Scientific Research Publishing

Open Journal of Social Sciences, 2024, 12, 76-93
https://www.scirp.org/journal/jss
ISSN Online: 2327-5960
ISSN Print: 2327-5952

Problem-Based Learning—An Exploration of Student Engagement among Hong Kong Chinese Senior Secondary Students

Kalwant Catherine Kaur, Anne O'grady

Nottingham Trent University, Nottingham, UK
Email: catherine_kaur@hotmail.com

How to cite this paper: Kaur, K. C., & O'grady, A. (2024). Problem-Based Learning—An Exploration of Student Engagement among Hong Kong Chinese Senior Secondary Students. *Open Journal of Social Sciences, 12,* 76-93.
https://doi.org/10.4236/jss.2024.127007

Received: May 30, 2024
Accepted: July 9, 2024
Published: July 12, 2024

Abstract

Problem Based Learning (PBL) has been adopted as a student-centred approach in many educational settings. This research study implemented PBL in the Liberal Studies (LS) curriculum in one secondary school in HK to examine its impact on student engagement. The study used a mixed-methods approach, gathering data through interviews, focus groups, field notes, and questionnaires. The findings demonstrate that PBL enhances student engagement and Self-Directed Learning compared to those in Traditional Teaching Methods. However, the study also highlighted that students' engagement can also be influenced by individual personality traits, allowing for active involvement through passive participation.

Keywords

Problem Based Learning, Traditional Teaching Method, Student Engagement, Self-Directed Learning, Chinese Learners, Hong Kong Diploma in Secondary Education

1. Introduction

The education system in Hong Kong, China (hereinafter referred to as HK) has undergone a substantial change over the last two decades from its former colonial education system (O and A levels) to the current Diploma of Secondary School Education (DSE). Schools in HK have predominantly emphasised spirit and morale raising ceremonies, compulsory uniforms, strict discipline, and an authoritarian school climate. However, in 2000, the Education Commission (2000) submitted to the government the reform proposal for the Education System of HK, which was to promote lifelong learning, as it was believed that students in

HK were not given comprehensive learning experiences and little room to think, explore and create. To make up for these weaknesses, the government decided there was a need to uproot outdated traditional pedagogy and develop a new education system that was student focused. The purpose of this research study, therefore, was to explore the effectiveness of a contemporary pedagogic approach—Problem-based learning—and to develop further understanding of the influence of Problem-based Learning (PBL) as a pedagogic approach from students' and teachers' perspectives in HK.

The setting of this study was in a HK secondary school, where students were HK Chinese. "Local" students with a Chinese ethnicity and using Cantonese (a dialect used in Guangdong province, China) as their mother tongue. Predominantly, they were born and raised in HK. It is, therefore, important to acknowledge Chinese students' more traditional approaches to learning. HK Chinese students display almost unquestioning acceptance of the knowledge of their teachers. This can be explained as an extension or transfer of the Confucian ethic or filial piety, which means a virtue of respect for one's parents, elders, and ancestors (Bedford & Yeh, 2019). Many authors have the perception that Chinese students are passive learners (Sit, 2013), and have pointed out that this is due to the overall culture of Asian societies, contextual and system perspectives (Biggs, 1996; Bond, 1991; Lee & Mok 2008; Wong, 2004). Chinese students are then often considered to be overly dependent on their teachers and too shy to ask or answer questions (Blidi, 2016).

Many valuable insights have emerged about the processes through which norms influence behavior. These proposals—some overlapping, some distinct—fall under a wide array of labels, such as conformity, peer pressure, self-stereotyping, coordination, herding, social proof, and identity signalling (Cialdini & Goldstein, 2004; Hechter & Opp, 2001). A possible reason for HK Chinese students' passivity is believed to be the threat of losing face in front of teachers and peers if the student answers questions incorrectly. In Chinese culture, students generally show great respect to their teachers, as they are considered to have the authority to determine what and how to be taught. Chinese learners have been brought up to respect knowledge and wisdom; as part of their cultural upbringing; they have been socialised to respect teachers and those who provide them with knowledge (Chan, 1999). In the classroom, the teacher usually initiates most of the communication, and students speak up only when they are invited to. The students seldom challenge their teachers in contrast to western culture where it is more usual for both teachers and students to expect to be treated as equals (Cortazzi & Jin, 2001). Some scholars, for example, Zeng (2006), have argued that it is stereotypical to suggest that Chinese learners are passive and in fact, they prefer not to challenge teachers publicly but are more likely to interact with them one-on-one after a lesson is finished (Chan, 2012; Zeng, 2006).

This study aimed to explore whether, by introducing a different pedagogic approach, these cultural norms could be influenced—both for students and

teachers.

2. Literature Review

According to Walker and Leary (2009), PBL was first introduced in medical schools in 1958 in an attempt to solve authentic, ill-structured problems that medics may face in reality. Various definitions of PBL have subsequently arisen. For instance, PBL is often character rised as being driven by challenging, open-ended questions, collaborative learning, and constructivist pedagogies (Savery & Duffey, 2001). Williams (2004) argued that PBL allowed learners to identify what they needed to know, analyse information and communicate the findings to others. Biber (2012) added the idea of teachers helping students to recognise problems, understand the causes of such problems and solve problems. However, the definition provided by Walker et al. (2012), states that PBL is an instructional learner-centred approach where students have control and responsibility for their own learning, encountering research, integrating theory and practice, and applying knowledge and skills to develop a viable solution to a defined problem provides a useful way of exploring PBL pedagogy.

PBL has a lot of potential to enhance 21st-century skills and engage students in real-world tasks (Bell, 2010; Han et al., 2015). The approach to learning requires students to take an active role in the learning process, starting with a carefully designed problem statement that challenges students to use problem solving techniques. Students are asked to identify what they already know, what they need to know, and how and where to access new information that may lead them to solve the problem. It is claimed by Han et al. (2015) and Kokotsaki et al. (2016) that during the process, students develop flexible knowledge, effective problem-solving skills, intrinsic motivation and ultimately self-directed learning (SDL) skills.

Andrade and Evans (2013) identified that students' motivation increases when they are responsible for identifying a solution to a problem; with the process resting with the student and when goals are clear and achievable. Walker et al. (2012) argued that the success of the PBL approach to learning is in the selection of appropriate problem statements that consider the abilities of the students and more importantly, the capability of the teachers who are to guide the learning process. PBL, then, is a form of education character rised by a student-centred, small group setting in which learning is driven by realistic but ill-defined problem statements (De Graaf & Kolmos, 2003). Teachers using the PBL approach will adopt different roles compared to a more Traditional Teaching Method (TTM) approach; they are less concerned with what and how they are teaching; rather, they are observing, looking, listening, stimulating, and facilitating student learning. Under the PBL approach, teachers need to be supportive and directive. Schneider (2017) supports students by influencing them through scaffolding techniques to ensure they are engaged and contributing to the group.

In exploring the adoption of PBL approaches amongst HK Chinese students,

Hung (2006) argued that there is a limited appreciation of PBL to date in HK schools as teachers are adamant that PBL is expensive, inefficient and time consuming; arguing that it takes more time for students to achieve the desired learning outcomes. Additionally, they argue that PBL is less effective compared to TTM because it provides limited guidelines to students, who often lose motivation as learning outcomes are not clear. While Zeng et al. (2015) argued that studies have shown that the academic achievements obtained using PBL are higher than those obtained using TTM, it is important to acknowledge that PBL puts greater demand on teachers, teaching time, learning space, further increasing burdens placed on teachers. Therefore, PBL may seem less desirable than TTM to teachers in HK.

This research study aims to investigate the impact of the PBL approach on student engagement in learning LS in senior secondary curriculum in HK. The research questions are:

1) What is the effect of the PBL approach on students' engagement in learning LS?

2) How does PBL affect students' knowledge acquisition through collaborative learning?

3. Research Methods

The research design for this study was an interpretive, single case study, adopted a mixed methods approach. Interpretive researchers such as Chronister et al. (2013) and Wood et al. (2016) focus on discovering and understanding how people perceive and experience the world around them (Rubin & Babbie, 2015), an approach often adopted across social and life science areas (Gustafsson, 2017). The rationale for combining qualitative and quantitative approaches was to enhance the overall validity of the study, as it allowed the emergence of confirmatory and exploratory questions and provided inferences that could confirm or complement each other (Teddlie & Tashakkori, 2003). In this research study, the qualitative methods used included semi-structured interviews, a focus group and field notes to help answer "how" questions (Yin, 2013) and a quantitative questionnaire, which focused on gathering numerical data to offer further information to explore the phenomenon (Earle, 2010).

The school in this case study was a subsidised secondary school in HK that had great flexibility in deploying resources and designing its own curriculum but within the parameters of the national curriculum content. Although the national curriculum is examination oriented, the school Principal supports creative ways of teaching. In this school, teachers usually undertake 12 to 18 teaching hours per week and every Friday they undertake staff development sessions, involving co-planning for lesson preparation, sharing sessions, team building activities and workshops.

The target population for this study was Year 11 (secondary 5) students as students at this age (16 - 17 years old) are more willing to experience different

approaches to learning compared to Year 12 (secondary 6) students, who are more focused on grades due to public examination pressures. (HK has an examination-oriented culture (Coniam & Falvey, 2016). Students in this school were largely considered passive in the classroom but displayed good subject-matter understanding and demonstrated strong academic performance.

There are 5 classes in Year 11 grouped with students of mixed ability in each class. Out of the 5 classes, 3 were selected for PBL teaching, 1 class for TTM and 1 for a pilot study. Table 1 shows the allocation of students for this research study. In each PBL class, which consisted of 29 - 31 students, students were split into 5 smaller groups, each group consisting of 5 - 6 students of mixed ability studying LS. Students' abilities were labelled based on their scores in previous LS examinations as shown in Table 2. Those scoring 0 - 49 marks were labelled low achievers, 50 - 69 were labelled middle achievers, and those scoring 70 - 100 were labelled high achievers. Class A, B and C were taught using the PBL approach as both teachers—Kael and Wera (names of the teachers are pseudonymised), had attended PBL workshops with the University of Hong Kong; Class D was taught using the TTM approach and Class E participated in the pilot study. Subsequent to the delivery of the PBL programme, both teachers were invited to participate in a semi-structured interview. Additionally, 10 LS teachers from the same school were invited to complete a teacher's questionnaire.

A typical series of stages in a PBL approach is usefully provided by Barrows (2002). These were later modified by Hung (2006), who proposed a PBL design process based on the 3C3R problem design model that consists of core components and processing components. Hung's 3C3R design model was used, as shown in Table 3, in designing the problem statements for this research study.

This study was conducted in two Phases: Phase I gathered qualitative data with students (6) and teachers (2); and Phase II gathered quantitative data from students (89) and teachers (10). Table 4 provides information about the interview and focus group participants. To respect the participant's privacy, pseudonyms were used instead of real names.

The major purpose of Phase II was to gather the perspectives of a larger number of students and teachers. The data collected allowed answers to questions such as how many students found PBL useful and if there was any relationship between the implementation of PBL and student engagement and Self-Directed Learning (SDL).

A thematic analysis was undertaken of the qualitative data and the Statistical Package for Social Science (SPSS) was utilised to analyse the quantitative data.

4. Findings

This section presents the research result of this small-scale study.

Theme: Student Engagement under PBL

PBL and Student Engagement

Table 1. Research sample.

Classes	No. of Students	No. of Groups per Class	No. of Students in each Group	Teachers
Class A—PBL A	29	5	5 to 6	Wera
Class B—PBL B	30	5	6	Kael
Class C—PBL C	31	5	6	Researcher
Class D—TTM D	30	Nil	Nil	Researcher
Class E—Pilot Study	27	Nil	Nil	Zoe

Table 2. Student abilities in LS.

Marks	Students Abilities	No. of students
0 - 49	Low Achievers (L)	12
50 - 69	Middle Achievers (M)	60
70 - 100	High Achievers	18

Table 3. Design model [Adopted from—"The 3C3R Model: A Conceptual Framework for Designing Problems in PBL" (Hung, 2006)].

Components	Functions
Content	Covering curriculum contents
Context	Appropriateness of problem context
Connection	Forming a conceptual framework about the topic
Researching	Guiding the research process to acquire intended content
Reasoning	Adjusting the level and information appropriate to the students
Reflecting	Cultivating the students' mindset of self-directed and life-long learning

Table 4. Interview and focus group participants.

Data Collection Method	Pseudonyms	Gender	Class	LS Ability of the Student
Teacher Interview	Wera	F	A	
	Kael	M	B	
Student Interview	Simone	F	C	H
	Uma	F	A	M
	Yash	M	A	L
Focus Group	Peter	M	B	M
	James	M	B	L
	Mel	F	C	M

Heinecke (2016) argues that students engage in the lesson when they are totally immersed in the task and persist in moving to deeper knowledge by looking at various aspects of solving a problem. Since teachers acted as facilitators, passive students were arguably, given more attention and assisted in solving problems via scaffolding learning techniques. Teacher Wera believed that students are engaged when they are encouraged and motivated. Hence, in PBL, the teacher's role as a facilitator is vital. Here is what both teachers remarked in their respective interviews:

Wera: *Students did better than what I expected, but it required a lot of encouragement and positive feedback assuring them they are doing a good job. I believe students truly obtain more knowledge and skills during the process of PBL. They are more independent and active learners under PBL.*

Kael: *Students were engaged and motivated in my class. PBL is a positive reinforcement to help students to learn better. The nature of the PBL approach using problem statements motivates students to brainstorm and search for answers by themselves.*

Students demonstrated a preference for active participation when given the chance, although they may hesitate. This is evident in the varying levels of elaboration in the responses of students from PBL and TTM classes when asked about the impact of a green lifestyle on the quality of life in HK. TTM students provided brief answers due to limited encouragement and opportunities for class participation and brainstorming. The following are the responses from TTM students:

Emi: *I disagree, as it will decrease the materialistic life of HK. HK is a shopping paradise.*

Josh: *I disagree, as it means fewer gatherings with friends. Nothing much to do sitting at home will not improve our quality of life.*

recorded in Field Note, 4 May 2017

The PBL class, on the other hand, provided elaborative answers; below is the response from a PBL student:

Arvin: *I disagree with the statement. Firstly, HK is a financial centre with a high GDP per capita but limited land supply. Houses are exceedingly small; hence people prefer to eat out or hang out and shop than sitting at home. The living standard is high in HK. People have higher purchasing power they can even afford to dine out three meals a day. Green life means buying fewer things, eating at home, taking mass transport and that will definitely not improve the quality of life of people in HK.*

recorded in Field Note, 4 May 2017

Another example from a PBL class, students deliberated on whether HK should adopt Electronic Road Pricing (ERP). Their answers were detailed and thoughtfully articulated as they engaged in brainstorming during the discussion.

Sara suggested that business districts such as Central, TST and Wanchai are ideal districts to apply ERP. However, Ben disagreed; he believes that since HK is a free economy, ERP will interfere with HK being a free market and discourage

foreign investment in HK. Furthermore, Mel argued, we have people living in these commercial districts, and some are 70 *from the middle class which will decrease their quality of life. Hence, ERP in commercial areas will not work in HK as no district is purely a business district in HK…*

recorded in Field Note, 13 April 2017

PBL and Collaborative Learning

The questionnaire included questions about whether using PBL in teaching LS improves student engagement. PBL students, who actively participated in classroom activities and problem-solving, completed the questionnaire.

Table 5 presents students' responses regarding whether PBL meets students' expectations as an active learning method. The majority of the students (35 strongly agreed and 45 agreed) expressed that PBL is indeed an active way of learning. This suggested that students were more likely to be actively engaged when utilising the PBL approach.

PBL is a student-centred approach that emphasises interactive sessions and minimal lectures (Gentry, 2000). However, when asked, most students disagreed (38 students) or strongly disagreed (12 students) that they spoke more than the teacher (Table 5). On the other hand, regarding group activity, 9 students strongly agreed and 59 agreed that they were active in the group (Table 6). Overall, the data suggested that while students were active in group work, teachers still spoke more than students, providing guidance and support. Nonetheless, the PBL approach does foster student engagement in learning LS.

PBL students experienced satisfaction through collaborative problem-solving, fostering better learning and understanding beyond textbooks. In contrast, TTM students relied on direct teacher instruction, resulting in reduced engagement, lack of questions, and diminished focus.

Researcher: *Andrew*! *You were dozing off in my lesson.*

Andrew: *Sorry, I am trying my best to be awake.*

Researcher: *Is my teaching so boring*?

Andrew: *No, but just sitting and listening is very boring and difficult to focus. I cannot just listen and do nothing.*

recorded in Field Note, 26 April 2017

The feedback from the two teachers who used the PBL approach indicated that their students were actively engaged, took responsibility for their learning, and prepared in advance. The approach also motivated low achievers to come to class prepared. Overall, it has enhanced collaboration, interpersonal skills, critical thinking, presentation skills, and self-directed learning.

recorded in Field Note, 9 May 2017

All 6 students, were interviewed individually (3 students) and in a focus group (3 students), agreed that PBL improves critical thinking and lifelong learning, especially for hardworking and vocal students. Some students also mentioned that PBL can help shy and reserved students participate in group discussions due to peer pressure and the desire to conform. Below are the responses from student semi-structured interviews:

Table 5. PBL is an active way of learning.

	PBL is an active way of learning than traditional lesson
Strongly Agree	35 (39.3%)
Agree	45 (50.6%)
Disagree	9 (10.1%)
Strongly Disagree	0 (0%)

Table 6. How active are the students under the PBL approach.

	I speak more than the teacher	I was active in the group
Strongly Agree	2 (2.2%)	9 (10.1%)
Agree	37 (41.6%)	59 (66.3%)
Disagree	38 (42.7%)	19 (21.3%)
Strongly Disagree	12 (13.5%)	2 (2.2%)

Yash: PBL gives me more opportunities to talk and discuss, even when I am quiet during the discussion. Since they are people I know very well and are a small group, I would dare to talk more openly. If I do not talk, my groupmates might think I am dumb.

Simone: When the teachers give us problems to solve, no matter if it is a problem statement, a news article, or a question to discuss, it makes the lesson more interesting, and since I am engaged in the discussion, it helps me absorb more information faster. PBL compared to the teacher talking using PowerPoint I prefer PBL as we get to discuss more issues and it is fun.

Uma: I did enjoy PBL as I could communicate with my classmates. It is fun to solve problems with peers compared to just listening to the teacher, which can be very boring if too frequent.

The interview and focus group analysis also showed that the students preferred learning under the PBL approach as it provides more flexibility and is less monotonous. Students in PBL classes appeared to be more engaged, attentive, and performed better than the TTM class on the content and problem-solving measures. Below are the responses of students from the focus group.

James: Since I contribute a lot during the discussion, I have a better understanding of the content knowledge, whereas if the teacher uses PowerPoint, it is boring. I will be merely copying or listening, or I might even be daydreaming eventually.

Mel: I agree with James in PBL that it is less likely that we do not pay attention as everyone has a role to play and no one wants to look stupid in a group, hence we are forced to be attentive.

Peter: Looking at PowerPoint or the teacher talking is very boring; I often fall asleep, but discussions under PBL make me contribute, and there are fewer chances for not participating.

Table 7 presents the result regarding the impact of the PBL approach on students' interest in learning LS. The data indicated that 13 students strongly agreed and 46 students agreed that the PBL approach stimulated their interest in learning LS. This suggested that students were actively engaged in class when using the PBL approach for LS learning.

To better understand the impact of PBL on student engagement in LS, student perceptions were assessed. The results in Table 8 indicated that a total of 74 students expressed positive views about learning through PBL, with 18 strongly agreeing and 56 agreeing that they enjoyed it. Additionally, 29 students strongly agreed and 40 agreed that they found it fun. These findings demonstrated that students valued the student-centred PBL approach.

When questioned about the potential of the PBL approach to contribute to better scores in public exams, a student provided the following response:

Yash: PBL helps with examination revision. I feel there is less to memorise when we learn from problem statements. During the discussion, I am actively involved, which helps me to remember things easily, as sometimes we joke around or say silly things, and those things get stuck in my brain and make it easier to recall.

Table 9 displays teachers' feedback on student engagement in class during PBL. All teachers (9 agreed, 1 strongly agreed) confirmed that students were actively involved and were interactive. This aligns with students' earlier reflections, indicating their active participation and enjoyment of learning through the PBL approach.

Teachers as a Facilitator

The research questions focused on the impact of PBL on knowledge acquisition and student engagement in LS. The results indicated that students in the PBL group showed greater engagement and performed better in presentations and assignments compared to the TTM group. Table 10 displays the assignment scores, which were standardised across all classes regardless of the teaching approach.

During a PBL class, discussions were facilitated by asking follow-up questions to encourage student participation in problem-solving. In a particular group discussion about the social classes suffering the most in HK, one student shared the following response:

Amanda: *Obviously, the grassroots*!

Researcher: *Are you sure, Amanda? Think about the subsidies that grassroots families get compared to sandwich groups.*

Amanda: *Wait! Sandwich groups cannot apply for any subsidies because they have home loans to pay off, whereas grassroots groups can apply for public housing and get medical and transportation allowances.*

recorded in Field Note, 19 April 2017

Facilitators encouraged deeper thinking and reminded students of the financial support and subsidies provided by the HK government to low-income families. Scaffolding techniques prompted students to justify their solutions

Table 7. PBL stimulated interest in subject (LS).

	PBL stimulated interest in learning LS
Strongly Agree	13 (14.6%)
Agree	46 (51.7%)
Disagree	28 (31.5%)
Strongly Disagree	2 (2.2%)

Table 8. How appealing is PBL to the students.

	I like PBL as a way of learning	PBL makes learning more fun
Strongly Agree	18(20.2%)	29 (32.6%)
Agree	56 (62.9%)	40 (44.9%)
Disagree	14 (15.7%)	15 (16.9%)
Strongly Disagree	1 (1.1%)	5 (5.6%)

Table 9. How actively are students involved under PBL.

	Students are actively involved in class when learning under the PBL approach
Strongly Agree	1 (10%)
Agree	9 (90%)
Disagree	0 (0%)
Strongly Disagree	0 (0%)

Table 10. Homework scores.

Student Name	Marks (%)
Simone (PBL)	75
Uma (PBL)	77
Angel (TTM)	50
Sam (TTM)	37.5

instead of providing direct answers. This approach helped students develop problem-solving, metacognitive, and reasoning skills, boosting their confidence and belief in their abilities. For instance, Kael pointed out that,

Kael: *In my PBL lessons, I allowed students to give feedback to their classmates on their work. It was nice to see that most of the students were actively involved in questioning and challenging others' ideas and making suggestions.*

recorded in Field Note, 26 April 2017

The study examined student engagement and their perception of the teacher's role as a facilitator in PBL lessons. Specifically, students were asked if the teachers assisted them in brainstorming, a crucial element of the PBL approach. The results from Table 11 revealed that 24 students strongly agreed and 53 students

Table 11. Teacher helped to brainstorm.

	Teacher helped to brainstorm
Strongly Agree	24 (27%)
Agree	53 (59.6%)
Disagree	9 (10.1%)
Strongly Disagree	3 (3.4%)

agreed that the teacher supported their brainstorming process. These responses indicated that teachers created a student-centred environment that fostered problem-solving, maintained focused discussions, and presented challenging tasks—essential characteristics of the PBL approach.

In the student questionnaire, students were asked about the teachers' role as facilitators in PBL lessons. The goal was to determine if students perceived the teachers as facilitators rather than simply providing answers. The results, presented in Table 12, show that 24 students strongly agreed and 55 students agreed that the teachers acted as facilitators. The data supports the idea that teachers guided students by asking questions and facilitating the problem-solving process during the lessons.

PBL teachers fostered a constructivist learning environment, shifting from teacher-centred to student-centred pedagogy. Students took full responsibility for their learning, actively identifying and pursuing areas of inquiry. Emphasising ownership of learning cultivated a habit of SDL.

Regarding the impact of the PBL approach on student engagement in learning LS, the results indicated that both students and teachers acknowledged that learning through PBL enhances student engagement. This supported the notion that PBL fosters a constructivist learning environment where students take ownership of their learning. Nevertheless, it is important to acknowledge that students reported that teachers dominated the conversation despite PBL's student-centred nature.

5. Discussion

La Force et al. (2017) argued that PBL is intrinsically motivating and encourages student engagement in learning. The evidence from the data gathered from this research study in both phases indicated that the PBL approach encouraged students' engagement in learning LS. Overall, most of the teachers and students rated this student-centred approach positively. Most students found learning under the PBL approach fun and agreed that it stimulated their interest in learning LS. The evidence from the data set confirmed that PBL encouraged students to learn an interdisciplinary curriculum like LS. This is similar to Gentry's (2000) and Pintrich's (2003) findings that demonstrated students are more engaged when they own their learning. Most teachers in this research study found students were more actively involved in class when they were taught using the PBL approach. This supports the conclusions of Finkelstein et al. (2010) and

Table 12. Teachers act as a facilitator.

	Teachers act as a facilitator
Strongly Agree	24 (27%)
Agree	55 (61.8%)
Disagree	7 (7.9%)
Strongly Disagree	3 (3.4%)

Gentry (2000), who found that students learn most effectively when they are actively engaged in the learning process and can independently construct knowledge. These findings are also in line with Brown's (2004) perspective that PBL is well-suited for self-directed learning (SDL), as learners thrive when encouraged to think critically and are given choices and responsibilities during the learning process.

Students in this study were encouraged to actively participate in collaborative and interactive activities to construct their knowledge, which is a key aspect of student engagement (Zumbrunn et al., 2014). Effective teamwork is essential when working in groups, fostering student engagement in learning (Boss, 2012). The study found that PBL classes had more frequent constructive talk compared to the TTM class. The evidence demonstrated that students enjoyed group work and acquired more knowledge compared to the TTM cohort. PBL facilitated argument generation to identify conflicts and contradictions among different positions, leading to higher-quality work (Wynn & Mosholder, 2016). Group work not only fostered collaboration and conflict resolution but also developed interpersonal, communication, and presentation skills, increased student engagement, and promoted higher-order thinking. Similar effects of PBL on students were observed in previous studies, including enhanced understanding, increased critical thinking, motivation, self-efficacy, intrinsic motivation, and the development of social and leadership skills (Azer, 2009; Cerezo, 2004; Jerzembek & Murphy, 2013; Sungur & Tekkaya, 2006; Wang et al., 2001; Zumbach et al. 2004).

This research study revealed that PBL pedagogy promoted the development of SDL, enthusiasm, and motivation in students. These findings align with Hmelo-Silver and Barrow's (2008) research, indicating that PBL encourages students to form deep explanations and understandings of topics. Teachers promoted autonomy by allowing students to take charge of their learning. They assisted students in developing confidence and redefining their perception of their role and capabilities in learning LS. The results of this study aligned with the findings of Lattimer and Riordan (2011), who highlighted the effectiveness of PBL in engaging and motivating learners.

The reason why certain students remained silent while present in a PBL learning space can be attributed to the assertion made by Jaworski and Sachdev (2004), who suggested that students may use silence as a means of actively listening and comprehending, even if they do not actively participate in verbal

discussions within the classroom. In their research study, some students refrained from interrupting the teacher during lessons, indicating their inclination to attentively listen, process information, evaluate it, and generate new ideas. This quiet process is recognised as a valuable form of productive learning, wherein learners internalise knowledge individually and construct it collectively within the group. Ultimately, this approach helps students develop their knowledge base, effective problem-solving skills, and SDL abilities, all of which are crucial for active involvement in PBL as highlighted by Hmelo-Silver (2004).

The data collected in this study further indicated that the majority of students and teachers considered PBL as a suitable approach for teaching and learning LS. The role of PBL in education is that as a pedagogic approach, it supports and enhances students motivation, self-directed learning and engagement in the classroom, as expressed by both students and teachers. The findings suggested that PBL promotes students' content knowledge through scaffolding and encourages them to take responsibility for their learning.

6. Conclusion, Limitation and Future Research

PBL, as a pedagogy, offers students and teachers alike an alternative approach to engaging with learning materials and as evidenced in this study can promote independent thinking and enhance problem solving skills. In the TTM class, the teacher played a dominant role in providing factual knowledge, with minimal student-initiated questions. This supports Che's (2002) observation that HK students tend to prioritise exam-oriented learning and rarely challenge teachers. Peng (2012) and Jackson (2002) argued that Asian learners are generally hesitant to actively participate in class, but this study found no evidence of students' reluctance to engage in PBL classes. Most PBL students in this research expressed a preference for communication with the exception of a few shy or less confident students. Teachers also felt able to support lower-achieving or less confident students by encouraging their involvement in problem-solving activities.

This study was limited by a dearth of existing literature on the relationship between the HKDSE public examination of HK and critical thinking in LS. Additionally, this study was conducted in a single DSS school in HK using English as the medium of instruction, therefore, there is no capacity to provide findings that could be considered generalisable; alternatively, what this study offers is an illuminating insight into how PBL as a pedagogic approach can support students in learning in HK. However, further research is needed in other school settings across HK including the Chinese context and aided schools, to better understand secondary school students' achievement under PBL.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

Andrade, M. S. & Evans, N. W. (2013). *Principles and Practices for Response in Second Language Writing: Developing Self-Regulated Learners*. Routledge.

Azer, S. A. (2009). Problem-Based Learning in the Fifth, Sixth, and Seventh Grades: Assessment of Students' Perceptions. *Teaching and Teacher Education, 25,* 1033-1042. https://doi.org/10.1016/j.tate.2009.03.023

Barrows, H. S. (2002). Is It Truly Possible to Have Such a Thing as dPBL? *Distance Education, 23,* 119-122. https://doi.org/10.1080/01587910220124026

Bedford, O., & Yeh, K.-H. (2019). The History and the Future of the Psychology of Filial Piety: Chinese Norms to Contextualized Personality Construct. *Frontiers in Psychology, 10,* Article 100. https://doi.org/10.3389/fpsyg.2019.00100

Bell, S. (2010). Project-Based Learning for the 21st Century: Skills for the Future. *The Clearing House: A Journal of Educational Strategies, Issues and Ideas, 83,* 39-43. https://doi.org/10.1080/00098650903505415

Biber, M. (2012). *Affective Characteristic Problem-Based Learning Process Effects on Mathematical Achievements of Students*. Dokuz Eylül University Institute of Educational Sciences.

Biggs, J. B. (1996). Western Misperceptions of the Confucian-Heritage Learning Culture. In D. A. Watkins & J. Biggs (Eds.), *The Chinese Learner: Cultural, Psychological and Contextual Influences* (pp. 45-67). CERC.

Blidi, S. (2016). *Collaborative Learner Autonomy: A Mode of Learner Autonomy Development*. Springer.

Bond, M. H. (1991). *Beyond the Chinese Face: Insights from Psychology*. Oxford University Press.

Boss, S. (2012). *Bringing Innovation to School: Empowering Students to Thrive in a Changing World*. Solution Tree Press.

Brown, H. D. (2004). *Language Assessment Principles and Classroom Practices*. Pearson Education.

Cerezo, N. (2004). Problem-Based Learning in the Middle School: A Research Case Study of the Perceptions of At-Risk Females. *Research in Middle Level Education, 27,* 1-13. https://doi.org/10.1080/19404476.2004.11658164

Chan, S. (1999). The Chinese Learner—A Question of Style. *Education + Training, 41,* 294-305. https://doi.org/10.1108/00400919910285345

Chan, Z. C. Y. (2012). Role-Playing in the Problem-Based Learning Class. *Nurse Education in Practice, 12,* 21-27. https://doi.org/10.1016/j.nepr.2011.04.008

Che, F. S. (2002). Teaching Critical Thinking Skills in a Hong Kong Secondary School. *Asia Pacific Education Review, 3,* 83-91. https://doi.org/10.1007/bf03024923

Chronister, K. M., Marsiglio, M. C., Linville, D., & Lantrip, K. R. (2013). The Influence of Dating Violence on Adolescent Girls' Educational Experiences. *The Counseling Psychologist, 42,* 374-405. https://doi.org/10.1177/0011000012470569

Cialdini, R. B., & Goldstein, N. J. (2004). Social Influence: Compliance and Conformity. *Annual Review of Psychology, 55,* 591-621. https://doi.org/10.1146/annurev.psych.55.090902.142015

Coniam, D., & Falvey, P. (2016). *Validating Technological Innovation: The Introduction and Implementation of Onscreen Marking in Hong Kong*. Springer.

Cortazzi, M., & Jin, L. (2001). Large Classes in China: "Good" Teachers and Interaction. In D. Watkins, & J. Biggs (Eds.), *Teaching the Chinese Learner: Psychological and Pe-*

dagogical Perspectives (pp. 115-134). ACER.

De Graaf, E., & Kolmos, A. (2003). Characteristics of Problem-Based Learning. *International Journal of Engineering Education, 19,* 657-662.

Earle, R. (2010). Research, Knowledge and Evidence in Youth Justice. In W. Taylor, R. Earle, & R. Hester (Eds.), *Youth Justice Handbook: Theory, Policy and Practice* (50 p). Willan.

Education Commission (2000). *Learning for Life, Learning through Life*. Government Printer.

Finkelstein, N., Hanson, T., Huang, C. W., Hirschman, B., & Huang, M. (2010). *Effects of Problem-Based Economics on High School Economics Instruction (NCEE 2010-4002)*. U.S. Department of Education.

Gentry, E. (2000). *Creating Student-Centred, Problem-Based Classrooms*. University of Alabama in Huntsville.

Gustafsson, J. (2017). *Single Case Studies vs. Multiple Case Studies: A Comparative Study*. Academy of Business, Engineering and Science, Halmstad University.

Han, S., Yalvac, B., Capraro, M. M., & Capraro, R. M. (2015). In-Service Teachers' Implementation and Understanding of STEM Project Based Learning. *EURASIA Journal of Mathematics, Science and Technology Education, 11,* 63-76. https://doi.org/10.12973/eurasia.2015.1306a

Hechter, M., & Opp, K. D. (2001). *Social Norms*. Russell Sage Foundation.

Heinecke, T. (2016). *Student Engagement: How to Inspire and Motivate Every Child*. BookBaby.

Hmelo-Silver, C. E. (2004). Problem-Based Learning: What and How Do Students Learn? *Educational Psychology Review, 16,* 235-266. https://doi.org/10.1023/b:edpr.0000034022.16470.f3

Hmelo-Silver, C. E., & Barrows, H. S. (2008). Facilitating Collaborative Knowledge Building. *Cognition and Instruction, 26,* 48-94. https://doi.org/10.1080/07370000701798495

Hung, W. (2006). The 3C3R Model: A Conceptual Framework for Designing Problems in PBL. *Interdisciplinary Journal of Problem-Based Learning, 1,* 55-77. https://doi.org/10.7771/1541-5015.1006

Jackson, J. (2002). Reticence in Second Language Case Discussions: Anxiety and Aspirations. *System, 30,* 65-84. https://doi.org/10.1016/s0346-251x(01)00051-3

Jaworski, A., & Sachdev, I. (2004). Teachers' Beliefs about Students' Talk and Silence: Constructing Academic Success and Failure through Metapragmatic Comments. In A. Jaworski, N. Coupland, & D. Galasinski (Eds.), *Metalanguage: Social and Ideological Perspectives* (pp. 227-244). De Gruyter.

Jerzembek, G., & Murphy, S. (2013). A Narrative Review of Problem-Based Learning with School-Aged Children: Implementation and Outcomes. *Educational Review, 65,* 206-218. https://doi.org/10.1080/00131911.2012.659655

Kokotsaki, D., Menzies, V., & Wiggins, A. (2016). Project-Based Learning: A Review of the Literature. *Improving Schools, 19,* 267-277. https://doi.org/10.1177/1365480216659733

LaForce, M., Noble, E., & Blackwell, C. (2017). Problem-Based Learning (PBL) and Student Interest in STEM Careers: The Roles of Motivation and Ability Beliefs. *Education Sciences, 7,* Article No. 92. https://doi.org/10.3390/educsci7040092

Lattimer, H., & Riordan, R. (2011). Project-Based Learning Engages Students in Meaningful Work: Students at High Tech Middle Engage in Project-Based Learning. *Middle School Journal, 43,* 18-23. https://doi.org/10.1080/00940771.2011.11461797

Lee, W.O., & Mok, M. (2008). Editors' Introduction. *Evaluation & Research in Education, 21,* 147-153. https://doi.org/10.1080/09500790802485195

Peng, J. (2012). Towards an Ecological Understanding of Willingness to Communicate in EFL Classrooms in China. *System, 40,* 203-213. https://doi.org/10.1016/j.system.2012.02.002

Pintrich, P. R. (2003). A Motivational Science Perspective on the Role of Student Motivation in Learning and Teaching Contexts. *Journal of Educational Psychology, 95,* 667-686. https://doi.org/10.1037/0022-0663.95.4.667

Rubin, A., & Babbie, E. R. (2015). *Research Methods for Social Work* (8th ed.). Cengage Learning.

Savery, J. R., & Duffey, T. M. (2001). *Problem Based Learning: An Instructional Model and Its Constructivist Framework (CRLT Technical Report No. 16-0)*. Indiana University Centre for Research on Learning and Technology.

Schneider, A. E. (2017). The Need for Project-Related Skills in the 21st Century. *St. Teresa Journal of Humanities and Social Sciences, 3*.

Sit, H. H. W. (2013). Characteristics of Chinese Students' Learning Styles. *International Proceedings of Economic Development and Research, 62,* 36.

Sungur, S., & Tekkaya, C. (2006). Effects of Problem-Based Learning and Traditional Instruction on Self-Regulated Learning. *The Journal of Educational Research, 99,* 307-320. https://doi.org/10.3200/joer.99.5.307-320

Teddlie, C., & Tashakkori, A. (2003). Major Issues and Controversies in the Use of Mixed Methods in the Social and Behavioral Sciences. In A. Tashakkori, & C. Teddlie (Eds.), *Handbook of Mixed Methods in Social and Behavioral Research* (pp. 3-50). Sage.

Walker, A., & Leary, H. (2009). A Problem Based Learning Meta Analysis: Differences across Problem Types, Implementation Types, Disciplines, and Assessment Levels. *Interdisciplinary Journal of Problem-Based Learning, 3,* 10-43. https://doi.org/10.7771/1541-5015.1061

Walker, A., Lee, M., & Ling Chui, Y. (2012). Contrasting Effects of Instructional Leadership Practices on Student Learning in a High Accountability Context. *Journal of Educational Administration, 50,* 586-611. https://doi.org/10.1108/09578231211249835

Wang, M., Poole, M., Harris, B., & Wangemann, P. (2001). Promoting Online Collaborative Learning Experiences for Teenagers. *Educational Media International, 38,* 203-215. https://doi.org/10.1080/09523980110105079

Williams, B. (2004). Self Direction in a Problem Based Learning Program. *Nurse Education Today, 24,* 277-285. https://doi.org/10.1016/j.nedt.2004.01.008

Wong, J. K. (2004). Are the Learning Styles of Asian International Students Culturally or Contextually Based? *International Education Journal, 4,* 154-166.

Wood, C., Farmer, M. D., & Goodall, D. (2016). Changing Professional Identity in the Transition from Practitioner to Lecturer in Higher Education: An Interpretive Phenomenological Analysis. *Research in Post-Compulsory Education, 21,* 229-245. https://doi.org/10.1080/13596748.2016.1195173

Wynn, C. T. Sr., & Mosholder, R. S. (2016). Facilitating Advanced Thinking Skills through Problem Based Learning. In *SoTL Commons Conference*. Bepress.

Yin, R. K. (2013). *Case Study Research: Design and Methods (Applied Social Research Methods)* (5th ed.). SAGE Publications.

Zeng, M. (2006). *The Adaptation of Mainland Chinese Research Postgraduates to the Universities of Hong Kong*. PhD Thesis, The University of Hong Kong.

Zeng, R., Yue, R., Qiu, H., Zeng, J., Wan, X., & Zuo, C. (2015). Preliminary Investigation

into Application of Problem-Based Learning in the Practical Teaching of Diagnostics. *Advances in Medical Education and Practice, 6,* 223-229. https://doi.org/10.2147/amep.s78893

Zumbach, J., Kumpf, D., & Koch, S. (2004). Using Multimedia to Enhance Problem-Based Learning in Elementary School. *Information Technology in Childhood Education Annual, 2004,* 25-37.

Zumbrunn, S., McKim, C., Buhs, E., & Hawley, L.R. (2014). Support, Belonging, Motivation, and Engagement in the College Classroom: A Mixed Method Study. *Instructional Science, 42,* 661-684. https://doi.org/10.1007/s11251-014-9310-0