections between related concepts. The teachers used a mixture of strategies in each lesson to suit the types of knowledge and the needs of students, while considering the existing language barrier.

Following the constructivist learning paradigm, the two major criteria in the classroom as a social learning environment are the construction of schema and scaffolding through the zone of proximal development. From the constructivist perspective, the pedagogical approach, which includes instructional explanation strategies, should be able to facilitate assimilation and accommodation and support students as they move from the actual developmental level to potential developmental level (see Section 2.5). In order to ascertain whether the instructional explanation strategies used by the teachers in this study could support and scaffold students through the learning process, it is important to understand the approaches of these strategies and in what ways these approaches were used in relation to how they support teaching and learning.

From analysing teachers' strategies, I found that the instructional explanation strategies used support understanding of classroom knowledge through three explanatory approaches – familiarization, visualization and contextualization. The model illustrated in Figure 5.9 shows that some strategies, such as making comparisons and using charts or tables, support understanding through a single approach, while the others support understanding via a combination of two or three approaches. As shown in Table 5.5 and 5.6, a strategy may have different approaches when used to explain different types of knowledge. For example, a combination of the familiarization and visualization approaches was applied when an image was used to explain concepts regarding subject-related words – but not when the same strategy was used to explain behaviour concepts. When explaining a behaviour concept through images, a different approach was used: visualizing the context of the behaviour situation. These three approaches give us a new perspective to explain how explanations support learning and understanding in the schema theory of learning.

Schema theory emphasizes how the connection of prior knowledge and new information results in assimilation. Instructional explanation strategies which use familiarization scaffold students through the learning process by making these connections. When the teachers verbally explained a new piece of knowledge, they paraphrased this knowledge with familiar words and concepts to support understanding. Similarly, when they used the students' first language as a strategy, teachers used words and phrases that students already knew in their first language to make these connections. Using daily life examples, making comparisons with familiar concepts, recalling prior subject knowledge and leading students to obtain hands-on experience were all strategies that facilitated assimilation through familiar knowledge. Strategies which used visualization and contextualization along with familiarization, including the display of pictures or images, movie clips or creating hypothetical scenarios related to the students' backgrounds or culture, served the same purpose:

linking the familiar with the unfamiliar. For example, one teacher explained the concept of word collocation through using a picture of a rose – something that would likely be familiar to every student.

The other two approaches – visualization and contextualization – when taken in conjunction with familiarization, promote accommodation by providing images of new knowledge or making use of situational contexts to support the construction of new knowledge. For example, a news report provided context for students to understand how psychological theories affect a court ruling. These students had no real-life experience with people with delusions, particularly in the legal context. The news report facilitated their understanding of a theory and how the theory related to reality. Likewise, using context to make sense of new knowledge also allowed students to locate a specific schema and then supported understanding of how the new knowledge existed in reality.

If Piaget's assimilation requires adaptation through the connection of new knowledge to existing schemata, the use of strategies which have a familiarization approach indicates that knowledge can be learned through assimilation. On the other hand, types of knowledge which draw on visualization and contextualization approaches are explained through demonstration and using context, rather than connecting them with students' prior knowledge. The teachers expected students to pick up new knowledge, understand it and build upon their existing schemata to accommodate it. This created a situation whereby their explanations focused on understanding a specific piece of new knowledge, yet neglected the importance of prior knowledge in the learning process, resulting in a certain amount of rote learning and memorization. However, the teachers did not teach a single piece of knowledge by using one explanation strategy. Instead, they applied different explanation approaches to support understanding of different types of declarative, procedural and conceptual knowledge.

Previous studies on explanation strategies focus on effectiveness of spoken explanations provided in tutoring or classroom contexts. Greater understanding of students' needs, including students' understanding and misconceptions of knowledge as well as their impasses and difficulties in learning are the common findings from these studies. However, there are no specific recommendations for the practical design and use of explanation strategies. Though having the limitation of missing student data for the evaluation of the strategies, the findings of this study indicate teachers' considerations regarding students' needs and difficulties in their implementations of explanation strategies. The list of instructional explanation strategies and the Principle of Instructional Explanation Strategies are also valuable for further studies to investigate the effectiveness of these strategies in supporting students to overcome impasses in tutoring and classrooms,

These findings also demonstrate that the strategies in the study fulfil the definition of instructional explanations which I developed in Chapter 2 – i.e. they are causal, descriptive, require adequacy, are goal-oriented and listener-oriented and use the familiar to explain the unfamiliar. Supporting student understanding of subject content was found to be teachers' primary goal when using explanation strategies. These strategies were listener-oriented and tailored specifically to meet the needs and the backgrounds of the college students based on the teachers' perceptions of the students' learning attitudes and other practical concerns such as time, space and the number of students in their lessons.

The teachers used instructional explanations to support student understanding of causal relationships, applying, for example, different strategic skills in different research contexts to explain how these skills affected the validity of the research. Yet, these strategies were not developed for law-like generalizations and have no specific forms: they could be given through spoken or written explanations, or using by visual aids, building on prior knowledge, drawing on comparisons, teacher demonstrations and activities in a student's primary language. Instead of requiring correctness, as with scientific and narrative explanations, the major concern was the adequacy of the explanations used to achieve the primary goal – i.e. to support understanding. A hypothetical scenario may not be correct; indeed it may be purely imaginative, as in the example of a patient with a thought disorder reacting to an alien voice. Using a familiarization approach, i.e. an approach using familiar language, examples, contexts, visual images and/or prior knowledge, indicates that instructional explanations use the familiar to explain the unfamiliar. Although some strategies appeared to adopt visualization and/or contextualization only when using hitherto unseen or experienced video clips, diagrams or charts; the teachers also provided spoken and/or written descriptions using familiar language to make sense of all the strategies used, explain the meaning of each piece of material, and also explain how and why these materials connected with new knowledge and the subject topics.

As discussed in Sections 4.2 to 4.4 and consolidated in Section 5.2, the teachers in this study generally believed that education is not simply about knowledge delivery, rather that this role is intertwined with others, namely information provider, facilitator and motivator, guiding students to be self-directed life-long learners. At the same time, however, the teachers perceived that Chinese culture, social environment, family expectations, the education system and a student's learning experience contributed to assessment-oriented, passive and dependent learning attitudes. Given that teachers' beliefs direct the way they teach, learning how they explain knowledge and how they structure their lessons is therefore a gateway to understanding how they respond to their perceptions.

To conclude, the findings answer the research questions and respond to the theoretical framework addressed in the literature review. A schematic diagram capturing what has been learned about explanatory processes in the research study's classrooms is presented at Appendix 34. The diagram summarizes the key findings (listed on the right-hand side) addressing the research questions in respond to the theoretical framework (listed on the right-hand side).

The findings about the types of knowledge, teachers' perceptions, the role of instructional explanation strategies and the scaffolding structure in different subject lessons reflect and respond to elements discussed in the first part of the theoretical framework related to the three dimensions of learning. The types of knowledge identified not only confirm the existence of declarative, procedural and conceptual knowledge reviewed in the literature, but they expand the categorization from three to twelve. Teachers' perceptions reflect the ways college teachers perceive learning, understanding, student motivation, their knowledge as teachers and their teaching approaches, while the role of instructional explanation strategies and the scaffolding structure in their lessons reveal the ways teachers actually act in relation to these elements as well as scaffolding patterns.

Social constructivist theory suggests that scaffolding supports students to learn through their ZPD (Wood, Bruner & Ross (1976); Vygotsky, 1978), and schema theory in cognitive constructivism tells us that learning is a schema construction process that involves assimilation and accommodation (Piaget, 1960). However, how instructional explanations scaffold learners through the schematic process was a question mark. In the second part of the theoretical framework focusing on the social and cognitive directions of knowledge construction, the findings provide a list of eighteen strategies for scaffolding purposes in practice and three explanatory approaches that connect to schema construction. The Principle of Instructional Explanation Strategies generated from the three explanatory approaches and derived from the instructional explanation strategies bridges the gap and fills the missing piece that explains the connection between practice and theory.

6.3 Contribution to knowledge

Exploring how experienced college teachers explained knowledge gives us a new perspective on instructional explanation strategies. This study viewed explanation strategies as a collection of scaffolding strategies employed for the purpose of explaining new knowledge. Indeed, strategies like modelling, giving examples, using visual aids and demonstrating, which are seen as individual scaffolding strategies independent from explanations, can be classified as scaffolding approaches under the umbrella of instructional explanation strategies, since their primary purpose is to explain for understanding. This perspective is an alteration to one generally-held view that explanations are only about "telling".

The findings regarding the types of knowledge, the types of instructional explanation strategies and the types of explanatory approach all add value to pedagogical perspectives on teaching and learning in HE classrooms. The identification of knowledge types reveals the types of knowledge that appear in the parts of the Associate Degree curriculum related to declarative knowledge. This study's findings provide evidence that declarative, procedural and conceptual knowledge, as suggested by Byrnes (1999), exist in the forms of word meanings, concepts of subject-related words/terminology, object concepts, skill concepts, event concepts, behaviour concepts, facts, steps/processes, techniques/procedures, technical computer programming skills, theories and strategic concepts in college classrooms. Nevertheless, the findings also lead to the conclusion that these three knowledge types are insufficient to explain what happens in the classroom, as there are different types of declarative, procedural and conceptual knowledge. Thus, Byrnes' categories needed to be further expanded to at least eight types of declarative, two types of procedural and two types of conceptual knowledge as listed in Figure 5.2.

The instructional explanation strategies explored in the study also contribute to the understanding of pedagogical approaches in terms of scaffolding techniques. The detailed discussion in Section 5.3 reveals how each individual strategy was applied and bridged students' prior knowledge to new knowledge moving from one declarative concept to another one, and also from declarative to procedural and conceptual levels. The relationship between knowledge types and instructional explanation strategies indicates that each individual type of knowledge requires different instructional explanation strategies. At the same time, this relationship also implies that different subject areas may have the same knowledge types and can share the same explanation strategies. Furthermore, the three explanatory approaches - familiarization, visualization and contextualization, are an innovative way of illustrating how instructional explanation strategies support the understanding of different kinds of knowledge across the curriculum. The study results provide a framework of instructional explanation strategies including models of their forms and approaches in relation to different knowledge types for reference and direction which allow teachers to look at their subjects and the choice of strategies to which they have access to support scaffolding in their lessons. Teachers can refer back to the models discussed in different parts of this study to classify the types of knowledge they are going to explain, find a list of explanation strategies they can use, and identify which approaches they can apply when using those strategies. Two examples demonstrating the steps involved in choosing explanation strategies and suitable approaches can be found in Appendix 35.

Pedagogical literature provides suggestions, as shown in Table 2.2 on p.45, on the components of explanations. However, simply knowing the names of components or strategies does not tell us how explanations support learning. The identification of the three explanatory approaches is a gateway to understand how instructional explanations support learning from the schema theory perspective. Models of scientific explanation have been extensively studied while narrative, practical and 'everyday' explanations have already had their theoretical constructs explored and explained through philosophical, communication or linguistic theories. Explanations, on the other hand, are essential elements in teaching and learning and are worthy of greater research attention. This study clearly reveals a need for theoretical development of instructional explanations in relation to teaching and learning theories.

The division of approaches into familiarization, visualization and contextualization has brought a novel yet significant perspective to showing the connection between schema learning theory and instructional explanations. They fill the gap between explanation strategies and schema development, explaining how explanation strategies facilitate assimilation and accommodation through the use of familiar, visualized and contextual materials. Therefore, although this case study cannot generalize what strategies teachers use in all community college or HE sectors across all disciplines, the discovery of the three explanatory approaches can be seen as a proposed Principle of Instructional Explanations, meaning that all instructional explanations support understanding and learning through familiarization, visualization and contextualization approaches, either individually or in combination.

Finally, with regard to the wider pedagogical research needs of Associate Degree programmes in Hong Kong, this study brings to light the teachers' perspectives on their students. These students, in general, were perceived to be encountering many obstacles and much frustration under Hong Kong's strongly selective education system, while the teachers had to put a lot of effort into supporting their students' learning, with heavy syllabi, tight teaching schedules, limited time and resources. This profound concern leads to a dependence on transmissive approaches and a need for all teaching strategies to be related to examination success, with a high level of negative backwash.

6.4 Implications of this study

This study's contributions to the field of pedagogy have several important implications for the teacher participants of the study, teachers of HE, Associate Degree providers and teacher trainers, both in service and pre-service.

6.4.1 *Implications for teachers of Associate Degree programmes*

Both the teacher participants in this study and other HE teachers may derive benefits from this study, as it provides a concrete picture of the ways teacher participants conducted their lessons in terms of implementation of different instructional explanation strategies to support understanding of knowledge. Individual teachers may review how they explain subject knowledge in their own teaching practices, and they may also see how other teachers in different subject areas explain new knowledge. This report suggests that even though the content and materials may vary from subject to subject, all teachers need to teach word meanings, facts, object concepts, skills, and theories. This study allows teachers to understand that even though they may teach different subjects, they all face the same challenges in terms of knowledge types and scaffolding strategies; thus, they may see the similarities and differences between knowledge types and the strategies other teachers use. Not only could this study inspire college teachers to learn from their colleagues in different subject areas, it could also provide direction to the study participants and other teaching professionals as they prepare lessons.

The high frequency of instructional explanations observed during teaching time proves that giving explanations was the dominant scaffolding strategy in college classrooms. However, this result also implies that supporting students' understanding of subject knowledge was the major, or only, goal in the classrooms; rather than to give space and time for teachers to interact with students. There was also a distinct lack of other scaffolding strategies and activities, such as time being devoted to teacher-student interaction, checking students' understanding, peer learning experience, getting and giving feedback to inspire critical thinking and independent learning. This study focuses on instructional explanation strategies and develops a principle for teachers as giving explanations is an inevitable and important scaffolding strategy in classroom teaching. Nevertheless, when giving explanations becomes a predominant teaching activity, teaching may turn into a transmissive style, meaning that learning would become receptive and content-focused, even involving rote learning. The teachers' approaches were predominantly didactic and pressure was placed on students to soak up and retain content for short-term instrumental purposes. More attention should be placed on the balance of the use of various scaffolding strategies as well as teacher-centred and student-centred approaches in order to provide sufficient space and facilitation for the construction and reconstruction of knowledge by the learners.

6.4.2 *Implications for Associate Degree programme providers*

The teachers' experiences with their students and their patterns of using scaffolding strategies in the observed and recorded lessons suggest that Associate Degree providers need to review the curriculum and provide more support to both teachers and students to achieve the goals of education.

Under the constructive learning theory, the goals of HE are to develop students' thinking skills and their capacity to become self-directed and independent learners.

However, from the interactions I had with participating teachers, my classroom observations and the analysis of the scaffolding patterns of the recorded lessons, I did not observe the teachers working towards these goals. Instead, they experienced students refusing to learn knowledge that would not be tested and asking for model answers with no initiative to find answers. Entering a HE environment did not change students' exam-oriented attitudes, previously developed from the high-stakes examination culture.

Asking Associate Degree providers to facilitate change in the prevailing exam-oriented culture puts them in a difficult position. Associate Degree programmes provide HE curricula that emphasize the development of thinking skills and self-directed learning attitudes; but to achieve the ultimate goal of having more Associate Degree students enter undergraduate programmes, the main focus of college teachers and managers is to have the students achieve good results. What is more, as an Associate Degree is not the "final destination" for most students, the students necessarily hold the same exam-oriented attitudes as through their school years – studying in order to get good results to enter university. At the college, the students expected their teachers to teach them everything they needed to boost their final grade point average (GPA). Although this situation is common in HE, this does not mean that educators should surrender to this common trend. Associate Degrees, as a bridging platform between school and university, should initiate students' transformation from a grade-oriented learning attitude and help them reach HE goals.

Looking back at classroom teaching and learning, even though this study did not aim to evaluate the Associate Degree programme, its syllabi or the teaching practices of college teachers, and even though the endeavours made by the teachers to use interesting materials in their explanations were appreciated and helped facilitate learning and understanding, the results of this study point to a need for change and advancement in the Associate Degree programme, and perhaps in HE in general.

The entire instructional approach of HE in Hong Kong should be reviewed and new measures implemented, for example, policy reforms to raise teaching and learning standards, the promotion of more classroom research, support for more practical training, and giving time and space to teachers to allow them to experiment and experience any suggested implementations.

6.4.3 *Implications for teacher training*

The findings of this study suggest that more attention should be placed on explanation strategies in both pre-service and in-service teacher training. Since "teachers [are] the principal agents of instruction" (Bruner, 1960, p.15), an adequate knowledge of teaching, including subject knowledge and the skills necessary to prepare and teach the materials, is vital for effective teaching and learning. This study offers evidence that instructional explanation strategies are significant in classroom teaching and have an essential role to play in supporting the understanding of new knowledge and scaffolding students through their learning process. Therefore, equipping teachers with the knowledge and skills to effectively use instructional explanation strategies is essential. However, the concept of explanation receives very little attention in pedagogical publications and in teacher training when compared to other strategies such as giving feedback and questioning. Yet, the reality is that teachers use explanations more than other strategies.

The fact that explanations received little attention in the interviews but were predominantly used in lessons suggests that explanations may have been under-emphasized in the teachers' training experience. This study contributes insights that could be drawn upon when preparing teachers to use instructional strategies, with particular focus on the importance of explanations. The findings regarding explanatory approaches could also be a valuable topic that would help teacher trainees understand how explanation strategies support understanding. Teacher trainers could use the study results to guide pre-service teachers to identify different knowledge types and provide inspiration as they design their lessons and choose instructional explanation strategies.

The same kind of training could also be of benefit to current teachers. Some university teachers believe that teaching is all about having good subject knowledge and that it is not necessary to improve, since teaching skills are innate abilities (Hativa, 2000). I disagree with this view, particularly as many teachers in HE in Hong Kong have received no formal teacher training, since being qualified in education studies is not an employment requirement in most HE institutions. In-service training, therefore, is needed to enhance teaching quality and thus effective learning.

Though experienced teachers have usually developed their own teaching style and materials, my study can still add value to their teaching. Further training could inspire them to revisit their subject knowledge, their materials and their teaching strategies, to review the explanation approaches they use in relation to other scaffolding strategies, and to revamp and modify the structure of their lessons and their use of explanations to facilitate both teaching and learning.

6.5 Limitations of the research

Cousin (2009) said that researchers could only "represent life out of the values, linguistic, and explanatory frameworks (discourses)" and they could only do it "within certain limits" (p.11); therefore, recognizing and addressing the limitations was an important step in this study. Patton (2002) reminds us that "there are no perfect research designs. There are always trade-offs. Limited resources, limited time, and limits on human ability to grasp the complex nature of social reality necessitate trade-offs" (p.223). This present study is no exception, as the constraints of time and resources placed several constraints on the research.

A necessary step to conducting a study in a college environment is the need to obtain approval from the college management. Since the management of the college was highly concerned about the confidentiality of their practices and any influence on teachers and students that the study might have, several weeks were spent reviewing my proposal and checking the associated documents before approval was given. When my request for data collection was eventually ratified by the college management, it was the mid-semester; many tests were going on and the teachers were busy with catching up to their tight syllabi, grading mid-term assignments and preparing for various upcoming tests and examinations. As a result, not many teachers could spare the time to participate in my study. Thus, though I expected to recruit ten participants, I could only recruit eight and did not have any choice regarding specific subject areas. While I am grateful and appreciative that eight teachers in nine subject areas were willing to take part, I still perceive this as one of the limitations, since the subjects chosen were reliant on what subjects the participants were teaching at that time. This meant that I had no control over what subject areas I could investigate, and it also limited the scope for analysis of the differences between instructional explanation strategies used and the background of the participants.

Time constraints also placed limits on when I could conduct class visits and video recordings. Again, the timing of the college management's approval meant that the participants could not offer a wide variety of time slots for class observations and video recordings. I started collecting the data in week seven of a thirteen-week teaching schedule. Since the last two weeks normally do not involve any teaching activity besides student presentation and revision, this only left five weeks for class observation and recording. Furthermore, the limited selection of available classes meant that I could not sit in on all the available time slots, given clashes with my own work schedule. These clashes could not be resolved, since the teachers' timetables were fixed and could not be changed. To collect as much data as possible, I chose to sit in on the classes offered by the participants for video recording for as long as possible – often this was not for the whole duration of the class. This resulted in the number of hours that were recorded being different from the number of hours that were observed. Ideally, it would have been best if I could have observed and recorded all classes. This situation could be improved by the data collection process starting at the beginning of the semester, or being spread across two semesters – so the participants might offer more time slots and create a better environment for data collection.

The restriction placed on where I was able to sit during the class observations also limited the data that could be collected. Sitting at the back of the classrooms made it difficult to observe all the students' responses to the teachers' explanation strategies, since I was facing the students' backs and could not observe everything that was happening, particularly in terms of the students sitting in the first two rows of the class. I could only record whether the students gave verbal responses to their teachers, and was unable to see their facial expressions or what they were doing at their desks while the teachers were explaining the subject knowledge. One possible improvement could involve sitting, not in the last row of the class, but rather in a corner of the classroom on a higher chair, as this would allow a wider view of the classroom. However, sitting at the back of the class was considered to be a position that would have the least influence on the students.

The time allotted for the interviews was also a limitation in that the short discussion time could not reveal the entire picture of all the teaching strategies the participants used in their classes. The participants could only bring up some frequently used strategies and those they remembered at that time. In spite of this limitation, the video recording provided a supplementary source for me to look into the actual teaching practice. In an ideal world, the stimulated-recall interviews would have been conducted after each class visit. This would have allowed better recall of the lesson and a more detailed discussion of the teaching strategies used for each lesson. However, owing to the tight academic timetable and heavy duties of the participants, the stimulated-recall interview had to be scheduled during the summer break instead.

The study could also have been improved if a second interview could have been arranged after the analysis of the interviews, video recordings and classroom observations, so as to collect the participants' feedback on what I had observed. However, owing to the fact that the teachers were not available, these second interviews could not take place. Although one interview yielded rich data, a second would certainly have reinforced the trustworthiness of the results.

Another limitation of this study involved the students themselves. Scaffolding is a mutual activity where teachers give support and the students then receive this support, connect it to their schema, and then assimilate and/or accommodate it into their own skills and knowledge. Perhaps students' perspective on the effectiveness of the teachers' explanation strategies could have been gathered. However, the college management ruled categorically that I could not interview the students, nor place a video recording device at the front of the class to film them. Therefore, this study could not hear the students' perspectives, learn about their experiences, or gather their feedback on the explanation strategies that were used.

The lack of discourse data analysis can also be seen as a limitation in this study. Explaining is a speech act that is prominent in any classroom teaching process and studying teacher and student interactions would definitely be a valuable analysis for the study of instructional explanations that facilitate knowledge construction in spoken form. Although the analysis of the scaffolding patterns in this study provides some understanding of the level of students' involvement, classroom interaction data that include students' responses could facilitate a more revealing view of teaching styles, reflecting the use of transmissive teacher-centred or constructive student-centred approaches for example. However, owing to the scope of this study which focuses on teaching strategies in a pedagogical direction, interactional aspects through discourse and conversation analysis were not covered. The study of instructional explanations in terms of language discourse is a potential further research area for linguistics researchers and PhD projects.

Teachers' personal traits, beliefs, life experience and education background, to name a few, contribute their own theories of teaching practice (MacCutcheon, 1992). How a person conceptualizes the world, their experience with students, the subject matters and the context of teaching also shape the way a teacher teach and thus influences their selection and enactment of teaching practices. This study involves eight teacher participants with different education background and teaching experience. Their personal and individual differences would obviously affect their adaptation of teaching approaches and strategies. However, individual differences of teachers in relation to their choice of teaching approaches and strategies is an area this study does not cover owing to its limited scope of investigation.

The last limitation of this study is its generalizability. The limited sample sizes and data gathered do not paint a full picture of the whole academic situation – a larger sample size and a wider scope of analysis would probably have provided more representative results. Moreover, the results reveal only a limited part of the scaffolding structure in college classrooms. Yet still, the beauty of a qualitative case study is to provide “a unique example of real people in real situations” (Cohen, Manion & Morrison, 2000, p.181). This study gave me a valuable chance to step into college classrooms and explore the methods employed by experienced college teachers as they nurtured a specific group of students through the Hong Kong education system. It shows what was perceived to be happening inside these classrooms, and thus provides valuable contributions to the knowledge of scaffolding support, in particular instructional explanation strategies in a HE setting, with implications for education practice.

6.6 Direction and scope for further study

The research focus in this study, instructional explanations, and the research context, a community college in Hong Kong, are two areas which have historically received a lack of attention from academic research.

As indicated by the results of this study, instructional explanations are a significant scaffolding strategy in classroom teaching. To inform practice and then lead to better teaching and learning effectiveness, more research is needed in this area. One possible research direction could be comparing and contrasting instructional explanation strategies used in classrooms at different levels – secondary schools, community colleges, universities; or between different types of education institutions. Comparative research in this area could provide insights into what instructional explanations are used to teach students of different cognitive or academic levels and how these strategies are used, thus revealing the various relationships between the different levels and strategies of instructional explanations.

The research performed in this study could also be extended to examine the knowledge types of different subject areas, and how various explanation strategies can effectively support student understanding. Similarly, studying and/or comparing explanation strategies in different subject areas, including language-related subjects, could also be a direction for future research. The present study indicates that explanation strategies have a number of different applications. For example, hypothetical scenarios were used more in psychology lessons where conceptual knowledge was involved, whereas teacher demonstrations were used in public speaking classes where procedural knowledge was the main focus. Future studies could investigate the knowledge types of different subjects more deeply and again, look at what instructional explanations can support understanding and learning and how they can do this.

In addition, further investigation of interactions between explanations and other scaffolding strategies would be beneficial to the application of scaffolding strategies and pedagogical design. The discussion in Section 4.7 reveals several explanation-questioning and explanation-activities patterns. The scope of future studies could include, for instance, the ways in which these patterns motivate students and facilitate learning and their effectiveness in terms of scaffolding.

Future research might also focus on individual differences of teachers, including their perspectives about learning and education, their personal and institutional experience and their training background in relation to their use of explanation strategies. To have teachers' individual differences included in a broader and deeper investigation of teachers' backgrounds needs to be done. This requires modification of data collection and analysis methods, different measures for the trustworthiness of the data and ethical considerations. Moreover, understanding how these differences and how their training affect the strategies used could provide insights to pre-service teacher training professionals to ensure that they put more attention on instructional explanations in teacher training programmes.

Studying students' perspectives, feedback and experiences with different instructional explanation strategies would also be an interesting research direction. Talking about what instructional explanation strategies can be used at different levels, how they can be used, the different subject areas and different backgrounds of teaching professions is all well and good, yet those with perhaps the most important perspective in the entire teaching and learning process – the learners – should not be ignored. To understand whether explanation strategies effectively support students' understanding and learning, performing a qualitative study on students' perspectives or a quantitative study involving assessment after exploring different explanation strategies – or a mix of both – are worthy of consideration.

At present, there is a paucity of research on community colleges in Hong Kong, and none of the few articles that do exist investigate pedagogical practices. This study will hopefully catch the attention of education researchers and highlight the fact that community colleges are places where more research attention is needed, given the fact that students who enter community colleges, to a certain extent, do not thrive in the wider general education environment. College teachers, therefore, may want to consider putting more effort into educating college students. Since education research can help improve education (Lodico, Spaulding & Voegtle, 2010) and the quality of teaching and learning (Tanner & Davies, 2009), to help students in this group and to enhance the quality of teaching in community colleges, more research is necessary.

6.7 Concluding remarks

This study explored and identified eighteen types of explanation strategies used for instructional purposes to support understanding of twelve types of classroom knowledge through three explanatory approaches revealed in pre-undergraduate college classrooms of nine subject areas in Hong Kong. The study began with a two-pronged approach: first, attempting to understand college teachers' perspectives on the general Hong Kong education environment and on a specific group of students in the Hong Kong education system; and second, investigating the instructional explanation strategies implemented by college teachers in various subject areas in their classroom teaching practices. The triangulation of data collection and analysis through interviews, classroom observations and video recordings provided a robust picture of what instructional explanation strategies were used in the classrooms, how these strategies were used, and how they influenced teaching and learning strategies.

This study shows that teaching is not merely a matter of providing or transmitting information to learners. The social and education environment, the local culture and ethnicity of students, and the learning background of students can significantly affect the perspectives of teaching professionals, which could consequently influence their teaching practices. The teachers in the community college demonstrated that their teaching strategies were designed specifically for their students, and were based on their perspectives about their backgrounds, previous learning experience, their needs, their social and education contexts as well as repercussions from assessment and curriculum pressures.

The eighteen types of instructional explanations strategies identified in this study were commonly used in classrooms where subjects in the communications, applied science and social science disciplines were taught. In theory, scaffolding involves many different strategies; yet in actuality, in order to achieve a set curriculum and to satisfy students' expectations, and at the same time being bound by a tight syllabus, limited time and space and a large class size, the teachers in this study were sometimes unable to put a variety of scaffolding strategies into practice. The teachers developed their strategies through the use of examples, visual aids, making comparisons, building on students' prior knowledge, using activities, demonstrations, making use of students' first language and supported all of these with verbal explanations.

These strategies were believed to be the most effective ones to support students' understanding of subject knowledge, while also facilitating teaching and learning, in their classrooms – even when the teachers were unaware that the strategies they were using were instructional explanations. In further discussion, these strategies were all found to be based on three specific approaches – familiarization, visualization and contextualization. In order words, this study not only revealed the types of instructional explanations used in college classrooms and the influence of teacher perceptions on the development of instructional explanation strategies, it also shed light on how instructional explanations support the understanding of new knowledge.

This study contributes new understanding about instructional explanation strategies, discloses the ways college teachers manage the teaching and learning environment in the HE setting in Hong Kong, gives practical value to pedagogical design and teaching and could inspires further studies on sub-degree programmes and teaching and learning effectiveness in teacher training programmes. Its findings offer implications for college teachers, serving as a reminder to pay attention to the use of instructional explanations, balance using other scaffolding strategies to facilitate understanding of their subject knowledge, and actively discuss teaching practices with other teachers. Moreover, it also informs the curriculum designers of Associate Degree programmes in Hong Kong to reveal and revamp the curricula, syllabi and course structures in order to give more room for teachers to apply more interactive teaching strategies and to promote conceptual development and critical thinking instead of merely learning for a good grade. Furthermore, the study could inspire pre-service teacher trainers to take account of the importance of instructional explanation strategies as a dominant feature of pedagogical-content knowledge in the classroom teaching contexts and give direction to these trainers to discuss with pre-service teachers what and how instructional explanation strategies can facilitate learning.

The study opens up an innovative direction to understanding instructional explanation, its dominant role in the scaffolding process in pedagogical practice, its interaction with questioning and class activities and its relationship with schema construction through connection of prior knowledge, visual stimulation and contextualization. Not only does the new definition of instructional explanation invite teachers to move from viewing explanations as ‘telling’ to a broad variety of strategies, but the proposed Principle of Instructional Explanation may also provide food for thought for teachers and teacher trainers more widely than those working in HE.

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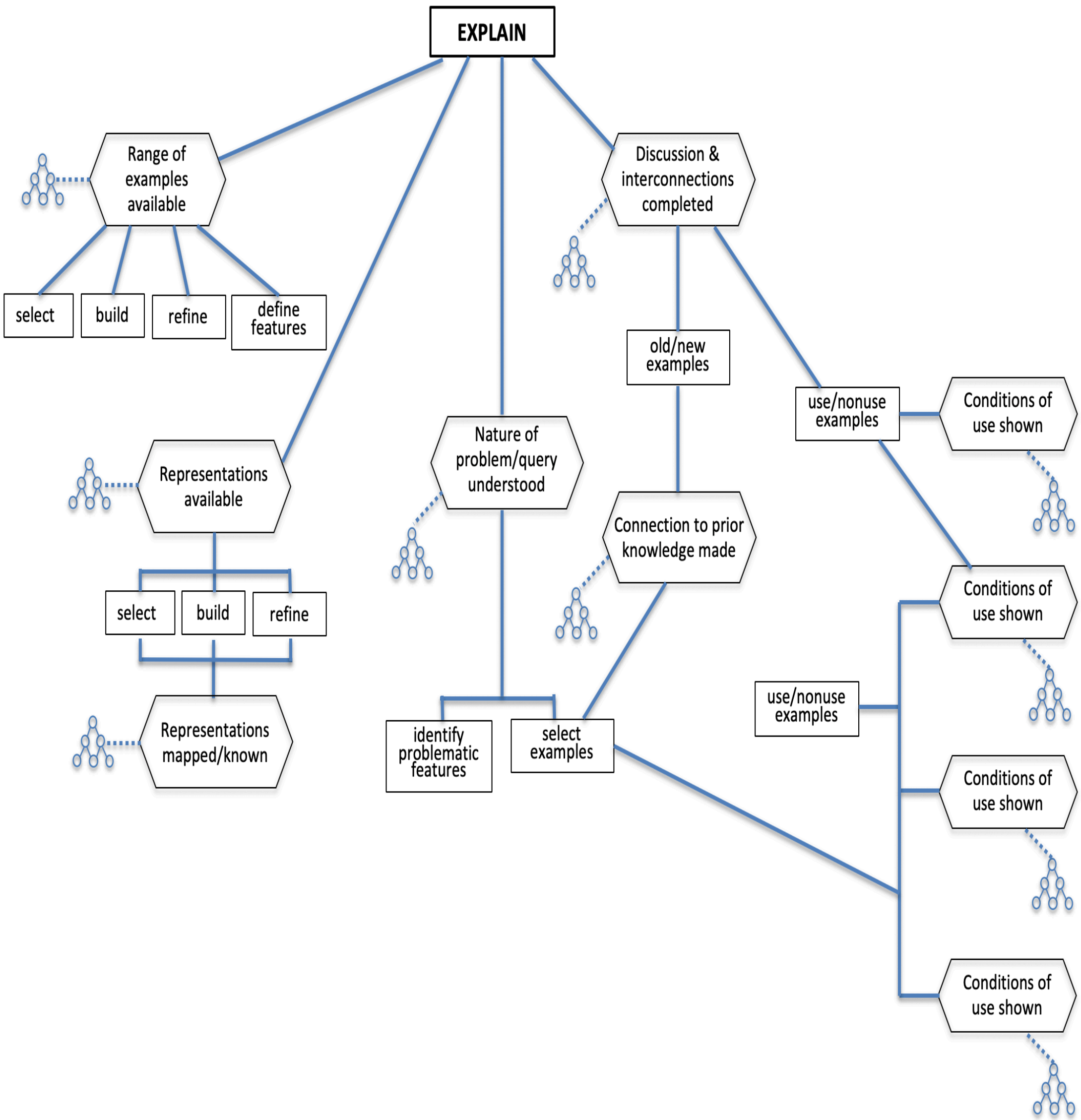
APPENDIX 1 – Model of instructional explanation by Leinhardt (2001)



Model of instructional explanation (Leinhardt, 2001, p.345)

APPENDIX 2 – Participant invitation letter

University of Leicester

Dear [INSERT PARTICIPANT NAME]

I would like to ask for your participation in a research project entitled, "Instructional explanation strategies: a case study of teaching strategies in an associate degree programme in Hong Kong". Yanne Tse, who is a PhD student at the School of Education at University of Leicester, will undertake the research project.

Minimal research has been done on the use of teacher explanations in tertiary classroom. I believe that teacher explanation takes a significant role in supporting understanding in learning new concepts and the effectiveness of teacher explanation is highly related to its connection with students' exiting knowledge. As a result of the research, a greater understanding of concept teaching strategies in relation to the effectiveness in teaching and learning will be known.

The research will involve video recording and observation of two of your lessons. You will also be invited to a stimulated recall interview session. The interview will focus on your teaching experience in teaching the college level students.

Data collection, analysis and discussion will maintain confidentiality and anonymity of individuals in the study. No participant's name will be shown on any written document of the research. These records will be stored securely in a locked cabinet used by the researcher and will never expose to other parties and in any occasion.

If you are willing to participate, please complete the attached consent form and return it to the researcher. Should you decide to withdraw from the study, you may do so at any time without prejudice. Your participation in this study does not prejudice any right to compensation, which you may have under statute or common law.

The University of Leicester requires that all participants are informed and provided with a copy of the Information Sheet and Consent Form for their personal records.

If you have any questions regarding the study, I would be pleased to answer them. Your cooperation is greatly appreciated, thank you.

Your sincerely

Yanne Tse

APPENDIX 3 – Participant consent form

University of Leicester

Participant Consent Form

BACKGROUND INFORMATION

Title and researchers. The title of this research is 'Instructional explanation strategies: a case study of teaching strategies in an associate degree programme in Hong Kong**'.** My name is Yanne Tse, a PhD candidate at University of Leicester School of Education.

Reason for the research. I am studying teaching strategies in classroom learning in relation to your teaching experience, and I am inviting lecturers in the College of International Education to enable me to research this topic in more detail.

Details of participation. The research involves recording of your lessons and class observation. You will then take part in a stimulated recall interview asking you about your experience in teaching as well as its relation to your perspective in teaching and learning. All the recordings and interview data collected will be strictly confidential. All participants in the research will be anonymous. Please feel free to ask questions now if you have any.

CONSENT STATEMENT

1. I understand that my participation is voluntary and that I may withdraw from the research at any time, without giving any reason.
2. I am aware of what my participation will involve.
3. I understand that there are no risks involved in the participation of this study.
4. All questions that I have about the research have been satisfactorily answered.

I agree to participate.

Participant's signature: ___________________________________

Participant's name (please print): ___________________________________

APPENDIX 4 – Student consent form

University of Leicester

Student Consent Form

BACKGROUND INFORMATION

Title and researchers. The title of this research is 'Instructional explanation strategies: a case study of teaching strategies in an associate degree programme in Hong Kong**'.** My name is Yanne Tse, a PhD candidate at University of Leicester School of Education.

Reason for the research. I am studying teaching strategies in classroom learning in relation to the college lecturers, and I am filming invited lecturers in the College of International Education to enable me to research this topic in more detail.

Details of participation. The research involves recording of your lesson and class observation. You will not be invited to participate in further discussion or interview of the data. Your physical presence and your performance in the classroom will not be the research focus. All the recordings and interview data collected will be strictly confidential. All participants in the research will be anonymous. Please feel free to ask questions now if you have any.

CONSENT STATEMENT

1. I understand that my participation is voluntary and that I may withdraw from the research at any time, without giving any reason.
2. I am aware of what my participation will involve.
3. I understand that there are no risks involved in the participation of this study.
4. All questions that I have about the research have been satisfactorily answered.

I agree to participate.

Participant's signature: ________________________________

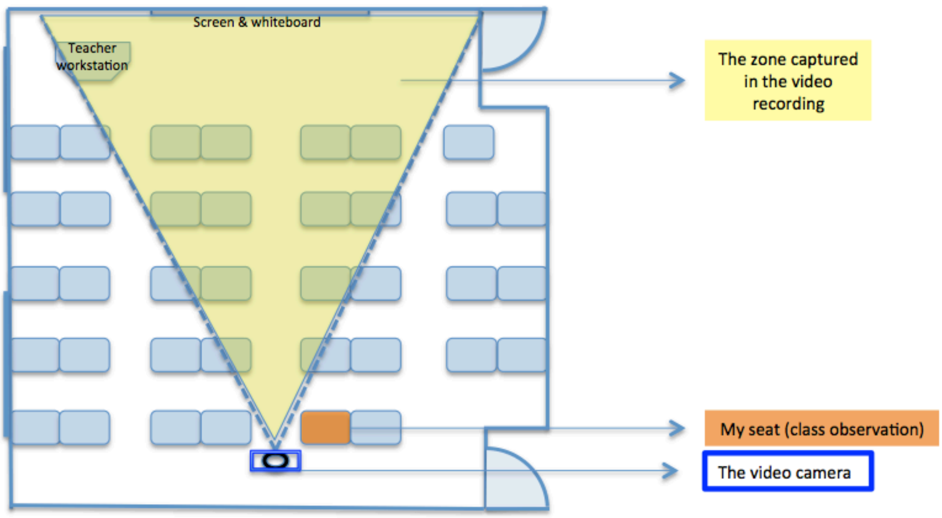
APPENDIX 5 – Timeline of data collection

Data collection schedule

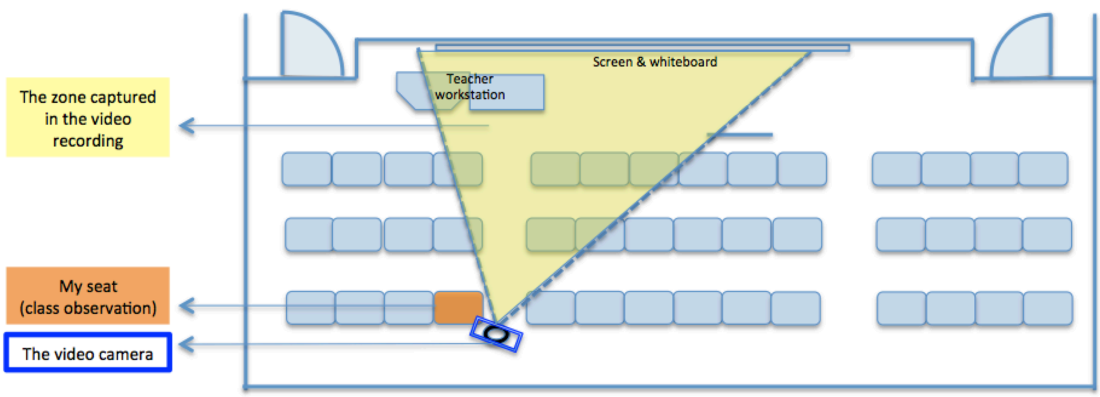
Date	Actions
26 February 2014	Submission of the letter asking permission to collect data
26 February 2014 - 4 March 2014	Sampling process: Steps 1 and 2
4 March 2014	Receipt of approval from the college director
5 March 2014 - 7 March 2014	Sampling process: Step 3 Arrangements made for video recording and class observation
10 March 2014 - 11 April 2014	Video recording and class observation sessions
24 June 2014 -18 July 2014	Semi-structured interviews and video-stimulated recall interviews

APPENDIX 6 – Classroom settings and video camera set-up location

Video camera position and seating arrangement (normal classroom)



Video camera position and seating arrangement (computer room)



APPENDIX 7 – A sample of class observation field notes

Classroom observation #2 (video recording - 2 hours)
13 March 2014; 930-1130; Room 810 computer lab
Participant: T1 (T= teacher; S/ss = student(s))

Subject: Graphic Design

Class focus: Semiotics/Semiology : the study of signs and meaning

1. Starting the lesson
T: starts the class talking about an ss assignment and tells ss what they will do the week after.
S: some ss are still settling down themselves, opening up the lesson ppt notes.
T: reminds ss to download the course ppt, and recalls previous lesson's topic

2. The concept of semiotics
T: introduces the class focus "semiotics" : the teacher introduced the Key term "semiology" by producing the Chinese name, which was written on the whiteboard. ss have the same ppt file showing in front of them on the computer.
T: connects the idea semiotics to the subject (public speaking & interpersonal communication) ss have taken or are taking.
S: No respond from ss,
T: uses Cantonese to ask the Q again
S: one ss gives response to the Q
T: uses the whiteboard to visualise the concepts and asks several Qs,
S: no respond at first then got some later on.

3. The concept of sign, signifier & signified
T: moves on to other concepts under the topic of semiology --> Sign.
S: Ss are quiet, some are listening and some are browsing the internet.
T: gives problematic / wrong samples and asked ss why.
S: Ss nod or shake their heads to give response.
T repeats the ‘yes’ ‘no’ answers after seeing ss responses.

4. The concepts of denotation & connotation
T: introduces the ideas of "denotation" & "connotation"
T: uses the grade of a ss assignment to illustrate the meaning of connotation.
S: The owner of the assignment voices out “thank you” as the T put an A on it just to explain the meaning of letter A.
T :asks Q
S: only a few ss nod their heads to answer the Q.
T: then uses a visual image, a big red rose, on the ppt to ask ss to give meanings of denotation and connotation; then a cross...;
S: one ss answers. Some ss remain clicking on other website and one nearby me keeps reading fb.

5. Polysemy:
T: asks ss to give examples of things with the pattern (a circle in a square) in our daily life. T contrasts "word" and "image" , then asks a question how ss can fix the meaning of an image
S: one ss answers - “use text”
T: continues encourage ss to contribute more ideas
S: ss start providing more answers and ss laugh out when one of the answer is interesting.
T: uses a visual example to show the function of words to fix the meaning of an image.
T asks ss to give meaning of the pic
S: one ss gives an idea.

6 The concepts of colour association & cultural specific

Class activity 1

- ss are asked to put down words related to "blue" and "red" onto the whiteboard. T demonstrates what ss need to do first. ss split in 6 groups, T allows all ss move to the front, brainstormed ideas together while putting their answers on the board. ss are allowed to use their 1st language to write down their answers.
- most ss actively contribute their answers, making a lot of noise, some ss stand at the back of the group and do not involve themselves in the activity. T joins the ss, observes them.
- after the activity, the board was full of words and expressions that associated to the idea of "blue" & "red". T works on the answers: 1st circle answers that appear across difference groups. Ss are activity calling out 'the target words' and help find and one ss walks out to help circle words. T then discusses the correlation between those words and implications, culture, generation, recent social issues etc. --> introduced the concept "cultural specific". Meanwhile, most ss looks at T, listen to him, some nod their head showing understanding, some write down note.

T: moves on to teach 'colour association' by showing ppt with different colour combinations and asks ss to associate the colour combinations to the things in their life.

S: a few ss call out answers.

T: gives a handout to ss about "colour symbolism" ;

T: emphasizes examples related to "cultural specific", then recalls some of the ss answers to show culture differences.

T: asks Qs from time to time while explaining

S: some ss remain actively providing answers. The ss nearby continues browsing fb n checking email etc.

T: shows ss some colour scheme charts, explains briefly, tells ss the usage of it, "no need to memorize, only for reference".

Break

7 The concepts of colour tone & colour association

Class activity 2

- ss are asked to find a partner dressing up the same colour tone of outfit.
- ss stand in a big circle, and the T checks out the colour tone of each group and asks ss to name the colour scheme,
- T turns the screen on with a list of colour schemes, then T asks the ss if the group has other colour tones that had not been mentioned with his own explanations.
- ss are moving around the classroom, finding partners, making a lot of noise.
- after matching, T puts ss in a circle, talks about the colour scheme ss formed, moves ss around to form diff colour schemes, compares and contrasts the schemes, asks ss questions. 4 ss have not joined the circle, standing at the side but listening. One ss is sitting but also listening. Some ss laugh when they are talked abt.
- T puts up a list of colour tones (terms such as warm colours, pale colours) on the ppt. T points to some terms, refers back to ss clothes to explain the meanings. ss are listening.

Class exercise

S: work on colour drawing exercise, focus on colour tone and feeling.

T: walks around and provide supports to them.

APPENDIX 8 – Pilot interview questions

Part I	
Areas of focus	Questions
Teaching background	1. What is your professional background? 2. How long have you been teaching Associate Degree students?
Teaching perspective	3. What is your perspective in teaching? 4. What do you think teaching means to you and to your students?
ching experience with the ociate Degree students	5. What do you think about the learning attitude of students in Hong Kong? 6. What are the major problems of Hong Kong students in terms of learning? 7. What factors do you think are the causes of the problems mentioned? 8. What comments do you give to the Associate Degree students? 9. What do you expect students to get out of your lessons? 10. What do you think are the major needs of this group of students? 11. Based on what criteria in general do you plan and design your teaching strategies?
Part II	
Areas of focus	Questions
About the lesson	1. What were the major concepts you taught in the lesson?
Preparation	2. How did you help students understand the concepts? 3. What did you consider when planning that lesson?
Construction of concepts	4. How did you help students construct the concepts in the lesson?
Use of visual aid	5. How did you find the visual aids helped support their understanding of the concepts?
Prior knowledge	6. In which parts of the teaching process do you think students' prior knowledge became connected to the new concepts?

APPENDIX 9 – Semi-structured interview Questions (Chinese version – in Cantonese)

Areas of focus	Main questions (in Cantonese and English)	Supporting questions (in Cantonese)
Teaching background 教學背景	1. 請介紹下你學術同教學方面的背景	1) 大學，碩士修咩科？ 2) PhD 嘅 research 有關咩㗎？ 3) 你教左幾耐書呀？ 4) 教過邊類嘅學校同學生呀？
	2. 想問有關你教了副學士課程嘅一點背景資料？	5) 你教了副學士課程幾多年呀？ 6) 你喺呢間學院教左幾耐？ 7) 你教邊一科㗎？
Teacher's beliefs 老師信念	3. 你的教學信念係點？	8) 你認為教學既意義係咩？
	4. 你覺得教學對你和學生有什麼意義？	9) 可唔可以分享下你既教學理念呀？ 10) 作為一個老師，你認為你喺課堂上嘅角色係咩呢？
Teacher's perception of students' learning attitudes 老師對學生學習態度的看法	5. 你覺得香港學生一般嘅學習態度係點㗎？ 6. 你覺得佢地主要嘅問題係咩？	11) 佢地嘅態度係點？ - 在課堂？ - 處理功課？ - 學習新知識？ - 修讀這課程？
	7. 你學得副學士嘅學生有冇你所提及嘅學習問題呢？	12) 可唔可以比一兩個例子？
	8. 你認為呢啲學習態度問題係來自咩原因？	13) 你認為中國傳統，家庭教育有冇關呢？ 14) 咁香港嘅教育制度對學生嘅學習模式有冇影响呢？
	9. 咁你覺得佢地既學習態度應該係點嘅呢？	15) 例如學生應該在課堂要做啲咩呢？ 16) 當你上堂嘅時候，你期望學生會在你嘅堂得到啲咩呢？
	10. 現實情況又係點嘅呢？	17) 佢地會在堂上做咩呢？ 18) 可唔可以比啲例子？ 19) 咁你喺課堂上會點面對學生咁既學習態度同模式呀？

APPENDIX 10 – Semi-structured interview Questions (English version)

Areas of focus	Main questions (originally written in Chinese)	Supporting questions (originally written in Chinese)
Teaching background	1. Can you briefly introduce your academic and teaching background?	1) What academic area did you study in your undergraduate and Master's degrees? 2) What was your PhD research about? (if applicable) 3) How many years have you been teaching? 4) What types/levels of students have you taught so far?
	2. How about your background in teaching Associate Degree students?	5) How many years have you taught in Associate Degree programmes? 6) How many years have you been teaching in this college? 7) What subjects do you normally teach?
Teacher's beliefs	3. What are your teaching beliefs?	8) In your opinion, what is the meaning of education?
	4. What does teaching mean to you ?	9) Can you share your teaching philosophy? 10) What are your roles in class?
Teacher's perception of students' learning attitudes	5. What do you think about the learning attitude of students in Hong Kong? 6. What are their major problems in terms of learning?	11) What are their attitudes in class? in handling assignments? in learning new knowledge? in taking this course?
	7. Do you think that Associate Degree students have the problems you just mentioned?	12) Can you give me some examples?
	8. What do you think are the causes of the problems mentioned?	13) Do you think Chinese culture and/or the family's education are related to these problems? 14) How about the Hong Kong education system? Do you think it is related to the students' learning style?
	9. What should students' learning attitudes be like?	15) For example, what do you expect the students to do in your lessons? 16) What do you expect student to get out of your lessons?
	10. What is the actual situation?	17) What do they do? 18) Can you give me some examples? 19) How do you handle the situation? (if negative comments are pointed out)

APPENDIX 11 – Video-stimulated recalled interview questions (Chinese version – in Cantonese)

Areas of focus	Main questions	Supporting questions
About the lesson	1. 呢堂係關於咩㗎？	1) 可唔可以簡單介紹下當日課堂嘅主題係咩呀？ 2) 呢一堂係乜野科？ 3) 學生喺呢一科裡面學啲咩？ 4) 學生洗唔洗修讀其他嘅先修課程先至嚟讀你呢科？
	2. 呢堂係有關咩類型嘅知識？	5) 係堂裡面既內容有冇邊啲係比較抽像既概念，定係一啲比較實在啲公式化嘅知識？可唔可以講解一下？
Preparation	3. 當你去準備呢堂嘅時候，你會考慮啲咩黎決定你點教呀	6) 呢喺準備課堂中呢幾個階段會考慮啲咩？ - 準備 PowerPoint - 安排課堂活動 - 選擇教學材料 - 準備其他有關課堂嘅野等等
Teaching strategies	4. 你點樣幫學生明白新概念？ 5. 你點樣解釋啲概念？ 6. 我見你有用 ppt，你覺得用 ppt 嘅作用係咩呀？ 7. 係嗰堂裡面，有冇邊啲部份係有利用到學生已有既知識去幫助佢地學習架 ？	7) 你係呢堂用咩方法去幫學生學習頭先所講比教抽象嘅概念呢？ 8) 你覺得呢啲方法點樣幫助倒學生學習？ 9) 點解你會咁安排你所用嘅方法呢？ 10) 用 visual aids 幫唔幫倒你去令學生明白啲抽象既概念呢？可以比啲例子嗎？ 11. 學生對呢科有冇基本認識架？咁針對當日既呢堂，有冇啲咩概念學生係應該要識左先會學到？
	其他在不同課堂上的教學技巧，例如 - Visual aids: PowerPoint, videos, pictures - Class activities - Group discussions - Demonstrations - Examples - Students’ prior knowledge	對於其他不同教學技巧可以問以下問題： a) 那個…是關於咩？ b) 點解你會用…? b) 你覺得… 點樣幫助學生理解呢？ c) 你認為…如何幫你解釋新概念呢？ d) …有咩用途呀？ e) …嘅角色在解釋課堂方面係咩呢？ f) …喺幫助學生理解方面擔任咗咩角色呢？

APPENDIX 12 – Video-stimulated recalled Interview questions (English version)

Areas of focus	Main questions	Supporting questions
About the lesson	1. What was the lesson about?	1) Can you briefly introduce the topic of this lesson? 2) What was the subject of the lesson? 3) What did the students learn about the subject? 4) Did students need to take any other subject before taking this lesson?
	2. What kinds of knowledge did the lesson explore?	5) Was the knowledge formulistic? Concrete? Abstract?
Preparation	3. What factors did you consider when you prepared the lesson?	6) What did you consider when … - preparing the PowerPoint? - planning the class activity? - selecting the materials? - preparing anything else for the lesson?
Teaching strategies	4. How did you help students understand the concepts? 5. How did you explain the concepts? 6. I noticed that you used PowerPoint. What is the functions of PowerPoint in your teaching? 7. In which parts of the teaching process do you think students prior knowledge was connected to the new concepts?	7) What strategies did you use in this lesson to teach those abstract concepts? 8) How did these strategies help support students learning? 9) Why did you organize the strategies in this sequence? 10) How do you find the visual aids help supporting their understanding of the concepts 11) Did students have foundation knowledge of the subject? Did they need to study any other subjects in order to understand the content of this particular lesson?
	Teaching tools or strategies which appeared in the videos or may have been mentioned in the interview: - Visual aids: PowerPoint, videos, pictures - Class activities - Group discussions - Demonstrations - Examples - Students' prior knowledge	Questions which may be used in discussions of teaching and explanation strategies: a) What was the …. about? b) Why did you use ….? b) How did you find …. supported student understanding? c) How did you find …. helped explain the concepts? d) What was the function of using …. ? e) What was the role of …. in explanation? f) What was the role of …. in supporting student understanding?

APPENDIX 13 – A sample of priori coding of the semi-structured interview data (with English translation)

Interview transcription (I: interviewer; T4: Teacher 4)	Priori code: - sub-theme
I: 咁你認為你作為一個老師, 你認為你係課堂上扮演緊咩嘅角色? *As a teacher, what do you think is your role in the classroom?* T4: Facilitator 啦, 我唸我可以 provide 一個環境同埋一啲 information, 然後我用一啲方法令佢對依啲 material 產生興趣, 話比佢聽究竟依啲 material 同佢自己& 佢地 everyday life 有咩關係; 佢地真正學唔學到, 其實我係做唔到, That's why 我話我係一個 facilitator, 我可以撥佢去對個樣野產生興趣, 撥佢自己去睇&知多啲。 (*Facilitator. I think I can provide an environment and some information. Then I use some methods to make them feel interested in those materials, and tell them how those materials could be related to them and their everyday lives. Whether they can really learn, is something I can't control. That's why I said I am a facilitator. I can lead them to arouse their interest in something and lead them to see more and learn more.*)	Teacher's role: - facilitator
I: 咁你覺得一般香港嘅學生, 有冇啲咩野好 common 嘅學習態度? *What do you think about the common learning attitude of Hong Kong students?* T4: Surface Learning 嚕我覺得, 姐係佢地剩係會睇下 Powerpoint 上面有咩; 如果中學層次仲低, 剩係睇 syllabus 入面 include 左啲咩, 有就去學去記; 我地去到 associate degree 嘅同學唔會問 Syllabus 係咩嘅, 但佢地只限於 powerpoint/ textbook 上面有嘅野先有興趣知, 唔係好多同學想再知多啲。 (*Surface learning, I think. That means they only see what's on the PowerPoint. The level would be even lower in secondary school in that they would only look at what's in the syllabus and then learn and memorize that. At the Associate Degree level, the students will not ask what's in the syllabus. But they only interested in things appeared on the PowerPoint or textbook. Not many students would want to know more.*)	Learning attitude: - surface learning
I: 嗯, 咁姐係佢地嘅態度都係..你比咩野, 佢就記咩野, 係咪咁解啊? *Do you mean that their learning attitude is 'they memorize what you give them'? Is that right?* T4: 可以咁講啦; 同埋佢地只著重於知道一樣野就算, 知道的程度只足夠去考試就 Okay 。 *Yes, you can say that. And they only focus on knowing one thing. The scope is just enough to handle the examination.*	Learning attitude: - only learn for exams
I: 咁我就明啦, 佢地識嘅野都係為左應付考試, 而唔懂得自己去 explore, 去發掘新嘅野; 你覺得點解會有啲咁嘅問題嘅? *Ok, I get it. They learn for examinations but do not know how to explore more and to find more new knowledge. In your opinion, what are the causes of this problem?* T4: 我覺得係中小學養成的, 整體學習都係為左 Mid-Term Exam, Final Examination, 老師唔係鼓勵佢唸多啲, 開闊啲, 而係 Focus 係教點樣學生拎高分, 過左 10 幾年之後, 已經習慣左。 *I think this was developed in primary and secondary schools. The overall learning purpose is for the mid-term exam and final examination. The teachers do not encourage them to think more and see more, but focus on teaching students how to get higher grades. After ten years, they have become used to this pattern.*	Reason (exam-oriented): - habitual developed in learning life, only cared about grades

APPENDIX 14 – A sample of open coding of the video-stimulated recall interview (VSRI) data (with English translation)

Transcription (I: interviewer; T6: Teacher 6)	Emerged code	Properties of code
I：明白， 咁係個堂入面呢，有冇邊啲係比較抽象嘅概念? 定係好多都係一啲實在嘅知識? *I see, then in this lesson, were there any abstract concepts or mostly factual knowledge?* T6: UM，係 factual，例如 DNA 個結構，但抽象主要係 DNA 個方面，因為大部份人無見過 DNA，所以呢就..我唸佢地係依方面都會有少少困難，同埋 DNA 製造 Proteins 嘅 Steps 都比較抽象，所以佢地好難去記到成個過程。 *Um…was factual, for example the structure of DNA. But it was abstract mainly because most people have never seen DNA. Therefore, I think it was a bit hard in this area, and the steps that DNA producing proteins were rather abstract too, and thus very difficult for them to memorize the whole process.*	58. factual 85. abstract	Type of knowledge
I：咁好啊， 正如你所講，DNA 個概念比較抽象啊，咁我想問下你用Ｄ咩方法去解釋依Ｄ概念啊？ *Ok then. As you said, the idea of DNA is relatively abstract, then I would like to ask what strategies did you use to explain the concept?* T6: 用 Video 嚕，咁因為 video 識得旭 ma，當我講完一次啦，我就會播比佢睇；因為 animation 識得旭嘅話呢，咁佢地都大概可以知道條DNA 點樣開啊，條 enzyme 點樣可以係上面行啊，然後製造 RNA，姐係製造 protein 咁樣嚕。 *I use videos because videos move. I told them once that I would play [one for] them. Since animation can move, then they could more or less know how a piece of DNA split, how the enzyme moves on the DNA and then produces RNA, which means making protein.*	46.use of video 93.visualize idea	Strategy to teach factual but abstract concept – video

APPENDIX 15 – Emergent Codes derived through open coding from VSRI data

No.	Coded items	Teachers (Subjects taught) Number of times discussed over the VSRIs							
		T1 GD/ PS	T2 IPC/ PRA	T3 PRA	T4 AP	T5 RM/ AP	T6 Bio	T7 FM	T8 CP
1	Skills / techniques/ procedures	1	2	1		1			1
2	Concepts / conceptual info	5	2	2	3	1		1	3
3	Things happen w/o specific skills (counterexamples)		1						
4	Application of concepts /knowledge (students are expected to do)	7	5		1	4	1		6
5	Use visual images (show concepts)	1		2	2	1			
6	Use daily life examples	3	1	2	1			2	1
7	Understanding	1	2	2	1	1	1	1	2
8	Let students provide answers	2	1						
9	English transcription of English video				1				
10	Use examples	5	4	10	2	3	1	3	4
11	Stimulation		2	1					
12	Teachers' appreciation	2							
13	Let students think	2	4	1					1
14	Avoid one way delivery	1							
15	Activity	5							
16	Competition	1							
17	Discussion	5	6						
18	Vocabulary / word meaning /terminology	1		1	1	1			1
19	Explanation (telling)	1	1		1	1			6
20	Students' experience	1	2			2		1	
21	Students' background	1				1			
22	Variation/change	1							
23	Related/close to students' daily life	1		1	2	2	1	5	1
24	Students' put effort	1							
25	Problem solving					2			1
26	one way delivery					1			
27	Prior knowledge	2		1	4				
28	Speak slower and more detailed								2
29	Common sense	1	1						
30	Creativity / ability to Create new ideas	1	1	2					
31	Use common mistakes/counterexamples								2
32	Strengthen impression of the taught knowledge				1				
33	Elaboration		1						
34	Students' observation	3							
35	Use illustration/diagram/drawings						1		1
36	Student's sensitivity	1							
37	Integration of knowledge				1				
38	Concept recall /recap/remind	1		1	1	1	2		1
39	Reinforcement of knowledge	1	2						
40	Demonstration	3	2						
41	Students' motivation				1				
42	Essential information / essence							1	
43	Learn from peers' performance	2							
44	Use ppt print out (fill in the blank)		1		1				
45	Limitation	1		1	1	2		1	1
46	Use video/movie clips/news clips	1	2	3	7	4	1	4	

47	variety	2	2	1					
48	support								1
49	Share teachers’ experience					1			
50	Simple							1	1
51	Students trying out to get experience	1	1						3
52	Avoid subjective judgment	1							
53	Avoid using remote examples				1				
54	Cognitive level of students				1				
55	Experiment /dissection						1		
56	Students’ abilities	1					1		
57	Peer interaction	1							
58	Factual		2			5	1		
59	Arouse students’ interest		3	1			1	3	
60	Check students’ understanding			1					1
61	Use cases/ scenario		5	1	5	7		1	
62	Construct a systematic structure of knowledge		1						
63	Misconceptions (counterexamples)				1				
64	Ask students questions		1						
65	Dramatic effect				2				
66	Use 3rd party							1	
67	Use Cantonese/Chinese		1	1	1	1	1		
68	Monitor / supervise		1						1
69	Ask students to take notes			1					
70	Initiate chat		1						
71	Give inspiration		1						
72	Give direction		1 ?						
73	Find out what students don’t know		1						
74	Use charts /tables				3	1		1	1
75	Consolidation	2	1						
76	Suitability of materials		1		1				
77	Understandable materials		1					1	
78	English barrier		1	1		2			
79	Attract/draw retain students’ attention		1	3	3		1		
80	Use written text on ppt - Explain concepts by using text		1	1		1	1		
81	Use body gestures/ movements				1				
82	Comparison and contrast	2		2	2	1		1	1
83	Strategic concepts/ skills		2	1					
84	Technical		1						1
85	Abstract		1	1	1	2	2	3	2
86	Identification of different ideas		1		2				
87	Steps / processes		1	1	1		1	1	3
88	Analysis		1						
89	Use simple words					1			
90	Meaningful							1	
91	In-class exercise								2
92	Repeat keywords				1				
93	Visualization		1	1	2	1	1	1	2
94	Knowledge input		1						
95	Informative knowledge		1		1	1		1	
96	Memorization		1		1	4	1	1	
97	Concrete idea		2		2	1			
98	Theories /theoretical/principles		1	1	4				1
99	Interesting (internet) materials			2	1				
100	Students’ feedback			1					

APPENDIX 16 – A sample of the video analysis (Teacher 3's Public Relations & Advertising lesson)

Lesson activities	Types of knowledge	Scaffolding	Scaffolding tools	Explanation strategies
2. Definition of PR				
She moved on to a new area – PR and told the students that was the second area the course covered.		Explicitly shifted students focus on a new topic		
She asked the students the definition of PR that the students learned before. As no student responded, she recalled teaching materials used in a past lesson about PR, and told students that she would build up new knowledge from that point.		The question stimulated students' memory and elicited their prior knowledge for the continuation of scaffolding Explicitly let students know the recalled prior knowledge was the starting point of the topic	- questioning - recalling prior knowledge - giving direction	
She provided an overview of the lesson and explained briefly the three areas that she was going to cover in the lesson.		The overview provided a clear framework of the lesson to the students so that they would be able to stay on track throughout the lesson.	- verbal explanation (spoken)	- verbal explanations (spoken)
She showed the written definition of PR and explained verbally. She picked some key words and explained.	Concepts of subject-related words/ terminology	The verbal explanation provided general concepts of the three areas.	- verbal explanation (written & spoken)	- verbal explanations (written & spoken)
She used body gesture to show two different levels of definitions – shallow & deeper.	Word meanings	The explanations supported understanding of the written definition.	- body gestures	- body gestures
She told the students the Chinese meaning of 'mutual' She used a hypothetical example to explain the concept of 'mutual beneficial relationship' with some body gestures and did handshaking with a student to show 'good relationship'.	Word meanings Concepts of subject-related words/ terminology	The body gesture helped the students to understand 'shallow' and 'deeper'. The Chinese translation of the word supported understanding to all, particularly those students of weaker English. The example and the act of handshaking also helped the explanation of the word 'mutual relationship'	- first language - examples (hypothetical) - verbal explanation (spoken) - body gestures	- first language - examples (hypothetical) - verbal explanation (spoken) - body gestures

APPENDIX 17 – An extract of field notes (Teacher 3's Public Relations & Advertising lesson)

1. Reviewing the main points of previous lessons - media planning & advertising
   - T: shows the topics, explains verbally and shows pictures of in-store media
   - S: many are getting ready for the lesson, some are looking down and doing things
   - T: lists out the key terminologies on the screen, with verbal explanation of the terms. She asks prompting questions about the contents
   - S: no response
   - T: shows video clips of Out-of-home media - shaving cream - *3D, motion*, IKEA curtain ad shows video clips – shaving cream, IKEA as example of 'out of home media'; asks students to give feedback.
   - S: one student gives response about the IKEA ad
   - T: shows video IBM smart idea - *creative use of Out-of-home media*
   - S: no response
   - T: elaborates the ideas and asks students to give feedback
   - S: no response
   - S: most sitting and listening; some are doing their own things

2. Fundamentals of Public Relations
   - T: shows the overview of the lesson "What is PR? Key differences of PR vs Advertising / scopes of PR"
   - T: asks 'what the definition of PR?'
   - S: no response
   - T: asks students if they remember the general definition they learned about PR, recalls the taught content and prompts students to answer again
   - S: one student answers
   - T: tells students the objective of the lesson is to learn more about PR
   - T: scopes of PR? T uses an example to explain the meaning of scope

3. What is PR?
   - T: shows a definition from a reference sources
   - T: explains verbally the meaning of PR & the key points that the students are going to learn
   - T: explains "Mutually beneficial relationship" by giving an example and uses gives the Chinese meaning of 'mutually', T also uses gesture at the same time
   - T: explains the building up relationship is not just one-off activity like shaking hand and saying hello (T asks a student to shake hand) but a long process

4. Various Types of relations
   - T: shows 6 different types of relations
   - T: uses a battery as an example
   - T: explains each type of relation verbally and put the key points on the board
   - T: mentions the battery again and asks students what industry relation of a battery company
   - S: one student responses
   - T: disagree with the answer and then provides some other ideas
   - T: points to the diagram on the screen
   - S: listening and writing down notes
   - T: shows some pics about what other people think PR do and tells students the meanings of the pics
   - T: asks if the students know where the pics come from
   - S: remain quiet

APPENDIX 18 – Distribution of explanation strategies Teacher 1-3 used to teach different types of knowledge in their lessons

Types of knowledge			Teachers/ Subject lessons/ Explanation strategies used to teach different knowledge types in class			
			T1	T1	T2	T3
			Graphic design	Public speaking	Interpersonal communication	Public relations & advertising
Declarative	Word meanings		- first language - daily life examples	- first language - written explanation - spoken explanation	- first language	- first language - body gesture
Declarative	Concepts	Concepts of subject-related words & terminology	- daily life examples - samplings - pictures/images (example & concepts) - diagrams/ illustrations - comparisons - prior knowledge - activities - spoken explanation	- charts - comparisons - demonstrations - first language - written explanation - spoken explanation		- daily life examples - hypothetical scenarios - specific cases - video clips - pictures/images (examples & concepts) - diagrams - comparisons - prior knowledge - written explanation - spoken explanation
Declarative	Concepts	Object concepts				- pictures/ images (examples) - video clips - spoken explanation
Declarative	Concepts	Event concepts				- video clips - specific cases - spoken explanation
Declarative	Concepts	Skill concepts	- pictures/images (concepts) - spoken explanation	- daily life examples - hypothetical scenarios - models/samplings - video clips - prior knowledge - body gestures - demonstrations - counterexamples - spoken explanation	- hypothetical scenarios - counterexamples - video clips - prior knowledge - written explanation - spoken explanation	
Declarative	Concepts	Concepts of behaviours (psychological /neurological / communication)			- daily life examples - specific cases - pictures/images (concepts) - video clips - comparisons - written explanation - spoken explanation	
Declarative	Facts				- pictures/images (concepts) - spoken explanation	
Declarative	Steps / processes					
Procedural	Techniques / procedures			- video clips - demonstrations - spoken explanation	- hypothetical scenarios - spoken explanation	
Procedural	Technical skills					
Conceptual	Theories /theoretical information					
Conceptual	Strategic concepts					

APPENDIX 19 – Distribution of explanation strategies the Teacher 4-8 used to teach different types of knowledge in their lessons

Types of knowledge			Teachers/ Subject lessons/ Explanation strategies used to teach different knowledge types in class				
			T4	T5	T6	T7	T8
			Abnormal psychology	Research methods in psychology	General biology	Food service management	Computer programming
Declarative	Word meanings		- first language - prior knowledge	- first language	- first language	- first language	
Declarative	Concepts	Concepts of subject-related words & terminology	- pictures/images (concepts) - comparisons - hypothetical scenarios - drawing - first language - spoken explanation	- specific case - first language - spoken explanation	- specific cases - pictures/images (example & concept) - prior knowledge - written explanation - spoken explanation	- daily life example - specific cases - comparisons - diagrams - first language - written explanation - spoken explanation	- daily life examples - pictures/images (concepts) - illustrations - comparisons - written explanation - spoken explanation
Declarative	Concepts	Object concepts			- daily life examples - drawings /diagrams/ illustrations - video clips - prior knowledge - first language - written explanation - spoken explanation		
Declarative	Concepts	Event concepts					
Declarative	Concepts	Skill concepts					- models - diagrams /illustrations - comparisons - prior knowledge - written explanation - spoken explanation
Declarative	Concepts	Concepts of behaviours (psychological /neurological / communication)	- daily life examples - specific cases - hypothetical scenarios - videos clips - pictures/images (concepts) - role-play/acting - body gestures - written explanation - spoken explanation				
Declarative	Facts				- video clips - spoken explanation		
Declarative	Steps / processes				- diagrams/illustrations - video clips - first language - spoken explanation	- charts - specific cases - first language - spoken explanation	
Procedural	Techniques / procedures			- hypothetical scenarios - specific cases - counterexamples - role-play - first language - spoken explanation		- role-play - counterexamples - first language - spoken explanation	- models - written explanation - spoken explanation
Procedural	Technical skills						- models - illustrations - counterexample - written explanation - spoken explanation
Conceptual	Theories /theoretical information		- daily life examples - hypothetical scenarios - specific cases - charts/tables - prior knowledge - written explanation - spoken explanation				
Conceptual	Strategic concepts			- hypothetical scenarios - specific cases - role-play - first language - written explanation - spoken explanation		- hypothetical scenarios - specific cases - video clips - diagrams - prior knowledge - first language - spoken explanation	

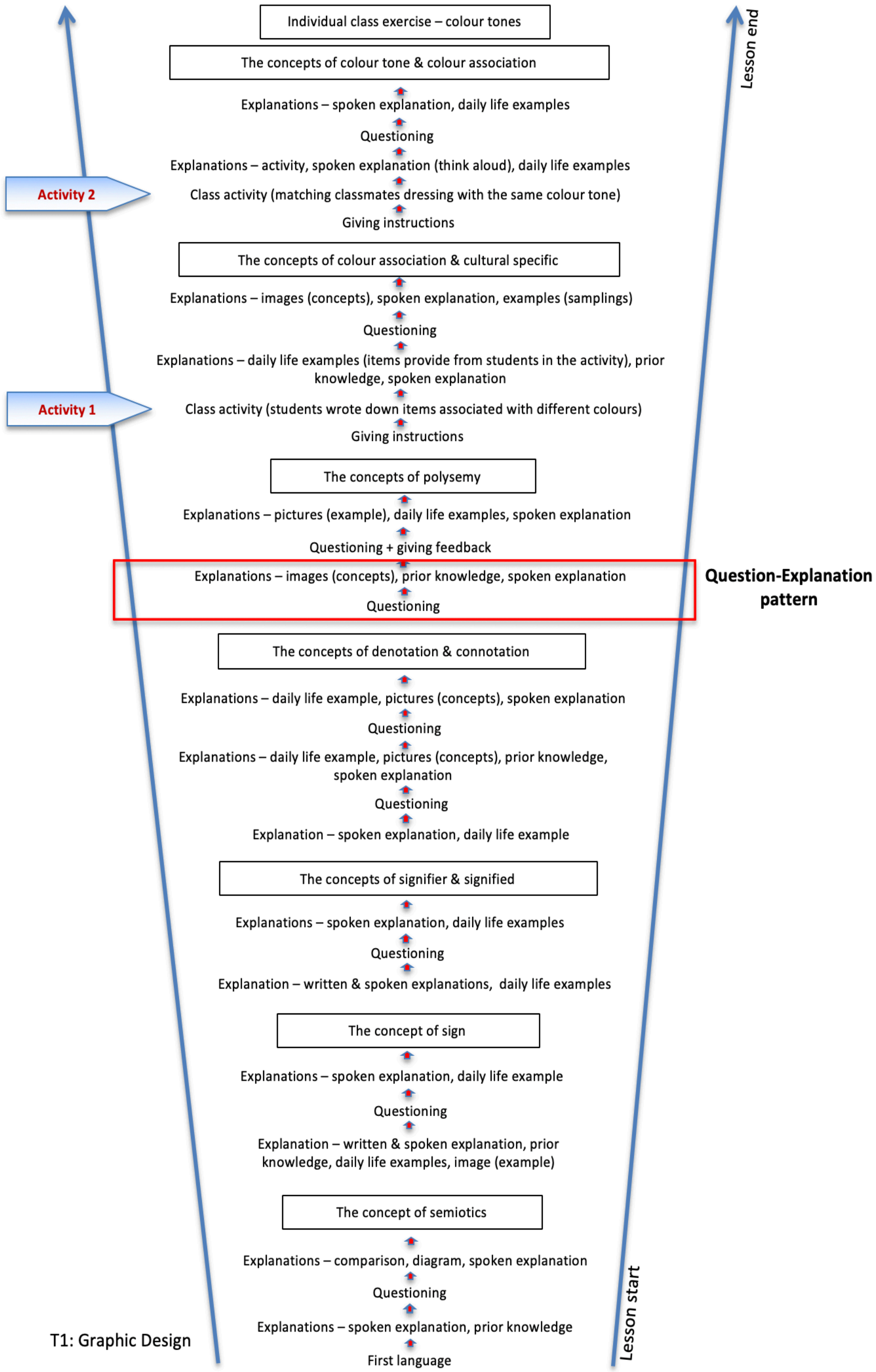
APPENDIX 20 – Explanation strategies used to teach different knowledge types in nine subject lessons

Explanation strategies	Explanation strategies – subtypes	Types of knowledge												No. of knowledge type each strategy used
		Declarative								Procedural		Conceptual		
		Word meanings	Concepts					Facts	Steps / processes					
			Concepts of Subject-related words & terminology	Object concepts	Event concepts	Skill concepts	Behaviour concepts			Technique/ Procedures	Technical skills (computer programming)	Theories	Strategic concepts	
Using examples	daily life examples	✓	✓	✓		✓	✓					✓		6
	hypothetical scenarios		✓			✓	✓			✓		✓	✓	6
	specific cases		✓		✓		✓		✓	✓		✓	✓	7
	counterexamples					✓				✓	✓			3
	models/ samplings					✓					✓			2
Using visual aids	videos / movie clips/ new clips		✓	✓	✓	✓	✓	✓	✓	✓			✓	9
	pictures / images (example)		✓	✓										2
	pictures/ images (show concepts)		✓				✓	✓						3
	diagrams / drawing / illustrations		✓	✓		✓			✓		✓		✓	6
	charts / tables								✓			✓		2
Making comparisons	comparison & contrast		✓			✓	✓							3
Building on prior knowledge	prior knowledge	✓	✓	✓		✓						✓	✓	6
Using activities	activities		✓											1
Teacher demonstrations	acting / role play / demonstrations					✓	✓			✓			✓	4
	body gestures / movements	✓				✓	✓							3
Using students' first language	Cantonese / Chinese	✓	✓	✓		✓			✓	✓			✓	7
Verbal explanations	spoken explanation - explain by telling	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	12
	written explanation on PowerPoint	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	12
No. of types of strategies used for each subtype of knowledge		6	13	8	4	13	10	4	7	8	5	7	9	-
No. of types of strategies used for declarative, procedural & conceptual knowledge		17								10		11		-

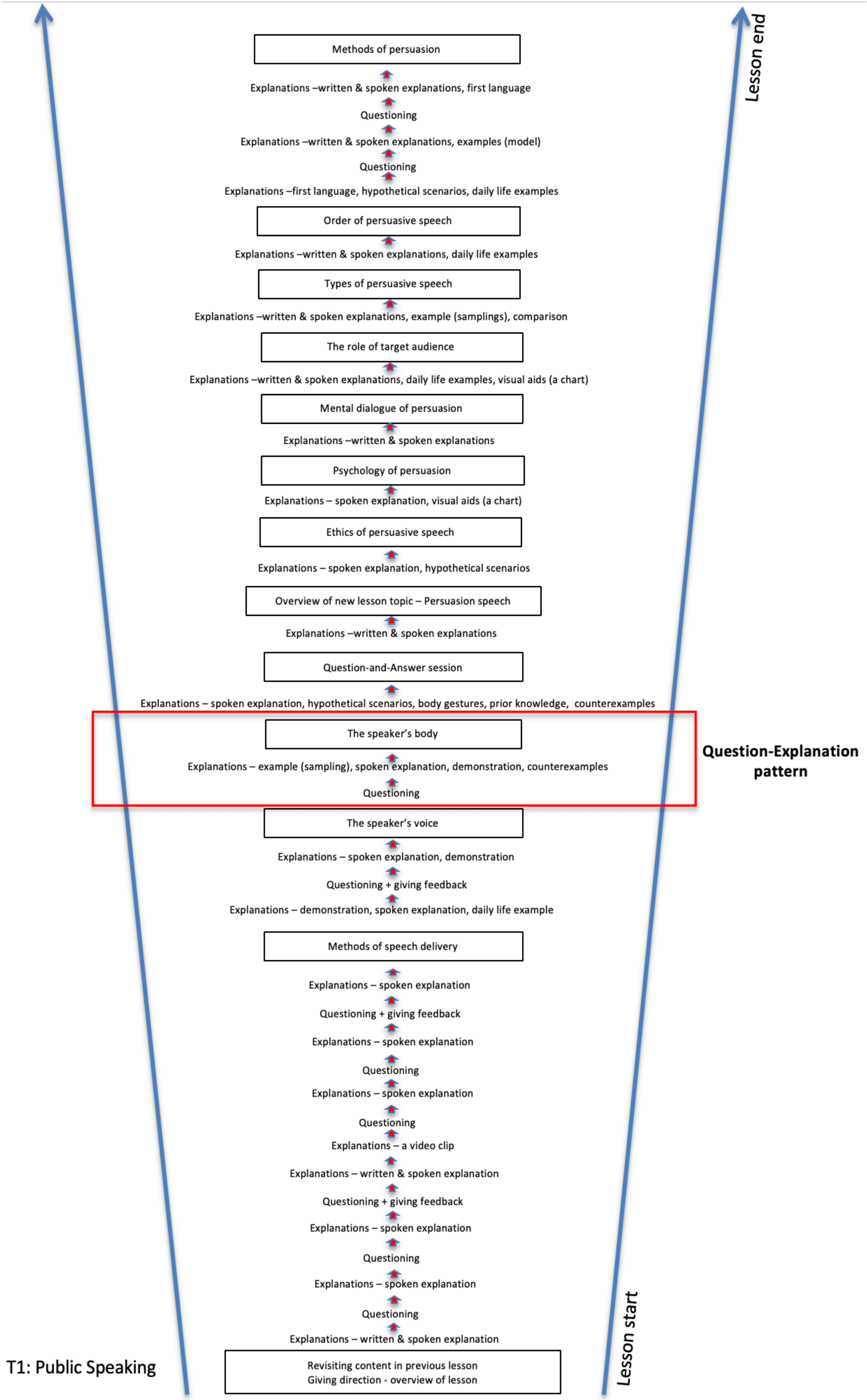
APPENDIX 21 – The number of explanation strategies used in nine subject lessons (from video data)

Explanation strategies	Sub-types of explanation strategies	Teacher/ Subject lesson/ Number of times explanation strategies used in each individual lesson									No. of teachers / no. of classes the strategies were used		Total numbers of strategies used in all nine lessons
		T1 Graphic design	T1 Public speaking	T2 Interpersonal communication	T3 Public relations & advertising	T4 Abnormal psychology	T5 Research methods in psychology	T6 General biology	T7 Food service management	T8 Computer programming	No. of teachers	No. of lessons	
Using examples	daily life examples	10	3	4	2	3		1	3	1	7	8	27
	hypothetical scenarios		3	4	3	14	16		5		6	6	45
	specific cases			3	7	10	14	7	10		6	6	51
	counterexamples		2	1			1		1	1	5	5	6
	models/ samplings	1	5							18	2	3	24
Using visual aids	videos / movie clips/ new clips		1	2	7	3		5	2		6	6	20
	pictures / images (example)	2			2			3			3	3	7
	pictures/ images (show concepts)	5		2	3	3		1		1	6	6	15
	diagrams/ drawing / illustrations	1			2	1		11	3	12	6	6	30
	charts / tables		2			7			1		3	3	10
Making comparisons	comparison & contrast	1	1	1	3	2			2	2	6	7	12
Building on prior knowledge	prior knowledge	5	1	3	1	2		2	2	1	7	7	17
Using activities	activities	2									1	1	2
Teacher demonstrations	acting / role play / demonstrations		5			4	7		1		4	4	17
	body gestures / movements		1		2	2					3	3	5
Using students' first language	Cantonese / Chinese	1	2	1	4	13	20	18	23		7	8	82
Verbal explanations	spoken explanation - explain by telling	19	39	14	18	42	28	24	22	23	8	9	229
	written explanation on PowerPoint	3	13	6	3	22	9	2	6	9	8	9	73
Total no. of types of strategies used in each lesson		11	13	11	13	14	7	10	13	8	-	-	-
Total no. of strategies used in each lesson		50	78	41	57	128	95	74	81	68	-	-	-

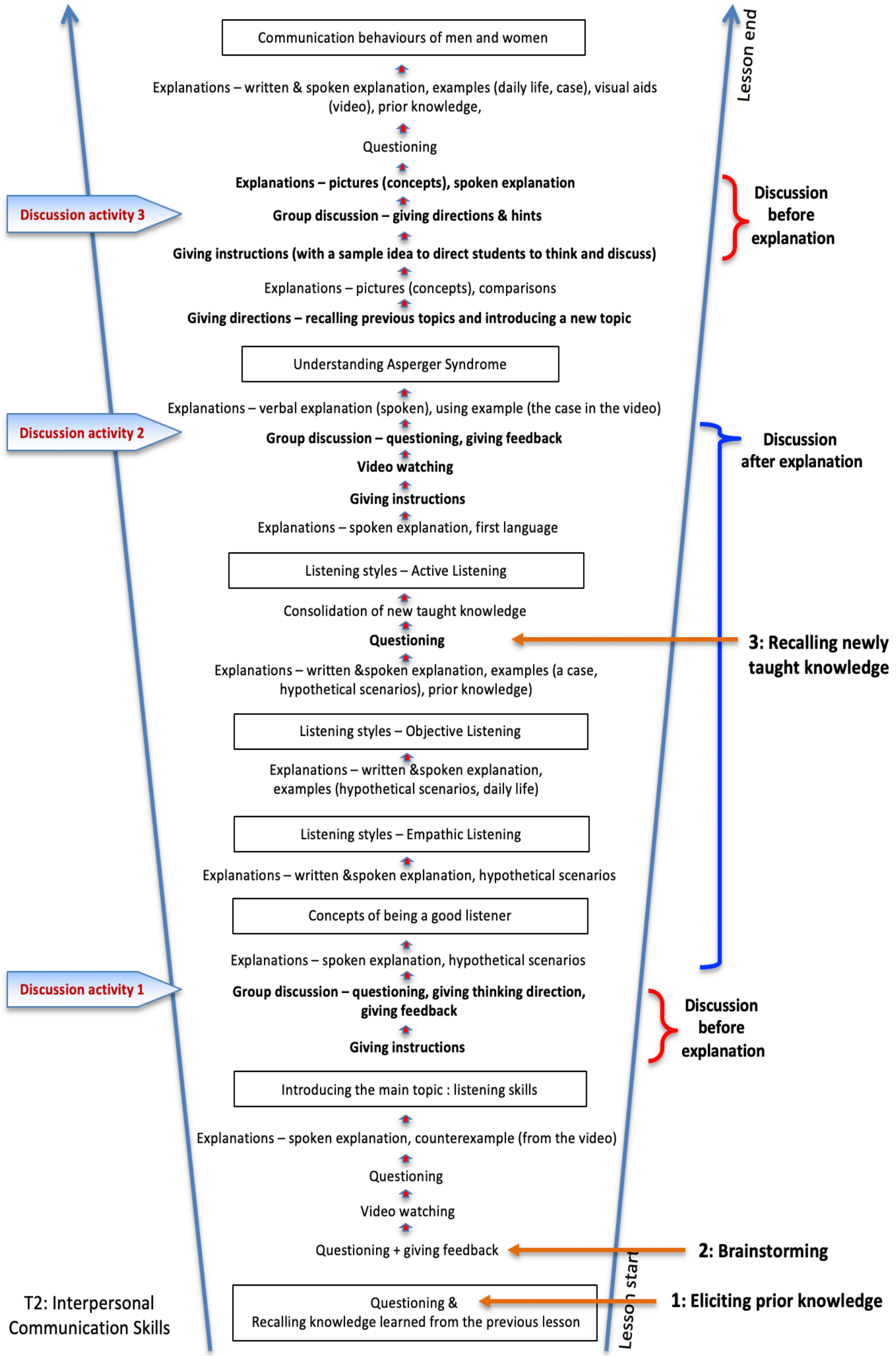
APPENDIX 22 – Structure of scaffolding in Teacher 1's Graphic Design lesson



APPENDIX 23 – Structure of scaffolding in Teacher 1's Public Speaking lesson

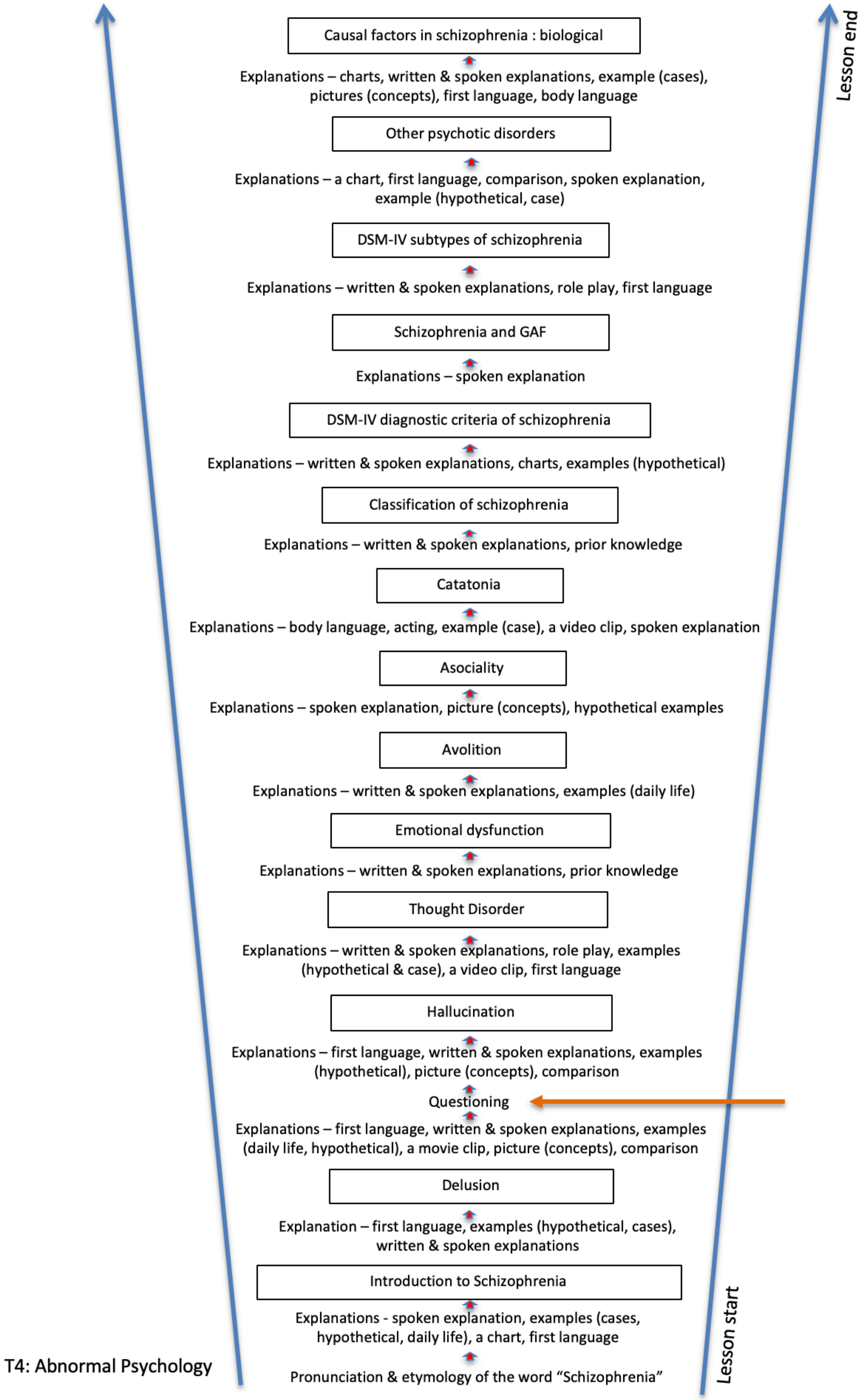


APPENDIX 24 – Structure of scaffolding in Teacher 2's Interpersonal Communication lesson

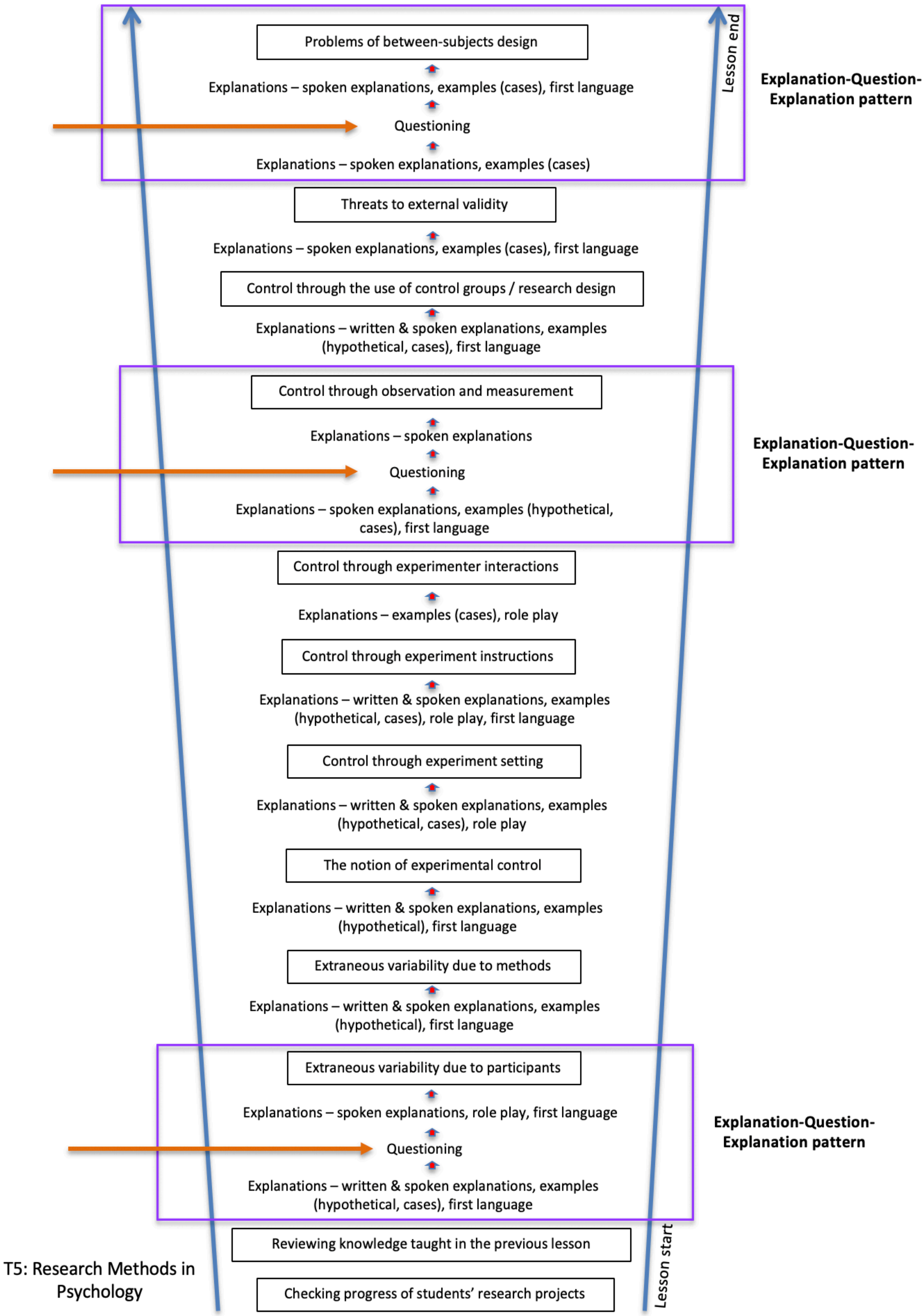


APPENDIX 25 – Structure of scaffolding in Teacher 3's Public Relations and Advertising lesson

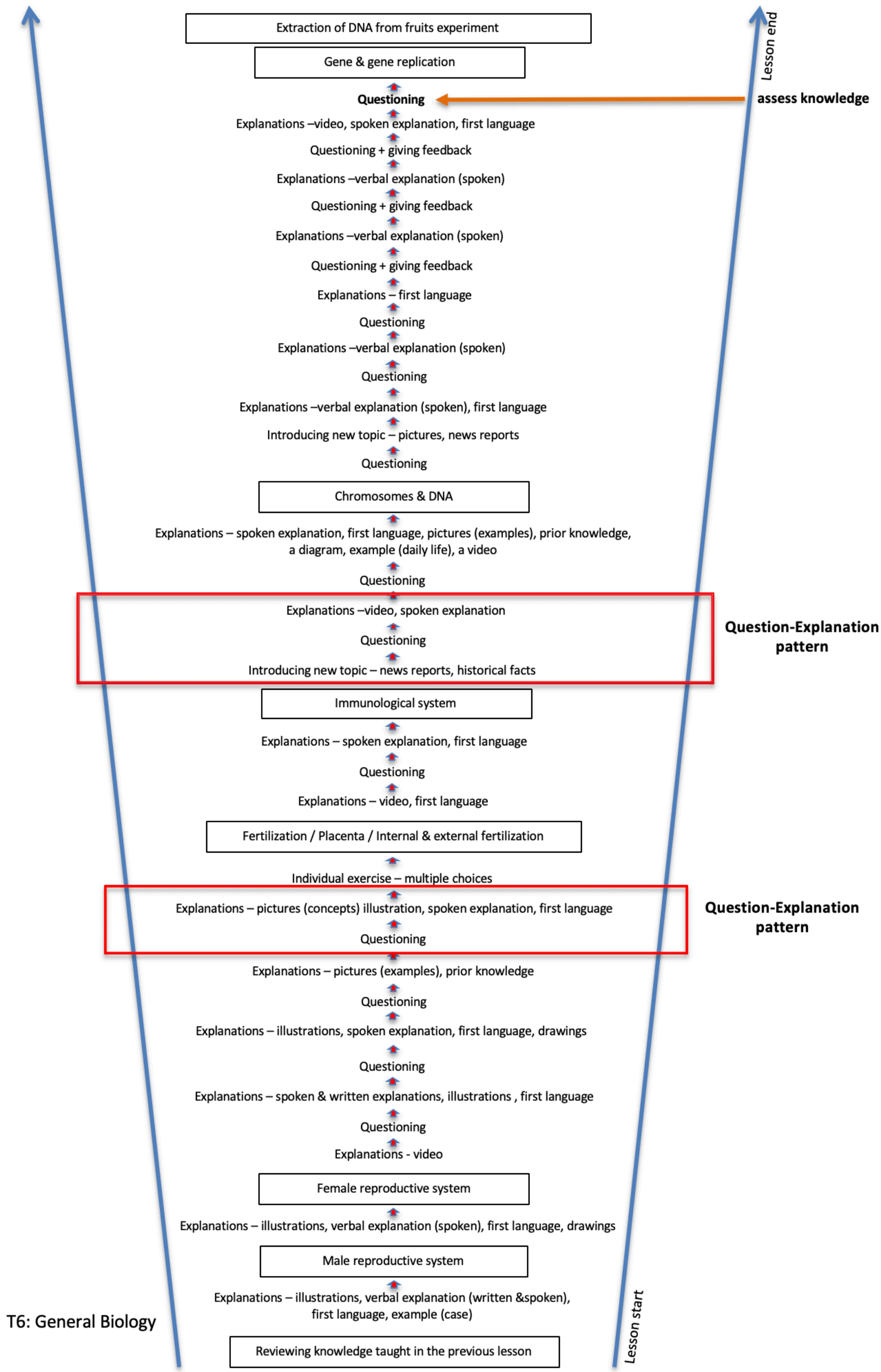
APPENDIX 26 – Structure of scaffolding in Teacher 4's Abnormal Psychology lesson



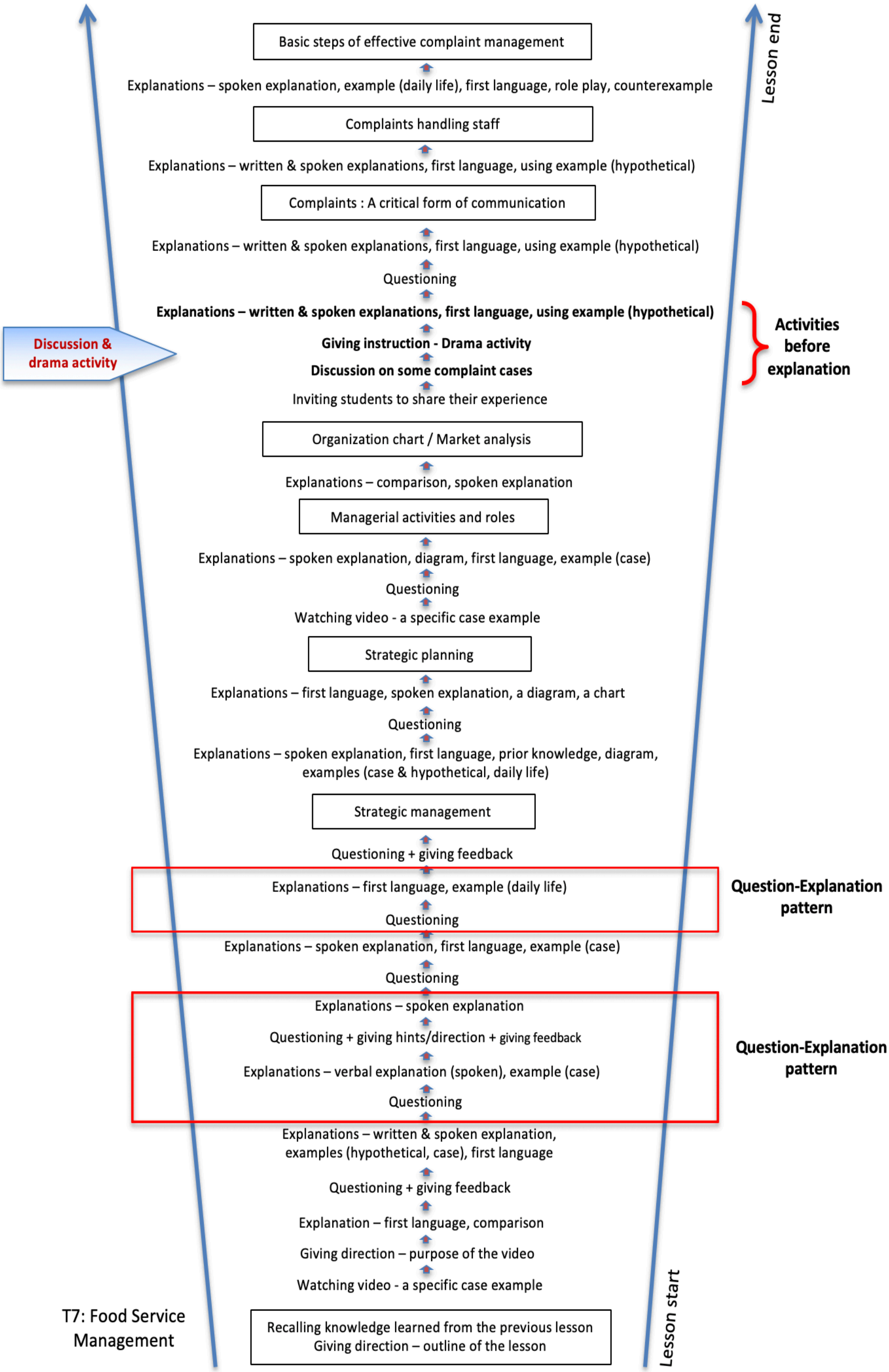
APPENDIX 27 – Structure of scaffolding in Teacher 5's Research Methods in Psychology lesson



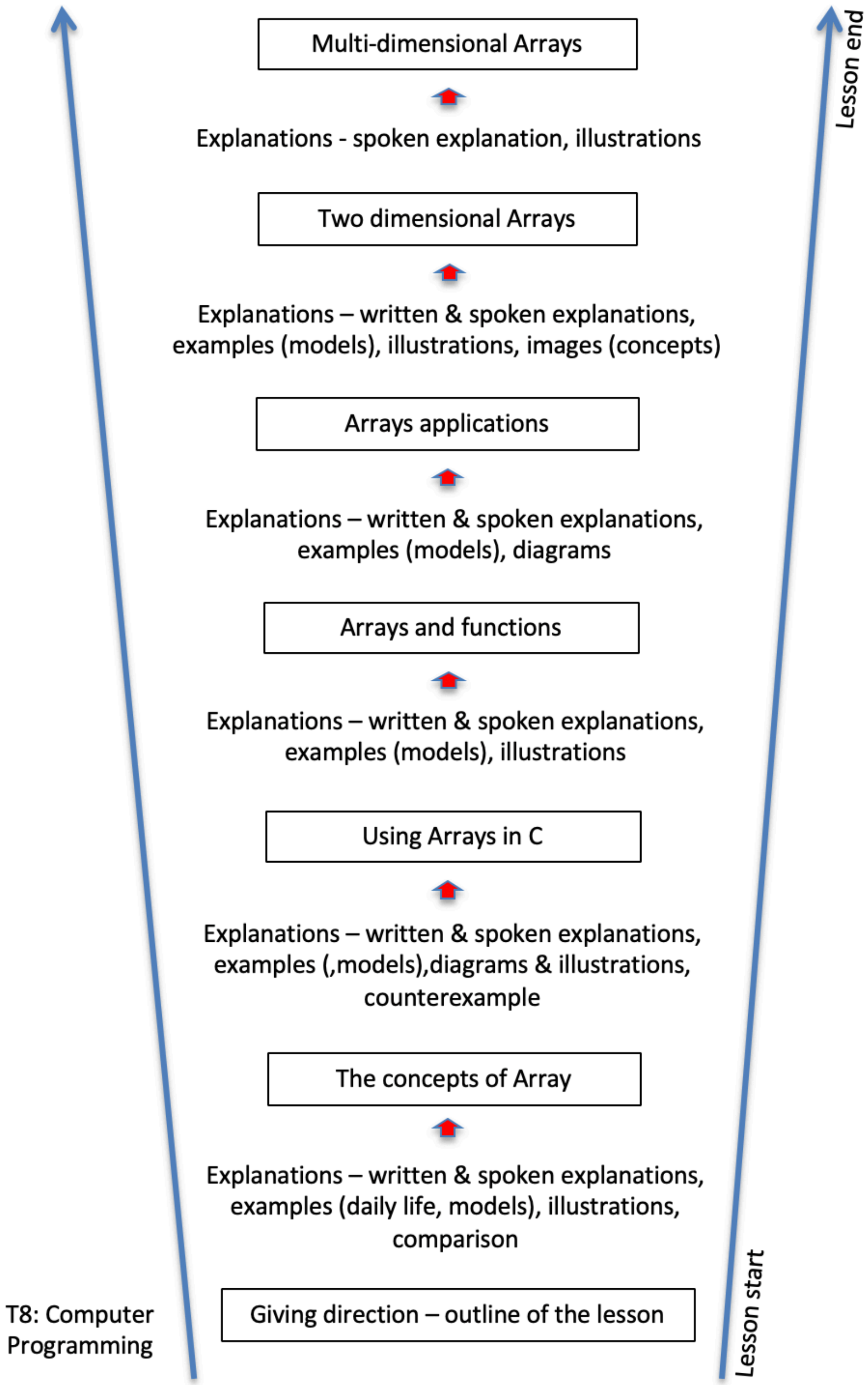
APPENDIX 28 – Structure of scaffolding in Teacher 6's General Biology lesson



APPENDIX 29 – Structure of scaffolding in Teacher 7's Food Service Management lesson



APPENDIX 30 – Structure of scaffolding in Teacher 8's Computer Programming lesson



APPENDIX 31 – Explanatory approaches implemented in different instructional explanation strategies

Explanation strategies	Explanation strategies – subtypes	Explanatory approaches						
		Individual			Combination			
		Familiarization	Visualization	Contextualization	Familiarization & Visualization	Familiarization & Contextualization	Visualization & Contextualization	Familiarization, Visualization & Contextualization
Using examples	daily life examples	✓				✓		
	hypothetical scenarios					✓		
	specific cases			✓			✓	✓
	counterexamples			✓				
	models/ samplings						✓	
Using visual aids	videos / movie clips/ new clips		✓				✓	
	pictures / images (example)				✓			
	pictures/ images (show concepts)		✓		✓		✓	
	diagrams / drawing / illustrations		✓					
	charts / tables		✓					
Making comparisons	comparison & contrast	✓						
Building on prior knowledge	prior knowledge	✓						
Using activities	activities					✓		
Teacher demonstrations	acting / role play / demonstrations						✓	
	body gestures / movements	✓			✓			
Using students' first language	Cantonese / Chinese							
Verbal explanations	spoken explanation - explain by telling	✓						
	written explanation on PowerPoint	✓						

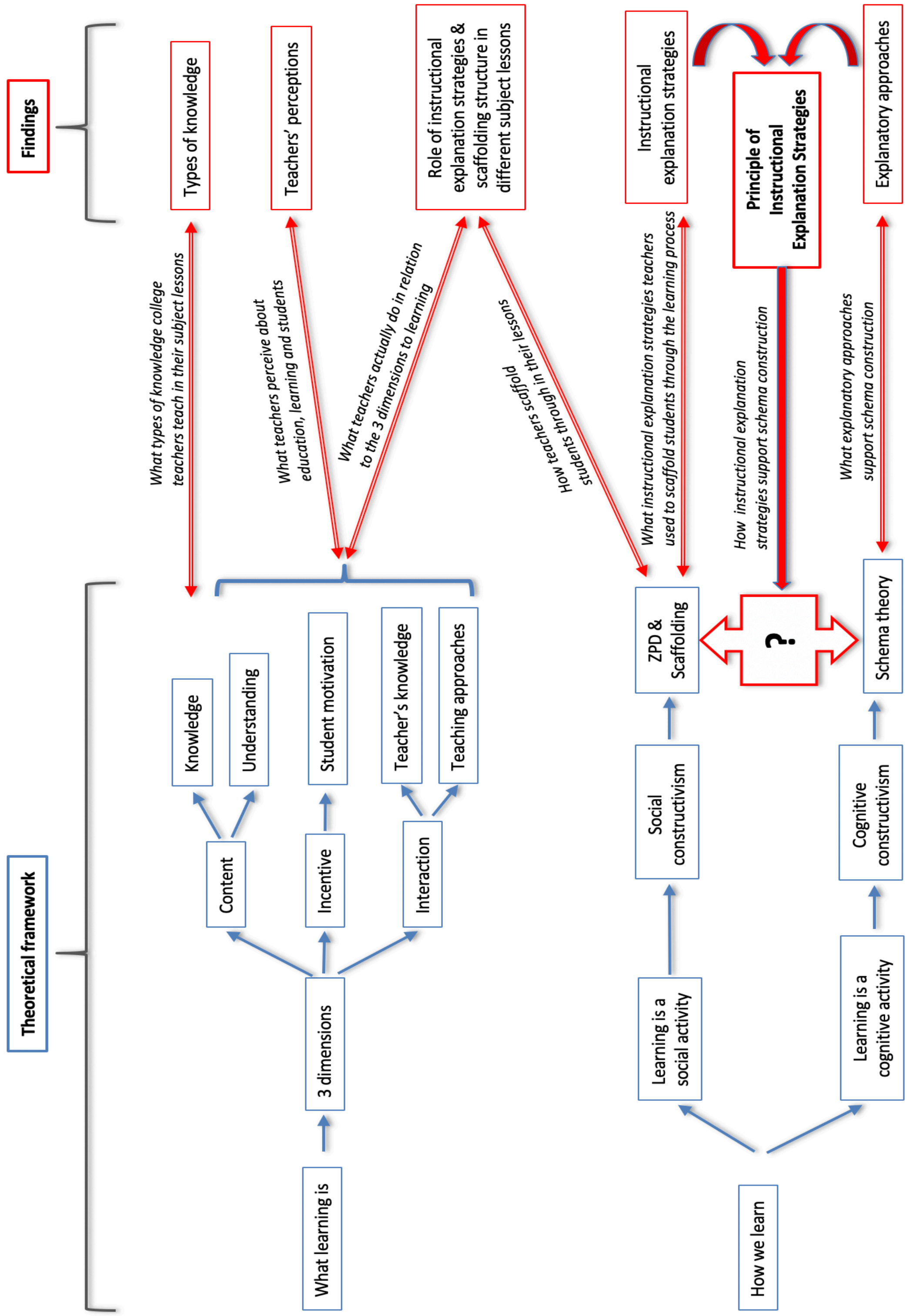
APPENDIX 32 – Explanatory approaches to support understanding of different knowledge types (inclusive of first language & verbal explanations)

Types of knowledge			Explanatory approaches: Individual – Familiarization	Individual – Visualization	Individual – Contextualization	Combination – Familiarization & Visualization	Combination – Familiarization & Contextualization	Combination – Visualization & Contextualization	Combination – Familiarization, Visualization & Contextualization
Declarative		Word meanings	✓			✓			
Declarative	Concepts	Concepts of subject-related words & terminology	✓	✓	✓	✓	✓		
Declarative	Concepts	Object concepts	✓	✓		✓			
Declarative	Concepts	Event concepts	✓	✓	✓				
Declarative	Concepts	Skill concepts	✓	✓	✓		✓	✓	
Declarative	Concepts	Behaviours concepts (psychological /neurological / communication)	✓	✓			✓	✓	
Declarative		Facts	✓	✓					
Declarative		Steps / processes	✓	✓	✓				
Procedural		Techniques / procedures	✓	✓	✓		✓	✓	
Procedural		Technical skills	✓	✓	✓			✓	
Conceptual		Theories /theoretical information	✓	✓	✓		✓		
Conceptual		Strategic concepts	✓	✓			✓	✓	✓

APPENDIX 33 – Explanatory approaches to support understanding of different knowledge types (exclusive of first language & verbal explanations)

Types of knowledge			Explanatory approaches						
			Individual			Combination			
			Familiarization	Visualization	Contextualization	Familiarization & Visualization	Familiarization & Contextualization	Visualization & Contextualization	Familiarization, Visualization & Contextualization
Declarative		Word meanings	✓			✓			
	Concepts	Concepts of subject-related words & terminology	✓	✓	✓	✓	✓		
		Object concepts	✓	✓		✓			
		Event concepts		✓	✓				
		Skill concepts	✓	✓	✓		✓	✓	
		Behaviours concepts (psychological /neurological / communication)		✓			✓	✓	
		Facts		✓					
		Steps / processes		✓	✓				
Procedural		Techniques / procedures		✓	✓		✓	✓	
		Technical skills		✓	✓			✓	
Conceptual		Theories /theoretical information	✓	✓	✓		✓		
		Strategic concepts	✓	✓			✓	✓	✓

APPENDIX 34 – Research findings in respond to theoretical framework

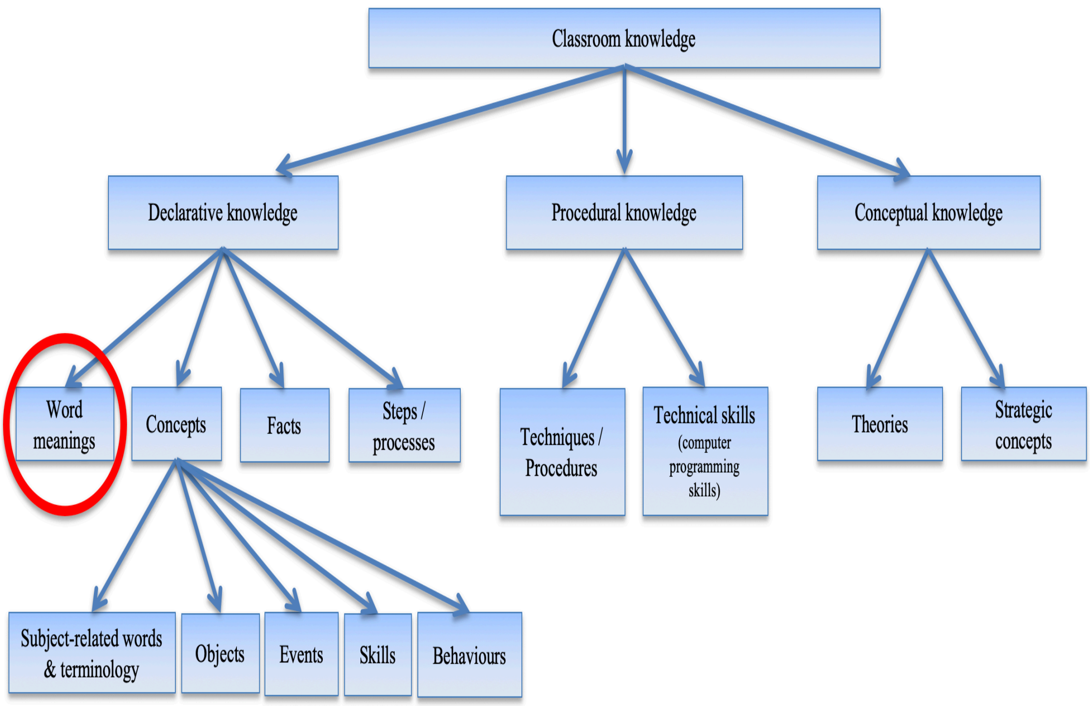


APPENDIX 35 – Steps for choosing explanation strategies with suitable explanatory approaches to explain different types of knowledge

Example 1:

The following example demonstrates how a teacher can use the models revealed in this study to find out what strategies and what approaches of strategies can be used to explain dictionary-meanings of a word.

Step 1: Identify the type of knowledge



(Original diagram is on p.227, Figure 5.2)

Step 2 : Find out choices of strategies and their related approaches (Using a summary table as a direct reference)

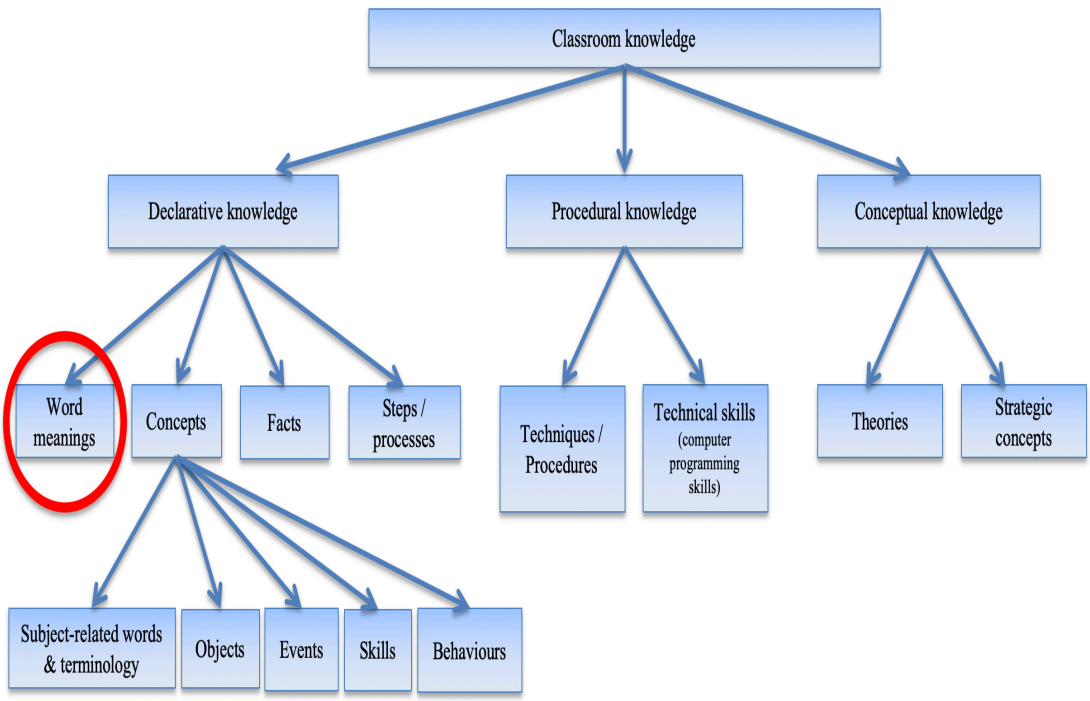
Once the type of knowledge is identified, teachers can refer back to the summary table (original table on p.257, Table 5.3) to find out what strategies can be used and what approach should be applied. For example, the dictionary-type meaning of a word can be explained through daily life examples using familiarization approach, connecting with prior knowledge, demonstrating/showing familiar body language or translating into students' first language, or verbal explanations.

Explanation strategies	Explanation strategies – subtypes	Types of knowledge / Different approaches of explanation strategies used to teach different knowledge types F = Familiarization; V = Visualization; C = Contextualization											
		Declarative								Procedural		Conceptual	
		Word meanings	Concepts					Facts	Steps / processes				
			Concepts of Subject-related words & terminology	Object concepts	Event concepts	Skill concepts	Behaviour concepts			Techniques/ Procedures	Technical skills (computer programming)	Theories	Strategic concepts
Using examples	daily life examples	F	F	F		F	F C					F C	
	hypothetical scenarios		F C			F C	F C			F C		F C	F C
	specific cases		C		C		V C		C	C		C	FVC
	counterexamples					C				C	C		
	models/ samplings					V C					V C		
Using visual aids	videos / movie clips/ new clips		V	V	V	V	V C	V	V	V			V
	pictures / images (example)		F V	F V									
	pictures/ images (show concepts)		F V				V C	V					
	diagrams / drawing / illustrations		V	V		V			V		V		V
	charts / tables								V			V	
Making comparisons	comparison & contrast		F			F							
Building on prior knowledge	prior knowledge	F	F	F		F						F	F
Using activities	activities		F C										
Teacher demonstrations	acting / role play / demonstrations					V C	V C			V C			V C
	body gestures / movements	F V				V	V						
Using students' first language	Cantonese / Chinese	F	F	F		F			F	F			F
Verbal explanations	spoken explanation - explain by telling	F	F	F	F	F	F	F	F	F	F	F	F
	written explanation on PowerPoint	F	F	F	F	F	F	F	F	F	F	F	F

Example 2:

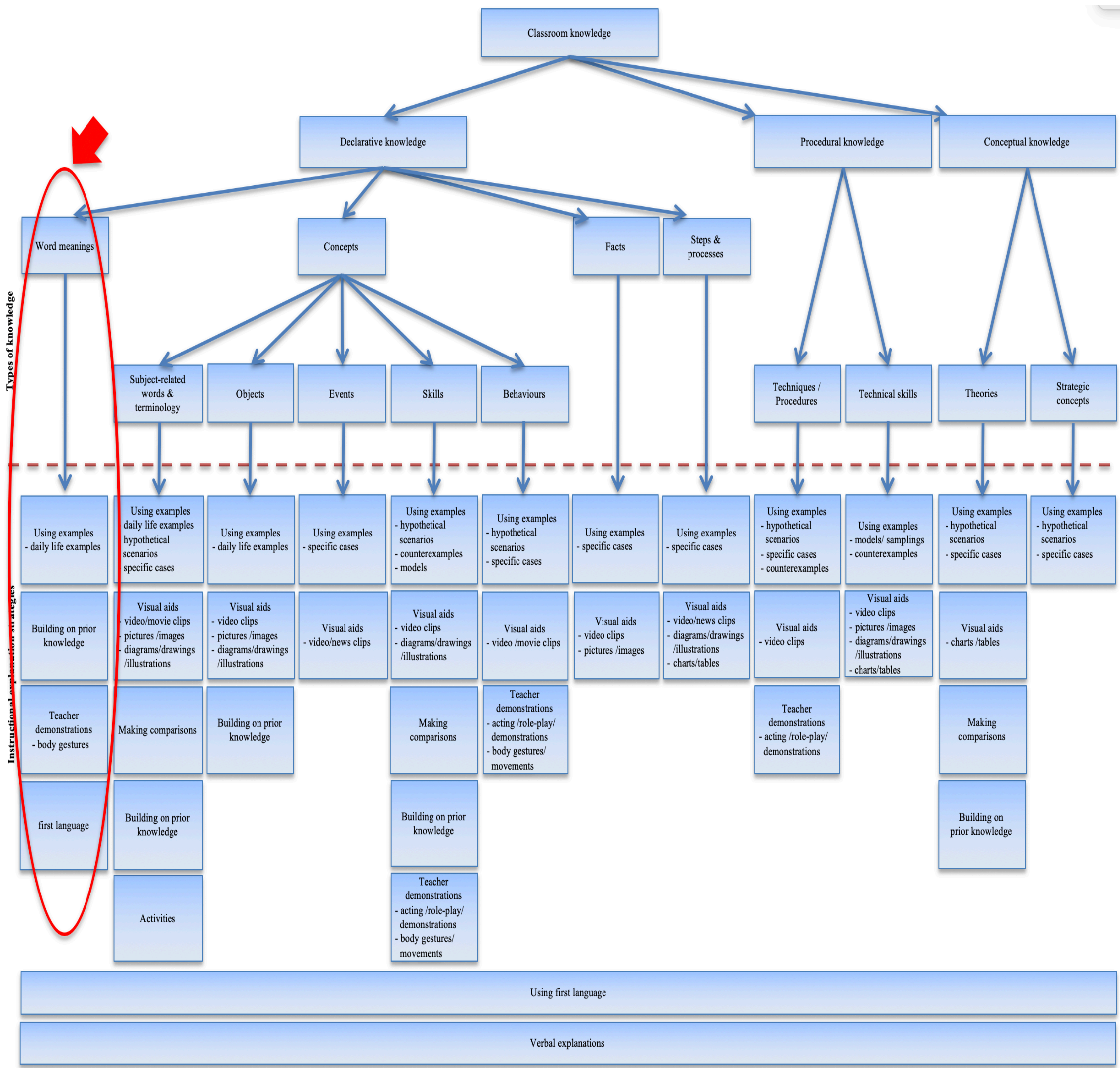
For pre-service teacher trainers, for instance, they can use the following steps after the knowledge type is identify in Step 1 if they want to use diagrams to illustrate the concepts, relationships and strategies/approaches selection process.

Step 1: Identify the type of knowledge



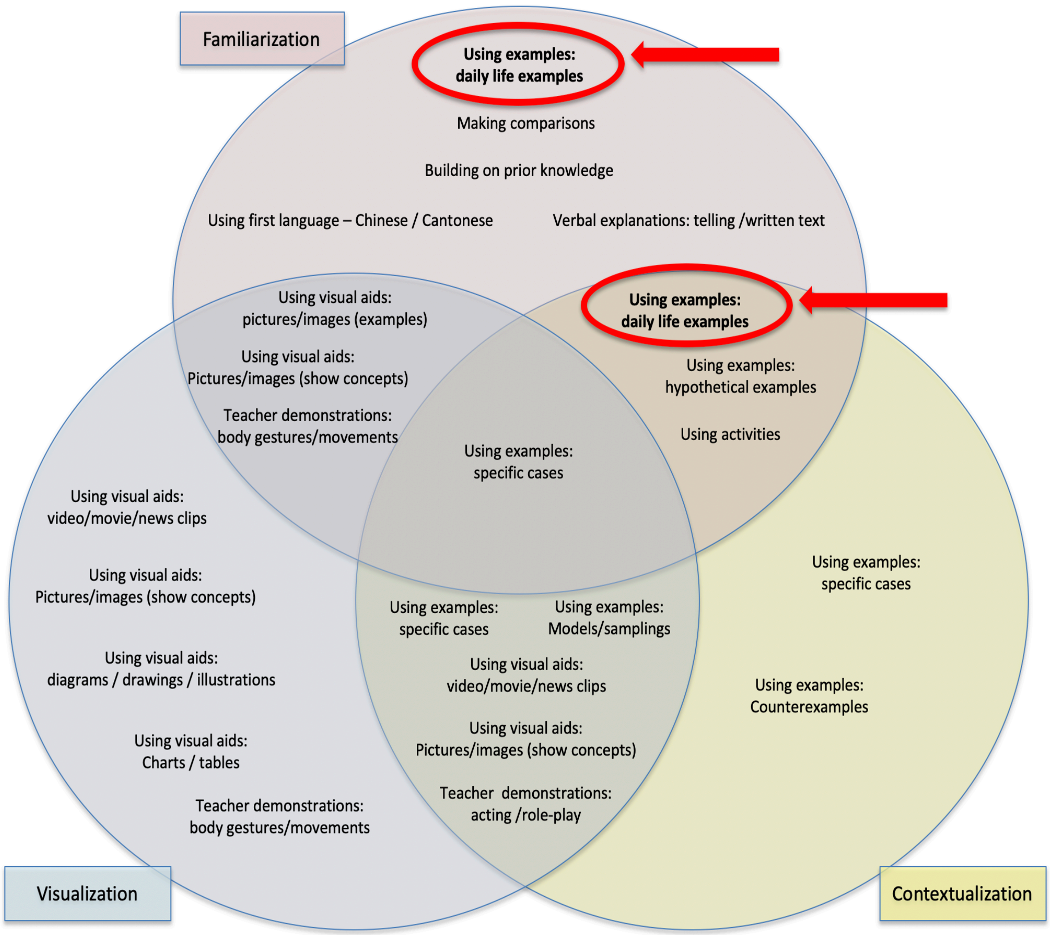
(Original diagram on p. 227, Figure 5.2)

Step 2: Find out a list of explanation strategies that can be used to explain the specific knowledge type. In this example, using daily life examples, building on prior knowledge, teachers' demonstration by using body gestures and students' first language are the choices to explain the dictionary-type meaning of a word.



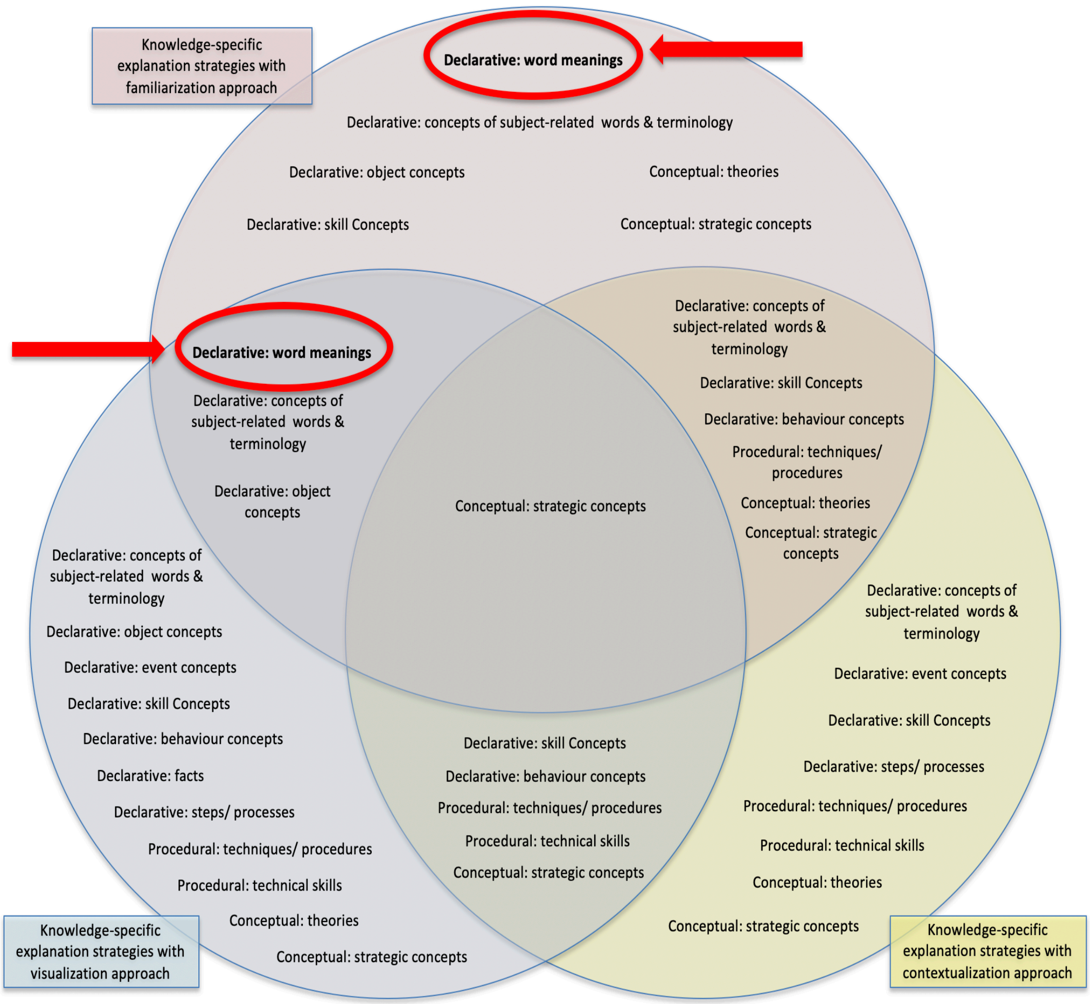
(Original diagram on p. 255, Figure 5.7)

Step 3: Select one strategy from step 3, and then find out the embedded approaches the strategy. In this example, using daily life examples is chosen. As indicated in the diagram, daily life examples can be given through familiarization or familiarization/contextualization approaches.



(Original diagram on p.264, Figure 5.9)

Step 4: Identify what approaches of strategies can be used to explain the specific knowledge type. As indicated by the circles, word meanings can be explained through strategies with familiarization and familiarization/visualization approaches.



(Original diagram on p. 271, Figure 5.11)

Step 5: Identify the approach of strategy that can be used to explain a specific knowledge type. By comparing the knowledge type and the selected strategy indicated on the two diagrams in step 3 and 4, we can see that familiarization approach should be adopt when using daily example to explain a word meaning.