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프로젝트 수업에서의 자기조절학습에 대한 학생들의 인식

Students' Perception of Self-Regulated Learning in a Project-Based Learning Curriculum

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요약

프로젝트 수업(PBL)은 학생들의 자기주도적인 학습을 유도하고 배움이 실제 경험과 분리되지 않는 교육을 가능하게 한다. 이 연구의 목적은 프로젝트 수업에서 학생들의 생활기술과 자가조절학습 전략이 어떻게 변화하였는지를 살펴보며 선행연구를 통해 알려진 PBL의 장점들이 학생들의 학습 과정에서 어떻게 나타나는지를 알아보고자 하는 것이다. 한국의 한 대학교에서 3학점인 프로젝트 수업이 4주간 이뤄졌고, 본 수업은 23명의 영어전공자들을 위해 개설되었다. 프로젝트 수업이 진행되는 동안, 학생들은 시간조절, 협동심, 업무기준평가와 참여도에 대해 자가평가를 프로젝트 수업동안 3회 진행하였다. 자가평가 이외에도 학생들은 그들의 전략과 진행사항을 기록한 자기성찰지를 3회 작성하였다. 자가평가와 자기성찰지를 분석한 결과, 학생들의 협동심에 대한 인식이 프로젝트 수업을 통해 증진되었다는 점을 알아냈다. 또한, 학생들은 자가조절학습의 3단계를 프로젝트 수업을 통해 모두 거쳤다는 점을 알게 되었다. 본 연구의 결과, PBL은 학생들의 협동심 발달에 긍정적인 영향이 있었고, 자기조절전략을 다양하게 사용할 수 있는 기회를 제공하였다. 본 연구의 결과를 바탕으로 프로젝트 수업을 통해 학생들의 생활기술 및 자기조절 학습역량을 증진시킬 수 있는 교육적 제안을 한다.

■ 중심어 : | 프로젝트 수업 | 자가조절학습 | 자기성찰 | 대학교육 | 대학영어교육 |

Abstract

Project-based learning (PBL) encourages self-autonomy and connects learning and real-life skills in the learning process. The purpose of the current study is to investigate students' life skills and self-regulated learning strategies in a PBL curriculum in order to examine how the proposed benefits of PBL are manifested in students' self-awareness of their learning process. Twenty-three students in a university in Korea participated in a 3-credit, 4-week, intensive PBL course for English majors. During the PBL course, students were asked to self-assess their life skills related to time management, cooperation, standard of work, and participation three times. In addition to the self-assessment, students kept reflection journals to keep track of their use of self-regulated learning strategies and progress which were also submitted three times. Based on the analysis of self-assessment and self-reflection, the results showed that students' perception of cooperation improved significantly during PBL. Furthermore, it was found that students also progressed through the three phases of self-regulated learning. Implications on suggesting on the use of PBL to encourage the development of life skills and self-regulated learning strategies are provided.

■ keyword : | Project-based Learning | Self-regulated Learning | Self-reflection | College Education | College EFL |

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I. Introduction

Project-based learning (PBL) is a teaching approach that encourages students to participate in an active learning process and engage in real-world and authentic projects. This student-centered pedagogical approach encourages students to gain knowledge and skills through collaborative projects for an extended period of time. By responding to authentic and meaningful questions, PBL has been found to support the enhancement of real-world skills such as critical thinking and cooperation[1] and taking responsibility of their learning process[2]. PBL has gained much attention recently due the importance of developing students to be able to adapt to and develop skills that will be required of them to meet the demands of the 4th industrial revolution. In the Korean higher education context, this inquiry-based pedagogical approach has been particularly useful as the goal of education has broadened from a traditional view of education which puts value on learning knowledge and skills to now include the development of the 4Cs[3]. The cultivation of the 4Cs, which are creativity, communication, collaboration, and critical thinking, can help students to prepare for the fast-changing global workforce[4]. PBL has been beneficial in developing life skills which are important skills necessary to be productive members of a work community[5]. Meyer[5] found that through PBL, students were able to learn important life skills, such as time management, collaboration, responsibility, and work ethic.

In order to help students to fully participate in PBL, students need to actively engage in the learning process and take responsibility of their own learning[6]. Being an active participant in the learning process requires students to become aware of their learning and take an active role in the classroom. Therefore, in the student-centered PBL curriculum, a major requirement for students would be to use self-regulated learning (SRL) skills. According to Zimmerman[7], SRL is the self-controlled learning process of a student. Zimmerman[8] suggests that a student who is able to self-regulate refers to a student who can plan their actions and adjust their actions to achieve learning goals. PBL, which requires students to actively construct meaning and progress toward goals collaboratively, heavily demands that students employ self-regulation strategies to solve problems and create a final product. Previous studies on SRL strategies used by students in PBL have shown contrasting results. Several studies have found that SRL can be developed in PBL learning contexts[9] whereas Lloyd-Jones and Hak[10] found that there was prolonged “uncertainty” among students participating in the PBL curriculum and that PBL was not able to support self-directed learning. Their study investigated whether students’ actions aligned with the PBL principles and found that students tended to rely on their peers or instructors rather than their self-direction in PBL. This shows that students produced outcomes that reflected their faculty and peer’s approval and were not self-directed. Other studies have provided evidence to support for PBL due to increase in student motivation and autonomy[11] and learner engagement[12].

To address the mixed findings in SRL and lack of research investigating the awareness of life

skills during PBL, the present study intends to build on this body of literature by investigating students awareness of life skills and use of SRL strategies in PBL in a Korean higher education curriculum. Two research questions were posed to investigate students' perceived development of life skills and SRL strategies.

RQ 1: How did students' perceptions of their life skills change during PBL?

RQ 2: What were the self-regulated learning strategies used by students during PBL?

II. Previous Studies

1. Life Skills

In the 1990s, the U.S. Department of Labor published a report by the Secretary's Commission on Achieving Necessary Skills[13] to clarify the skills for employment and provide teachers and schools guidelines on assessing proficiency in such skills. The life skill competencies identified in the report include the ability to use resources, information, systems, and technology and interpersonal skills. Even in the 21st century, the skills required in today's world demand understanding of subject knowledge, collaboration, and using and assessing resources [5]. Various studies have suggested that these skills can be encouraged when students are working on projects and such important life skills that can be learned are problem-solving skills, responsibility, collaboration, and time management[14-17]. Wurdinger and Qureshi[16] investigated how students' life skills can change during the PBL course and found that all life skills studied in the research showed an increase. In particular, statistically significant changes were observed in responsibility, problem-solving, self-direction, communication, and creativity. However, no statistically significant changes were observed in time-management, collaboration, and work ethic. Meyer[5] found that during PBL, students' awareness of their time management, collaboration, communication, and self-directedness improved. The results show that PBL can help students become more aware of their learning process that relate to life skills that will be expected of them in a work community. However, the results from previous studies are inconclusive as to which life skills can be developed through PBL.

2. Self-regulated Learning

The promotion of self-regulated learning (SRL) has attracted researchers and practitioners because SRL can help them deal with students' learning difficulties to help students succeed in coursework and academic attainment[18]. A self-regulated learner would be able to autonomously regulate learning through planning, directing, monitoring, and reflect on their actions[19]. Pintrich[20] suggested the four assumptions of SRL which are: (1) students are active participants in learning by synthesizing new information with their previous knowledge, (2) students can regulate their thinking and actions, (3) students can evaluate their work with external standards to reach learning outcomes and goals, and (4) self-regulatory features mediate "the relations between the person, context, and eventual achievement" (p. 388).

Self-regulated learning is accepted in the pedagogical literature[8] as this framework puts the responsibility of learning on learners and

allow students to devise strategies of learning that will require a high cognitive load. Zimmerman[7] suggested that self-regulation is "the self-directive process by which learners transform their mental abilities into academic skills"(p. 65). Self-regulated learners can engage in the learning activity in a proactive way and take responsibility of their learning by becoming aware of their weaknesses and strengths through personally set learning goals and outcomes. This awareness is possible through the promotion of metacognitive skills, such as monitoring, planning, and evaluation[7].

Several models of self-regulation models have been proposed (e.g., Winne's model, Boekaert's model and Zimmerman's model). Zimmerman [18] proposed a model of SRL which is one of the most widely accepted one and is the model that was implemented to frame this study. According to Zimmerman[18], the cyclical SRL process includes three phases: forethought, performance, and self-reflection. One phase can affect the following phase, which can then influence the next phase which means that all phases, in turn, can influence one another. The forethought phase is where students can plan and initiate their learning to achieve a goal or complete an assignment. This phase includes two main sources of self-regulation: (1) task analysis and (2) self-motivational beliefs. In this phase, students set goals and strategize their learning. This phase is also affected by students' interests and self-efficacy. The performance phase follows the forethought phase and this phase includes self-control and self-observation. The performance phase is where students can use metacognitive strategies and facilitate strategies that can help them keep focus and control learning. These strategies can include monitoring, time management, self-recording, metacognitive monitoring, and other strategies in which students can use to control and monitor motivation, learning, and emotion. The self-reflection phase is characterized by self-judgement, which includes self-evaluation and causal attribution, and self-reaction which refers to affective reaction such as self-satisfaction and adaptive inferences. The three phases, forethought, performance, and self-reflection, are not mutually exclusive but rather intertwined.

Previous studies on SRL found that various teaching approaches can promote SRL, such as portfolio assessment[21], online discussion forums to discuss writing strategies[22], mobile game-based teaching[23], and self-assessment [24][25]. These studies have found that approaches that require student reflection, collaboration, and active participation can promote the use of SRL strategies that can help students to work towards learning goals and attain academic achievement. Hence, it is important to provide students with opportunities to become motivated through self-reviewing and monitoring processes in learning to build and use SRL strategies.

In an English language teaching context, Bloom[26] found that self-regulation led to higher academic attainment and motivated students to learn. He found that two strategies which are goal setting and self-monitoring helped students increase awareness of their learning and adapt their actions based on self-evaluation. Lin[27] investigated self-regulated learning strategies and their relationship to achievement goal orientations among ESL students. He found that self-regulated learning

and goal orientations are positively associated. It was also found that ESL students were able to use a wide range of learning strategies. Other studies have also found that self-regulated learning strategies can help English language learners develop their academic achievement and language abilities[28][29]. Therefore, it is important to provide English language learners opportunities to use various SRL strategies in order to develop skills that can help regulate and control their actions to achieve goals and enhance their language abilities.

3. Project-based Learning to Promote SRL

Project-based learning or PBL is a learner-centered, inquiry based pedagogy that includes attributes that can help the promotion of SRL. PBL is based on the notion of constructivist theory which encourages learning through collaboration and supports self-awareness of learning[30]. PBL brings benefits to the students' learning process. PBL can enhance students' interest and critical thinking skills[31], help students feel more confident and develop self-esteem[32] and increase their academic achievement of content knowledge[33]. PBL can also help enhance motivation and support active learner engagement[34]. PBL also focuses on inquiries that supports collaboration[35], is authentic and purposeful[34], and has explicit learning goals[34]. Hence, PBL can be an effective learning approach that can involve learners to collaboratively investigate a topic and produce, in many cases, a tangible product[36]. The role of a teacher is to provide students with a "balance between delivering knowledge and facilitating student-centered learning interests and experiences"(p.3)[37].

Due to the benefits of PBL based on constructivism and experiential education, PBL has been implemented in English language teaching contexts[37-39]. PBL in a language classroom has been found to promote authenticity in communication and enhance collaboration and cooperation[40]. Furthermore, PBL can integrate content learning and language acquisition[41]. This shows that PBL can be used in a content curriculum to bring together the attainment of content knowledge and language abilities.

Therefore, the current study attempts to investigate students' SRL strategies in a PBL course for English majors to incorporate practical use of their content knowledge and English learning and using opportunities. There have been previous studies that have investigated the use of inquiry-based approach in content curriculum for higher education[37][42-44]. The primary focus of these studies were to investigate students' overall perceptions of their learning abilities[44], learning of culture[37], and effect of PBL on teaching abilities of pre-service teachers[42]. There is still a paucity of research on how PBL can support students' use of SRL strategies as students progress through the PBL process based on Zimmerman's model in Korean higher education context in a content curriculum. The current study was situated in a 4-week PBL classroom which was developed based on the recommendations by Moursund[34], in that PBL is authentic, uses authentic assessment methods, is guided by a teacher, uses collaborative learning approaches, and clarifies goals. Hence, this study attempts to add to the body of PBL research by investigating changes in students' perception of

their own life skills and the strategies used during PBL.

III. Methods

1. Research Context

The current study was conducted at a Korean university in the Seoul Capital Area. This university, to enhance students' real-world skills, revised the curriculum for third year students to include an intensive 4-week PBL course. This 4-week course began in 2019 with approximately 27 majors participating in PBL, but as of 2020 about 34 majors offered the 4-week PBL course to their students. The school is expected to expand PBL to all majors in 2021. Because it is a 3-credit, 4-week class, the class meets daily from Monday to Friday from 9 am until noon and encourages hands-on experiences where students can create tangible results. The current study was conducted in a PBL course for English majors. The goal of the course was to create creative and useful content that can clearly and effectively provide information to international students on campus using their knowledge of English, culture, and effective communication strategies.

The study was carried out in Fall 2020 semester. The sample of the current study was selected based on convenience sampling where participants are chosen based on accessibility to the researcher[45]. Students are often participants in convenience sampling and because it was important to have a group of students with identical PBL experiences to investigate their perceptions of learning, convenience sampling was implemented in the study. A total of 23 students participated in the PBL course who were majoring or minoring in English. Of the 23 students in the course, 1 students was a sophomore, 13 students were juniors, and 9 students were seniors. There were 13 female and 8 male students in the study. All students in the class had no prior experience in intensive PBL.

2. Data Collection

[Figure 1] displays the data collection process in relation to the PBL process. The data collected for the study are twofold: (1) self-assessment on four life skill variables; *time management, cooperation, assessment of work, and level of participation* and (2) students' reflection journals of their perceptions on the quality of their input and PBL progress. Life skill variables were identified from previous studies[5][16] on life skills that can be promoted through PBL. The reflection journal prompt provided guiding statements that students could use to 1) identify their contribution in the project, 2) identify their weakness and strengths in PBL 3) assess their level of participation, and 4) set goals and plans to work on their projects. These statements were provided to help students consider the SRL strategies as suggested in Zimmerman[18].

The life skills were assessed on a self-assessment questionnaire using 5-point Likert type scale questions; 1 indicating *strongly disagree* to 5 indicating *strongly agree*. For example, for time management, students had to had to indicate their level of agreement to the statement, "I met project deadlines in a timely and efficient fashion."

Students were asked to keep reflection journals of their progress and to explain their work process. There was no strict format for

the reflection. Both the self-assessment questions and reflection journals were submitted three times during the 4-week PBL course in 1 to 1.5 week intervals (after week 1, week 2.5 and week 4). Students uploaded their responses using Google Forms.

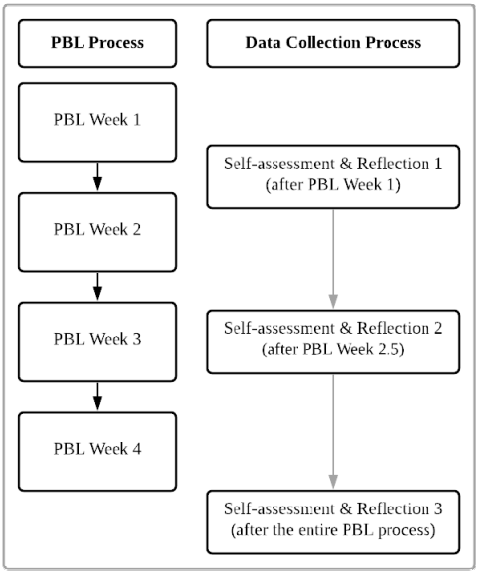

Figure 1. Data Collection Process

3. Data Analysis

Descriptive statistics and the non-parametric Friedman test were used to analyze the data from self-assessment. The reliability coefficient of the self-assessment is 0.96 using Cronbach's alpha coefficient, which shows high reliability.

Students' reflection journals were analyzed based on an inductive approach[46]. Through recursive reading of students' reflections based on Zimmerman's SRL phases, a coding scheme was developed by the researchers. This approach allowed to investigate emerging patterns in the data[47].

IV. Findings

[Table 1] shows the descriptive statistics results of the four life skill variables from self-assessment.

Table 1. Descriptive Statistics of Life Skill Variables (N=23)

	Time Management		Cooperation		Assessment of Work		Particip-ation	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
1st	4.6	0.9	4.3	1.0	4.3	1.0	4.6	0.8
2nd	4.5	1.0	4.4	1.0	4.4	1.0	4.5	0.8
3rd	4.8	0.4	4.8	0.5	4.7	0.5	4.8	0.7

The Friedman test was used to determine the differences in variables over a period of 4 weeks. Self-assessment was conducted three times within the 4 week period. For *time management*, there was no statistically significant difference in students' perceived level of time management during the PBL course, $\chi^2(2)=0.737$, $p=0.692$. As for perceived level of *cooperation*, there was a statistically significant difference during the PBL course, $\chi^2(2)=6.091$, $p=0.048$. Post hoc analysis with Wilcoxon signed-rank tests was conducted with a Bonferroni correction applied, which resulted in a significance level set at $p<0.017$. There was no significant difference between 1st and 2nd self-assessment ($Z=-0.333$, $p=0.739$) and 2nd and 3rd self-assessment ($Z=-2.232$, $p=0.026$). There was a statistically significant difference between 1st and 3rd self-assessment ($Z=-2.414$, $p=0.016$) which shows that the first and third self-assessment of their level of cooperation shows statistical difference. For *assessment of work* ($\chi^2(2)=3.000$, $p=0.223$) and *level of participation* ($\chi^2(2)=1.826$, $p=0.401$), there were no statistically significant differences in

students perceptions during the PBL process.

[Table 2] summarizes the frequencies for the SRL strategies that the students used based on the analysis of students' three reflection journals. It was found that students used strategies from all three phases of SLR proposed by Zimmerman[18].

Table 2. Self-regulated Phases and Strategies

SRL Phases Themes		Frequencies			
		1st	2nd	3rd	Total
Forethought					
	Goal Setting	5	1	0	6
	Strategic Planning	6	2	0	8
	Self-efficacy	9	1	5	15
	Task Interest	1	0	2	3
Subtotal		21	4	7	32
Performance					
	Self-recording	2	14	8	24
	Task Strategies	3	4	0	7
	Time Management	2	2	3	7
Subtotal		7	20	11	38
Self-reflection					
	Self-Satisfaction	0	1	17	18
	Self-evaluation	2	3	12	17
	Causal Attribution	0	1	0	1
	Adaptive	0	0	1	1
Subtotal		2	5	30	37
Total		30	29	48	107

Forethought phase is characterized as goal setting, planning, and motivation. It was found that forethought strategies were most frequently identified in students 1st reflection journals. Students perceived PBL to be of intrinsic value and found ways to portray their belief in one's abilities to manage and execute activities. For example, a student wrote:

> "I am doing my best to visualize the final outcome that is being discussed in our group. This is an interesting project and I can see through the analysis of the existing content that international students have difficulty understanding resources. Most of all, I think this project can really help others and I can empathize with international students. Through this connection, I think we will be able to concentrate and really work on this together." (Student 2, 1st reflection journal, translated quote)

Characteristics of the forethought phase were identified in 2nd and 3rd reflection journals in that students expressed task interest. For example, another student wrote that:

> "I really think this is an interesting project and learned a lot. I didn't like team work but the topic was interesting and the activities were meaningful. I can see why we are doing this as the project." (Student 17, 3rd reflection essay, translated quote)

Strategic planning was also identified as students were able to critically analyze their discussions and strategize their progress. For instance:

> "Based on feedback, we revised our leaflet and discussed online and offline about how to proceed. Before, we had allocated the same amount of space for each of our topics but agreed that this was not a good plan. We tried to prioritize the importance of the topics by how much we actually use it as students." (Student 15, 2nd reflection journal, translated quote)

Findings from the forethought phase shows that students were able to think about the PBL requirements and set goals for their groups and consider the value of the project.

At the performance phase, PBL was found to help students monitor and record their abilities. Based on the analysis, it was found that performance strategies were most frequently observed in the 2nd reflection journal, and the most frequently used strategy was self-recording. For instance:

> "As the team leader, I am trying to divide up the work fairly among team members and keep track of all of our progress. I created a draft of our leaflet and divided up the space in our design so each of us can think about how much information to include. I kept notes of our meeting to keep track of our work." (Student 6, 2nd reflection essay, translated quote)

Similarly, self-recording was used near the end of the PBL course in which a student took pictures of their discussions and activities to visualize the progress of their teamwork:

> "Because we had to take pictures on campus to create

our resources, I took pictures of our work and discussions to help us remember what we need to do. I think this helped our entire team to understand our progress and to be on the same page." (Student 1, 3rd reflection essay, translated quote)

Time management was also an issue for students, as students had the intensive 4-week PBL course that overlapped with their other courses. For example, one student exemplified how he/she strategized his/her time:

"The third week of the PBL course was tough as it overlapped with some final exams for my other classes. My responsibility was to edit our videos, so I focused a lot on finding ways to spend time to edit. I tried to use the weekend to edit our videos as the weekdays had to be used for exam studying. It was hard but I am happy because I think our videos turned out well." (Student 9, 3rd reflection essay, translated quote)

In can be summarized that in the performance phase, PBL was used by students as a means to record the group's progress and strategize in order to accomplish a common goal.

At the self-reflection phase, the PBL curriculum was perceived by the students as highly satisfactory and self-satisfaction was most frequently identified in the students' reflection essays. In fact, this high level of satisfaction could be seen from their self-assessment of the effort they put to accomplishing the project at the end of the PBL course. For example, a students noted that:

"This PBL was the first time that I actually felt like the entire team worked hard to accomplish the given assignment. Within in the assignment, there were many subtasks, and even though no one was a master, we really worked hard and tried our best and I can vouch for our effort." (Student 20, 3rd reflection journal, translated quote)

Students also perceived PBL to help them evaluate their strengths and weaknesses. For example, a student discussed his/her weaknesses in technical abilities but at the same time, praised his/her promptness and accomplishment of the task.

"I had difficulty with video editing. Because we had to visualize our work, the work required a lot of time, but I planned a timeline of work to be prompt with my part of the work. I think I did well." (Student 7, 3rd reflection journal, translated quote)

It can be seen that in the self-reflection phase, students used both self-satisfaction and self-evaluation to reflect on the effort they showed to work on the project and assess their achievements. This shows that students were able to self-regulate their work on their projects.

V. Conclusion and Suggestions

The current study investigated students' development of life skills through PBL and the SRL strategies students employed during the PBL curriculum. The results showed that students' perception of their development of cooperative abilities improved due to PBL which is consistent with findings from previous studies[1][5][34]. The results suggest that PBL can help students to work together collaboratively in meaningful and authentic contexts. Teachers should provide students with opportunities to promote cooperation through investigation and decision-making challenges[48]. Teachers can provide a structured PBL process[34] to allow students to experience cooperation and encourage students to communicate and develop interpersonal relationships to produce a final outcome. Moreover, as Meyer[5] suggested, it is important to offer PBL for a prolonged period for students to realize and understand the significance of projects and fully experience PBL to be aware

of their learning process and strategies.

With regard to SRL strategies, it was found that students were able to experience all three phases of SRL. Students were able to initiate strategies and plan their project outlines to achieve goals. Students were able to utilize their understanding of the expected outcome of the project to self-record their progress and devise strategies to support their work. This shows that students were able to self-regulate their learning and that they were able to show discovery of strategies through self-direction. This contradicts what Lloyd-Jones and Hak[10] found in their study where students final outcomes which correlated to guidance from faculty and peers instead of their self-direction. Furthermore, students reflected on their PBL progress by displaying positive satisfaction about their effort and showed abilities to self-evaluate their strengths and weaknesses. The findings are consistent with findings from previous studies that investigate the effects of PBL on students self-regulating strategies[11][37][12].

Still, there are some limitations of the study. This study was based on the data from one course from 23 students. Due to the small number of participants, generalization of the findings should be considered with caution. Future studies on a larger scale in other content fields may be able to provide more information on students' use of SRL and the development of such strategies through PBL. Moreover, the current study only focuses on the four life skill variables and SRL, but it may be valuable to test other affective domains, such as anxiety, motivation, and self-esteem, which were also found to be encouraged in PBL. Innovative ways of employing PBL can also provide information to practitioners in implementing PBL in their classrooms to promote SRL in future studies. Future research that implements the mixed research method where researchers can use multiple methods or data sources can offer a more comprehensive understanding of PBL.

Despite some limitations of the study, the findings may be able to encourage researchers and practitioners to use PBL to help students develop important life skills and other learning strategies such as planning, strategizing, monitoring, and reflecting strategies that will provide students with the skills to take responsibility of their learning. Skills that can be transferred from classroom learning to a work community can help students better prepare for the real world where they would be expected to understand the goal of a project to set realistic objectives and implement skills that can help them show initiative and responsibility.

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