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Research on Project-Based Learning Design for Secondary Vocational School English (Technical Modules) Teaching from the Perspective of STEAM

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Abstract: The English teaching in secondary vocational education is required to create real learning scenario for students, especially for the vocational module teaching, so that students can get more efficient exercises in their language practice and application abilities. Thus, applying PBL and STEAM into secondary vocational school English teaching is of great assistance to the achievement of learning objectives and the improvement of the talent cultivation and enhancement of comprehensive abilities for students. Thus, the paper proposes an innovative PBL teaching design based on STEAM to activate the secondary vocational school English teaching. The aim is to facilitate the efficiency of English education in secondary vocational school. Then, there is much possibility of meeting national needs, market demands and enhancing students' employability.

Keywords: English Teaching; PBL Learning; Secondary Vocational Education; STEAM.

1. Introduction

In 2019, the Ministry of Education, the National Development and Reform Commission, the Ministry of Finance, and the State Administration for Market Regulation (2019) jointly issued the pilot scheme for the "Diploma Certificate + Vocational Skills Level Certificate" system in institutions, aiming to meet national needs, market demands, and enhance students' employability. The "1+x" certificate system is beneficial for improving the quality of talent cultivation and enhancing the comprehensive abilities required for students' development. In 2021, the General Office of the Central Committee of the Communist Party of China and the General Office of the State Council issued the "Opinions on Promoting the High-Quality Development of Modern Vocational Education", emphasizing the need to innovate teaching models and methods, widely implement project-based teaching, situational teaching, modular teaching, and more.

What's more, the English curriculum standards for secondary vocational school (Ministry of Education, 2021) require teachers to create simulated or real teaching scenarios, especially in the context of vocational module teaching, to facilitate the enhancement of students' language practice and application abilities.

Through the policies, it showed that English teaching in vocational education needs to pay more attention on the holistic development of students and their ability to solve practical problems. Based on this, PBL is a type of corresponding teaching method for English teaching in vocational education. It consists primarily of four key elements: content, activities, context, and outcomes, which evolves around the concepts and principles of disciplines, utilizing various resources in real-life situations to engage in a new exploratory learning model focused on solving specific relevant problems.

According to recent studies, PBL is usually connected with STEAM. STEAM, an acronym for Science, Technology, Engineering, Arts, and Mathematics, represents the integration of these five disciplines. It aims at cultivating comprehensive innovative talents, especially innovative and practical skills. Applying the STEAM philosophy to guide the design of project-based learning in vocational English within engineering disciplines allows students to center their learning around project tasks, enabling them to apply interdisciplinary knowledge to solve real-world problems and ultimately create project products with creativity. Students not only acquire language knowledge and concepts in the English discipline but also significantly enhance their interest in subjects such as science, technology, engineering, art and mathematics.

Therefore, integrating English instruction with other disciplines can assist students in building a holistic knowledge framework. Thus, this paper seeks to explore interdisciplinary project-based teaching models from the perspective of STEAM. Building upon the foundation of vocational English teaching in the engineering disciplines, the study proposes and implements a project-based learning approach.

2. Literature Review

2.1. Research on Project-based Learning

2.1.1. Research on Project-based Learning Abroad

Overseas research on project-based learning is concentrated in three main areas: research on the implementation and application of project-based learning in specific academic subjects, studies on the integration of project-based learning with technological environments, and investigations into the impact of project-based learning on the enhancement of students' abilities.

(1) Research on Implementation and Application of PBL in Specific Academic Subjects. Research on the implementation and application of project-based learning is widespread abroad, spanning from elementary education to graduate education. Project-based teaching is utilized across various levels of education, with a predominant focus on higher education and engineering education. The research predominantly explores the impact of this teaching model on students and education. For instance, Kyong-Jee Kim [1]

from Dongguk University College of Medicine in South Korea applies project-based teaching to medical education. Kim investigates the influence of project-based learning on the development of students' empathy skills, and the results indicate that empathy projects contribute to enhancing students' understanding of empathy and strengthening their empathic communication skills. Additionally, researchers like Kataria, Devika; Sanchez, Gustavo; Govindasamy, Siddhartan [2] apply project-based learning to foundational automation engineering. They challenge students to develop a low-cost material handling robot equipped with basic control.

(2) Studies on Integration of PBL with Technological Environments. Project-based teaching differs from traditional teaching models, and without technological support, relying solely on students' independent learning may not truly qualify as project-based learning. Scholars abroad are increasingly exploring the integration of project-based learning with advanced modern technologies, investigating how project-based learning combined with technological environments can overcome traditional project-based learning bottlenecks.

For instance, Morxlc [3] and colleagues in the United States researched the integration of project-based learning with Virtual Reality (VR) technology. The study found that project-based learning supported by virtual technology effectively promotes students' independent learning**.** Researchers at Stanford University, led by Kim [4], studied the learning effects of implementing project-based learning in online learning environments. The results indicated that this form of project-based learning could facilitate "deep learning" among students.

(3) Research on the Impact of PBL on the Enhancement of Students' Abilities. Project-based learning emphasizes the application of interdisciplinary knowledge to solve problems, thereby cultivating students' abilities. Foreign scholars are particularly focused on how project-based learning contributes to the development of students' skills. For example, Gulsun Kurubacak [5] researched how project-based online learning fosters students' critical thinking skills. Jdaitawi and Malek [6] divided 180 first-year students into two groups, with the experimental group using PBL teaching. The results indicated that project-based learning can enhance students' communication skills and promote positive learning attitudes.

2.1.2. Research on Project-based Learning at Home

Research on project-based learning in China is concentrated in four main areas: theoretical model construction of project-based learning, research on the implementation and application in teaching, problem identification and corresponding strategy research, and research on the evaluation system of project-based learning.

(1) Research on the Theoretical Model Construction of PBL. Most scholars primarily focus on the research regarding the theoretical model construction of project-based learning. Scholars such as Zhong Zhixian and Liu Jingfu [7] argue that project learning is primarily composed of four key elements: content, activities, context, and results. The process model of project learning includes six fundamental steps: selecting a project, formulating a plan, exploring activities, creating works, exchanging results, and evaluating activities. Cheng Qian [8] suggests that the specific steps or main stages of project-based learning in English oral classes include project initiation, project implementation, summarizing and reporting, and project evaluation. Teachers should determine the project subject, clarify the project focus, establish evaluation criteria, and then group all students based on the semester teaching tasks and outlines. Zhang Wenlan, Zhang Siqi, Lin Junfen, Wu Qiong, Chen Shulan, and others [9] propose a project-based learning implementation process based on curriculum reconstruction principles in the online environment. This process includes six key steps: establishing the project, formulating a plan, exploring activities, creating works, exchanging results, and summarizing evaluation.

(2) Research on the Implementation and Application in Teaching. Implementation and application constitute the ultimate focus and destination of research on project-based learning. Numerous references shed light on the specific implementation and application of project-based learning in disciplinary teaching. For example, in the field of information technology, scholars like Yu Yanfang and Li Yi [10] apply project-based teaching, enabling learners to establish rigorous thinking patterns and certain investigative skills, Zhang Mingfang [11] incorporates project-based teaching into the instruction of English linguistics, facilitating a better understanding and application of linguistic knowledge among students.

(3) Research on Problem Identification and Corresponding Strategy. Chinese scholars have summarized the challenges of implementing project-based learning in practical teaching and proposed corresponding solutions. For instance, Chen Jinguo [12] identified issues in project-based learning in vocational school mathematics, suggesting strategies such as scientifically designing learning projects, accurately understanding pre-project operations, and guiding project implementation correctly. Liu Yudong [13] conducted an analysis of the current research status of project-based teaching methods in foreign language instruction, discussing the existing problems. He pointed out shortcomings in foreign language project-based learning, such as a lack of systematic, targeted, and effective research. Liu proposed engaging in academic research activities to promote the comprehensive development of project-based teaching in foreign language instruction.

(4) Research on the Evaluation System of PBL. Effective assessment methods are crucial for gauging students' learning outcomes. Project-based learning employs diverse and multi-faceted assessment methods with a focus on combining summative and formative assessments, as well as integrating self-assessment and peer assessment. Evaluation is typically conducted through test papers, project evaluation forms, self-assessment forms, and inter-group evaluation forms.

For example, Qiang Feng and Zhang Wenlan [14] utilized the Delphi method and Analytic Hierarchy Process to construct a project-based learning evaluation indicator system based on curriculum reconstruction. They analyzed the weights of various indicators in the system. This framework aims to enhance the comprehensive development of students' abilities and improve the quality of teaching, providing valuable guidance for instructional practices.

2.2. Research on STEAM Applied in PBL

Research on STEAM applied in PBL learning abroad primarily focuses on different stages of education, which includes primary school, junior high school, senior high school and vocational school.

(1) Research on STEAM applied in primary school. I Nyoman Sudana Degeng et al. [15] discovered the existence of cognitive and affective learning outcomes of students using

PBL based STEAM with scientific learning with inquiry learning models. Kim, Moon Gyeong and Choi, Sun Young isni [16] investigated the effects of a STEAM PBL on the elementary students' creative problem solving, scientific achievement and class satisfaction in elementary science class. Through the research, the results showed that students' satisfaction has been improved. Adriyawati A, Utomo E, Rahmawati Y, et al. [17] explored how the integration of STEAM-PBL was applied with the aim of developing students' scientific literacy. The results of scientific literacy analysis showed that overall the highest percentage has reached the level of competence.

(2) Research on STEAM applied in junior high school. Torres M P, Lagarón D C, Bargalló C M. [18] Characterize the impact of the STEAM educational approach through the analysis of contemporary STEAM projects implemented in five SPANISH secondary schools from a curriculum perspective based on STEAM practices. The research revealed an imbalance in the sophistication of STEAM projects. Hsiao H S, Chen J C, Chen J H, et al. [19] discovered the implication of using different teaching approaches for a hands-on STEAM activity for junior high school students' STEAM knowledge, creativity, and hands-on performance. It revealed that PBL with the CAIM in the hands-on STEAM activity brought about positive learning outcomes and creative abilities for the students.

(3) Research on STEAM applied in senior high school. Chung C C, Huang S L, Cheng Y M, et al. [20] Investigate the integration of imagination and STEAM education to construct special topic course on wearable devices. The research reveals that the iSTEAM PBL model can enhance students' imagination, STEAM competences and satisfaction with their learning effectiveness. Akbar F H, Rahayu R, Wanabuliandari S. [21] analyzed the effectiveness of PBL model with STEAM approach assisted by android application at an Islamic senior high school. It showed model is effective in improving the mathematical problem-solving abilities on the material of sequences and series.

(4) Research on STEAM applied in vocational school. Rahmawati Y, Hadinugrahaningsih T, Ridwan A, et al. [22] applied STEM approach which was integrated with electrochemistry PBL model to explore the changes of critical thinking skills. It showed that the students reached a sufficient level on the measures of conceptual understanding. Trisna A M, Hatta P, Budiyanto C W. [23] applied the integrated model to Graphic Design course with the aim of being able to stimulate students in practical activities to be more active, independent, creative and collaborate well with fellow students. Wannapiroon P, Nilsook P, Techakosit S, et al. [24] applied STEM education integrated with PBL into the teaching in vocational school students in Thailand, revealing the elements of STEM literacy for Thai vocational education.

Domestic research on the STEAM applied in vocational English PBL in China is not so multiple. The research focuses on two aspects of the integration of STEAM and English teaching, that is, teaching in English at the Primary and Secondary schools and professional English.

(1) Research on the integration of STEAM and teaching in English at the Primary and Secondary schools. Wu Zhenyi [25] pointed out in the process of English classroom teaching that English teachers should take the STEAM education philosophy as a guide. They should emphasize the integration of disciplinary knowledge, focus on the discovery, reflection, exploration, and practice of knowledge. By utilizing information technology and effective teaching methods, teachers should inspire students' proactive inquiry awareness. In classroom instruction, students should be organized to engage in inquiry activities, continuously improving their inquiry skills through practical exploration. The goal is to cultivate students into innovative and comprehensive talents adaptable to the future society.

Guo Shaoqin [26] proposed that theme-based unit teaching based on the STEAM philosophy should aim at core literacy, with the foundation of content, activities, situations, and outcomes as the basis. Theme development is a prerequisite, with activity exploration at its core and information technology as support. The approach highlights student-centeredness, emphasizes group cooperation, and requires students to investigate real-life issues. She believes that English theme-based unit teaching based on the STEAM education philosophy is scientific and practical.

Liang Weibiao [27] advocates that for rural junior high school English teaching, the STEAM education philosophy can help students discover a whole new world in English learning. English teaching based on the STEAM philosophy can cultivate students' comprehensive abilities, including innovation and thinking abilities. Therefore, the scholar believes that adopting the STEAM education philosophy can enable students to break through the constraints of subject knowledge. While learning English foundational knowledge, students can also develop other interdisciplinary comprehensive abilities.

Hu Xiaojin [28] proposed, based on the STEAM education philosophy, that learning, and language abilities are built on the foundation of listening, speaking, reading, and writing. Through autonomous learning under the STEAM philosophy, students can express their thoughts in English fluently. He believes that the exchange of cultural awareness and thinking qualities is the ability to inherit cultural communication between different countries. Thus, he emphasizes cross-cultural awareness in English learning, highlighting the importance of culture as an element.

Wang Yan [29] expressed in the STEAM + English development model that, guided by STEAM, project-based learning can help students develop authentic English listening, speaking, reading, and writing abilities. The STEAM+ English development model changes traditional English learning thinking, creatively integrating English acquisition and literacy enhancement into the same construction process.

(2) Research on the integration of STEAM and professional English teaching. In the context of industry English teaching, Li Yongmei et al. [30] argued that the "A" added to STEAM represents "Arts" or Liberal Arts. In this context, "Arts" broadly refers to humanities subjects, including social studies, language, culture, physical education, music, aesthetics, and performing arts. Therefore, the emphasized philosophy of new engineering education, in addition to interdisciplinary and creative development, also emphasizes language, arts, humanistic spirit, and social responsibility. The practice of "emphasizing language while neglecting culture, emphasizing basic skills while neglecting the integration of disciplines" in foreign language teaching clearly cannot meet the goals of cultivating talents in the new engineering field. Therefore, the curriculum system of new engineering English should evolve towards multidisciplinary integration, promoting the organic combination of language learning, humanities education, and engineering education to cultivate

engineering and technical talents with an international perspective and social responsibility.

Wang Yan [31] briefly outlined the characteristics of STEAM education, such as interdisciplinary nature, practicality, dynamism, empiricism, experiential learning, and collaboration. She believes that these characteristics of STEAM align with the characteristics of English for Specific Purposes (ESP), including industry-specific English. Industry English requires students to acquire and apply language skills in practice, breaking down the barriers of disciplinary boundaries and creating contexts like real professional scenarios to cultivate students' language abilities. Integrating industry English learning into STEAM interdisciplinary project-based learning not only develops students' industry-specific English skills but also enhances their innovation, practical, and problem-solving abilities in addressing real industry issues.

Liu Xiaohui et al. [32] contend that the application of the STEAM education philosophy, such as in wine label and bottle packaging design competitions, effectively and significantly increases the interest and engagement of brewing major students in learning.

2.3. Summary

From the above literature analysis, it is evident that domestic scholars mainly concentrate on the theoretical construction of project-based learning, while research on the problems and countermeasures in project-based learning is relatively scarce. The application of PBL focuses on science and engineering disciplines. There is scarce research on the integration of PBL with English teaching.

In the realm of the application of STEAM applied into PBL, under the guidance of STEAM, English language discipline instruction has gradually shifted its focus from assessing the mastery of English language components to emphasizing the authentic contextual input, output, and application of English knowledge. This implies that the taught English is undergoing an imperceptible transformation from being perceived as a subject to becoming a language, with the latter placing a greater emphasis on authenticity.

Therefore, there is currently limited research on project-based learning in vocational English, and there is no specific research on project-based learning design for vocational modules in engineering disciplines. The integration and application of the STEAM education philosophy in vocational teaching are also mainly concentrated in technical subjects, lacking integration with vocational English teaching.

3. Theoretical Foundation

3.1. Dewey's Pragmatic Educational Theory

Dewey, drawing on philosophical, sociological, and psychological concepts, formulated a pragmatic educational theory. He provided a comprehensive exposition of the essence of education, its objectives, and fundamental teaching principles:

(1) Essence of Education. It emphasized that "Education is life and the continuous transformation of experience". Dewey advocated for learning to take place in authentic life contexts. Furthermore, educational activities should be based on students' interests and capabilities throughout their developmental journey.

(2) Objectives of Education. Dewey emphasizes that people should not approach education with predefined objectives. He opposed the utilitarian purposes imposed on education from external forces and advocated for individuals to lead better lives in real-life contexts.

(3) Fundamental Teaching Principle: Learning by Doing. Dewey highlighted schools as significant places for student learning, akin to microcosms of society. Dewey suggested organizing a series of education activities closely connected to students' daily lives, allowing them to explore their interests and strengths.

Therefore, PBL guided by STEAM embodied the three fundamental principles. The research would show Dewey's pragmatic educational theory in the teaching design of the case study.

3.2. Multiple Intelligence Theory

The theory of Multiple Intelligences was come up by Howard Gardner, which asserts that intelligence is the capability of an individual to solve problems or create products in real and complex situations. This theory encompasses eight aspects of intelligence, including logical-mathematical intelligence, interpersonal intelligence, spatial intelligence, and bodily-kinesthetic intelligence. Throughout the practical process of teaching, the development of intellectual capacities is usually neglected.

Tailoring instructional activities according to the diversity of intellectual abilities is crucial. Additionally, in the evaluation of teaching, employing various assessment methods is essential to ensure a comprehensive understanding of students' learning situations, thereby fostering enthusiasm for learning in every student.

PBL guided by STEAM is implemented in real situation, which is different from the simple knowledge teaching. In the process of project implementation, students are assigned specific roles and engage in collaborative efforts. They can identify their roles within the team based on their intellectual characteristics and strengths, providing everyone with the opportunity to contribute and grow. Therefore, the project-based STEAM teaching model fully demonstrates the insights of the multiple intelligence theory into modern education and teaching.

4. Case Study of PBL from the Perspective of STEAM

The case is taken from the Secondary Vocational School English Public Basic Course Textbook: English Vocational Module for Engineering published by Foreign Language Teaching and Research Press. The theme of the class is "The First Day at School", which is highly in accordance with students' daily school life.

4.1. Text Analysis

The material is selected from Unit 1——"The First Day at school" in the Secondary Vocational School English Public Basic Course Textbook: English Vocational Module for Engineering. This class is a listening class.

The unit begins with an engaging lead-in activity that presents students with a series image of different jobs, such as IT engineer, electrician, construction worker, mechanic and so on. This is an effective way to activate students' prior knowledge on the topic and encourage discussion about jobs in an authentic context which is closely related to students' daily life.

Based on the pictures, the unit provides students with

several words and expressions about first day at work. Then, there is the listening material of this unit which tells the conversation of first day at work. The conversation facilitates students to use practical language in authentic situation.

At the end of the listening part, the unit offers a conversation which is like the listening one. The conversation can help students to consolidate the words and their usage. As the course of fist day work, it's time for introduction of working place. Thus, students can have a general understanding of their work and learn how to communicate with each other at first day for working.

4.2. Students Analysis

The students are from grade one in vocational school which is not so similar to students in normal school. They need to learn more practical English so that they can communicate better with others in English when they go to work for first day.

The students have learned the fundamental words and grammar. They can speak and write down some simples sentences to express themselves. But they lack the specific knowledge about their jobs.

4.3. Learning Objectives

After this class, students will be able to:

1) pronounce, spell, and make up sentences the words and expressions of this lesson.

2) communicate with others in the scene of first day at work.

3) develop their confidence of being competent at a certain job.

4) develop their teamwork spirit and strengthen their creative awareness.

4.4. PBL Teaching Design Based on STEAM

In this lesson, the content is organized based on the students' learning interests, employing a student-centered, learning-by-doing approach to achieve the lesson's objectives. The students will be divided into several groups and will engage in various activities—including individual tasks, group tasks, and class-wide activities—under the guidance of the teacher. Throughout the process of completing these specific tasks, students will acquire linguistic knowledge and develop corresponding skills.

4.4.1. Prior to the Implementation of the Project

The lesson adopts brainstorm to guide students to think about their dream job. It can activate students' existing knowledge. Meanwhile, this method can arise heated discussion and ignite the interest in learning.

The tasks that students need to do:

Task 1: students need to look up the main content of their dream job, and the influence that job bring to people's daily life.

Table 1. Three Scheme comparing

Subject	The Job's Detailed Content
Science	Chemical worker
Technology	electrician, mechanic, railway worker, senior technician
Engineer	IT engineer,
Art	HR manager, supervisor
Mathematics	none

Task 2: students need to finish listening to activity 3 and combine the former listening materials to conclude the practical words and expressions about first day at work.

Task 3: students crate an original skit depicting what might happen on the first day of work.

What's more, the content outline of task one is based on STEAM, which contains the five aspects as in Table 1:

4.4.2. During the Implementation of the Project

Step 1: Publishment of the Task: The teacher informs the students about the requirements and steps of the three tasks.

Step 2: Role Distribution: Group cooperation is an extremely important aspect of project-based learning. It can effectively assist members within the group to complete and execute assigned tasks while students also have their own opinions regarding the form of group division. At this point, how to group students is one of the details that teachers need to pay attention to. A group typically consists of 4-6 people, and the roles assigned to different individuals should be based on their own characteristics.

Step 3: Guidance of Knowledge: This part mainly includes points.

Firstly, the teacher guides students to learn the relevant words, like construction worker, railway worker, IT engineer, HR manager, supervisor and so on.

Secondly, after explaining the key knowledge, the teacher guides the students to finish the listening activity 1 and 2 so that they are familiar with their counterpart. After learning the example conversation, students get to know the common conversation on first day at work.

Thirdly, teacher leads students to continuously complete listening material 3 by themselves. During this process, the teacher ought to help the students in need.

Fourthly, students are required to finish the task 2, concluding practical words and expressions in tables.

Fifthly, teacher guides students to create an original skit by using the expressions they summarized before.

Lastly, students perform their original skit as groups.

4.4.3. After the Implementation of the Project

Teachers need to assess students' task completion and utilize appropriate grading criteria. The assessment must be in accordance with students' actual learning situation. The assessing criteria is showing as follows.

5. Analysis of Case Study

5.1. Students Gain Autonomy in Learning, with Teachers Serving as Facilitators

The case study demonstrates that the design of the teaching tasks is student-centered, emphasizing learner autonomy and proactivity in the learning process. The case involves three tasks: the first task is preparation for classroom learning; the second task is the summarization, induction, and reinforcement of language knowledge by students during the learning process; and the third task is the transfer and application of acquired knowledge in simulated scenarios. These three tasks are conducive to students' acquisition of language knowledge through participation in specific tasks, enhancement of teamwork awareness, and development of innovative thinking.

For instance, in the third task, students are required to allocate roles to enact a situational dialogue on the first day of work. On the one hand, students' intrinsic motivation is greatly stimulated through self-directed performance, and they achieve "learning by doing" through script creation and acting. On the other hand, the completion of various tasks

within the project necessitates division of labor and collaboration within the group, cultivating students' team spirit and understanding of work division.

Table 2. Project completion evaluation form

Content	Levels (Level 1 3☆; Level 2 2☆; Level 3, 1☆)	Assessment
Knowledge Mastery	○ Level 1: can exert solid language knowledge and be able to extrapolate and apply language knowledge from Project 2 fluently;	☆☆☆
	○ Level 2: Proficient in professional job names and communicating language for "first day at work";	
	○ Level 3: Have knowledge gaps and difficulties in reading and writing;	
Enhancement of Competence	○ Level 1: Be able to apply language knowledge from textbooks to specific situations;	☆☆☆
	○ Level 2: Be able to inspire interest in English learning expand knowledge view;	
	○ Level 3: Not highly interested in English learning	
Positive Attitudes	○ Level 1: Be able to actively participate in activities, engage in critical thinking and dare to explore;	☆☆☆
	○ Level 2: Be able to complete three projects with the help of group members;	
	○ Level 3: Finds it difficult to complete activities and is unwilling to cooperate with teammates;	

Moreover, in this teaching model, the teacher's role shifts to that of a facilitator and guide, which helps to stimulate students' learning interest and exploratory spirit, enabling them to seek knowledge and solve problems when completing assigned tasks more actively. For example, during the second project, the teacher guides students on how to collaborate and divide tasks by clarifying task requirements and assigning roles, which can help students understand how to effectively communicate and coordinate in teamwork.

5.2. Enhancing Curriculum Dimensions to Foster Interdisciplinary Awareness

The progression of tasks within project-based learning, as illustrated by the case study, demonstrates the hierarchical nature of teaching. In Task One, students are required to research and comprehend various tasks from five STEAM perspectives, significantly enhancing the richness of the curriculum and the effectiveness of education. Integrating teaching tasks encompassing science, technology, engineering, arts, and mathematics not only facilitates language instruction but also deepens students' professional skills.

Furthermore, as students engage in subsequent tasks, they not only learn language skills but also gain insights into their respective job positions and responsibilities. They can comprehend, articulate, and write corresponding expressions, thereby establishing connections between English language studies and other disciplines. Consequently, this cultivates students' interdisciplinary awareness and facilitates the acquisition of integrated knowledge.

5.3. Diversified Evaluation Methods Promoting Holistic Student Development

The evaluation activities conducted in the later stages of the project implementation, as evident from the case study, depict a multifaceted assessment of student task completion by teachers. This diversified approach to assessment facilitates comprehensive student development. Furthermore, this case aligns with the requirements of vocational English curriculum standards by integrating teacher assessment, peer evaluation, and self-assessment. This integration enhances the monitoring, evaluation, and feedback mechanisms of student learning processes, guiding students towards self-management and active learning, thus improving learning efficiency.

Through diversified evaluation methods, students can engage in better self-reflection, evaluating their performance in the project and adjusting learning strategies with targeted guidance from teachers. Simultaneously, teachers can gain insights into students' learning situations through self-assessment and peer evaluation, enabling them to make corresponding improvements to teaching methods and enhance teaching efficiency.

6. Conclusion

To meet the government requirements, the secondary vocational education must take measures to renovate the teaching methods so that students can adapt the society in the future. By connecting PBL learning with STEAM, the secondary vocational education can facilitate students to learn language knowledge and have a better understanding of their technical majors.

Based on this, the paper provides an example for PBL teaching design. In theory, the PBL teaching from the perspective of STEAM can help students to learn and practice the target language in a more authentic context and achieving learning by doing.

Therefore, through the above analysis and discussion, the article aims to provide more reference for the secondary vocational English teaching and promotes the teaching efficiency.

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