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Structuring Ubiquitous Learning Resources for Output in a Project-Oriented College English Classroom: A POA-PDCA Approach

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Abstract: This study examines how ubiquitous learning resources can be structured into a project-oriented College English classroom for output through the POA-PDCA approach. In response to limited classroom time, fragmented use of online resources, and the final-product orientation of project-based learning, a two-cycle POA-PDCA instructional framework was designed. The first cycle focused on project planning and resource preparation, while the second focused on output development and revision. Pre- and post-questionnaires were used to evaluate changes in students' resource use, confidence in language skills, and project learning experience. The results showed positive changes in students'task-oriented resource use, speaking-oriented output confidence, and process-oriented project learning experience. The findings suggest that the POA-PDCA cycle can function as a process mechanism for transforming ubiquitous learning resources into task-oriented support for language output in a project-oriented College English classroom.

Keywords: College English; Production-oriented approach; PDCA cycle; Project-based learning

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1. Introduction

EFL teaching for non-English major students in China mainly operates through the College English curriculum in higher education. Along with the development of curriculum reform, the College English curriculum has been facing a growing tension between the limited instructional time and the sustained input and output required for cultivating comprehensive English competence. For instance, at the college institution examined in this study, the English curriculum allocates only one 90-minute session per week over 32 teaching weeks in an academic year, allowing insufficient classroom exposure for students who are expected to develop not only linguistic skills, but also communicative competence for future academic and professional careers.

From the input perspective, ubiquitous learning resources, which expand learning beyond the classroom

by providing access to online materials, digital learning tools, and online learning platforms [1], may help to increase language input outside the classroom. Still, research has also shown that access to such resources does not automatically translate into effective language learning [2]. The pre-questionnaire in this study examined students' prior use of ubiquitous learning resources and found that students' online learning mainly concentrated on vocabulary and listening apps. Students have also reported confusion about the effective ways to use online resources for comprehensive English learning. Therefore, instead of being used as isolated supplementary materials, ubiquitous learning resources need to be pedagogically organized under the guidance of teachers.

From the output perspective, project-based learning has been widely applied as a model for increasing output opportunities in higher education [3]. In EFL classrooms, by working on communicative tasks as a project, students can deliver essays or oral presentations to increase language output. However, project-based language learning may put more emphasis on the final product if the process lacks sufficient support and guidance.

To address these issues, this study proposes a POA-PDCA approach to construct ubiquitous learning resources into the project-based College English classroom. The study focuses on two research questions: RQ1: How can POA and PDCA address the limitations of ubiquitous resources and project-based learning? RQ2: What effects does the model have on students' resource use, output confidence, and project learning experience?

2. Literature review

2.1. Ubiquitous learning resources

With ubiquitous learning resources, College English learning extends beyond time and space. Yu and Chen pointed out that ubiquitous resources should not be static and fixed. Instead, they should facilitate learning through activities and social cognitive networks, which can be built through interaction between learners [1]. A systematic review, based on the core database of foreign linguistics and applied linguistics from 2010 to 2022, reveals that different forms of technology-enhanced cooperative learning had a significant positive impact on foreign language learners' performance. The use of ubiquitous resources in technology-enhanced cooperative learning cultivates students' language proficiency and enhances their critical thinking skills, communication skills, language awareness, motivation, and self-reflection. What is worth noticing is that the review also points out that the type of task being collaborated on should be taken into account to achieve effectiveness. Other factors also include interaction patterns, group organization, and instructional integration [2]. In light of relevant research on ubiquitous resources, tasks should be designed with proper pedagogical mediation to achieve effective learning. Cooperative interactions between learners should also be considered. The key issue is not simply whether resources are available, but how such resources can be organized and how the tasks should be designed to support language output and encourage interaction between learners.

2.2. Project-based learning

Project-based learning provides a practical structure for increasing output opportunities in College English teaching. It is a promising approach that improves student learning in higher education [3]. In EFL classrooms, project-based language teaching can give students a communicative scenario to use English through information collection, group discussion, proposal writing, script development, presentation, and reflection. Still, group activities design, teacher and student support, self and peer evaluation, and assessment emphasis on reflection are important in coping with the challenges of the project-based teaching design [4].

Research also shows that in project-based learning, students' engagement changes across different phases. The influencing factors include peer support, task progress, leadership, and teacher support [5]. Based on the previous research, it can be concluded that project learning should be organized as a progressive process with pedagogical mediation. Instead of focusing on the final product, more focus should be given to how students learn during the process and how the process can be supported through proper instructional structure.

2.3. The production-oriented approach

The production-oriented approach (POA) was proposed by Wen Qiufang. It provides the theoretical basis for linking input, output, and assessment in College English teaching [6]. POA is based on the output-driven hypothesis (ODH), the input-enabling hypothesis (IEH), and the selective learning hypothesis (SLH) [7]. It emphasizes that input should serve output production. POA proposes principles of learning-centeredness, integration of learning and language use, and whole-person education. The teaching procedures cover motivating, enabling, and assessing [7]. Wen and Bi pointed out that compared with task-based language teaching, POA places stronger emphasis on teacher mediation, selective input, and using assessment as part of learning [8]. In POA, resources are not used for general exposure but as enabling input for communicative output. Recent discussions of AI-enabled learning also suggest that AI-supported functions can facilitate language support, feedback, and communicative practice in POA teaching [9].

2.4. Self-regulated learning and the PDCA cycle

Self-regulated learning provides a theoretical basis for understanding how students manage learning processes. Panadero reviewed six major self-regulated learning models by Zimmerman, Boekaerts, Winne and Hadwin, Pintrich, Efklides, and Hadwin, Järvelä and Miller. The review points out that these models differ in emphasis, but most conceptualize learning as a cyclical process involving preparation, performance, and appraisal. These phases generally include task analysis, goal setting, strategic action, monitoring, evaluation, and adjustment [10]. The results correspond to the PDCA cycle, which is widely used in quality control in project management.

The PDCA cycle originated in the Shewhart-Deming style of quality improvement. It consists of four stages: Plan, Do, Check, and Act [11]. The Plan stage focuses on identifying goals, procedures, and resources. The Do stage centers on the implementation of the plan. The Check stage examines whether the progress is in line with the intended goals and provides suggestions for future adjustments. The Act stage adjusts the project accordingly for improvement. PDCA has been widely used in quality and organizational management. Previous studies have also applied PDCA to teaching management and online education quality improvement [12], but few studies have applied it as a student's self-regulated mechanism in project-based language learning.

3. Conceptual framework

3.1. A POA-PDCA project-oriented College English classroom

Based on the literature review, this study constructs a POA-PDCA approach in a project-oriented College English classroom to address the two limitations in RQ1. First, ubiquitous resources increase input but may be used in a fragmented way and should be structured pedagogically with clear output goals to facilitate learning. Second, project-based learning provides communicative needs but may concentrate more on the

final product if the process is insufficiently supported or goes without students' self-regulated process.

The POA-PDCA approach in this study attempts to structure ubiquitous learning resources for output in project-based learning. POA provides the teacher's perspective to motivate, enable, and assess the students. PDCA offers a self-regulated mechanism from the students' perspective to monitor the process. Ubiquitous resources in this framework function as the enabling input. Project-based learning provides the context of output. The integration seeks to build a comprehensive College English classroom based on previous models.

3.2. POA: The teachers' scaffolding mechanism

POA mainly provides the teachers' scaffolding mechanism in this framework. It defines how teachers offer guidance to organize the input, output, and assessment. According to the POA model, the teaching procedures include motivating, enabling, and assessing [6]. In the motivating stage, teachers are mainly committed to stimulating students' interest to deliver output through communicative tasks. The role of the teacher in enabling focuses on guiding students to select and process resources for the output. In assessing, revision and further learning are supported through teacher and peer feedback. Generally, POA prevents resource use from remaining fragmented by placing it within a teacher-mediated structure, with output as its focus.

3.3. PDCA: The students' process regulating mechanism

While POA provides the teacher's instructional guide, PDCA organizes how students regulate the project process. In this study, PDCA is organized in line with the self-regulated learning models, which conceptualize learning as a process of planning, monitoring, evaluating, and adjusting [10]. Generally, in the Plan stage, students design their output goals and choose what resources to use. In the Do stage, they work with those resources and produce a draft. In the Check stage, they get feedback from the teacher and peers for further improvement. Finally, in the Act stage, they revise their work and reflect on what they have learned. By practicing the PDCA cycles, students also have the opportunity to gain project learning experience essential for their future careers.

3.4. Two-cycle design of the integrated framework

To clarify the structure, the integrated POA-PDCA framework uses two PDCA cycles. The first cycle covers planning and resource preparation. It involves motivating and enabling stages in POA. The second cycle focuses on developing and revising the output. Enabling and assessing stages in POA match with cycle two. The two cycles work together to ensure that the project becomes a continual process involving drafting, checking, revising, and reflecting.

The conceptual framework answers RQ1 by demonstrating how the models can be integrated. For RQ2, the framework measures students' performance in resource use, output confidence, and project learning experience through the pre- and post-questionnaires.

4. Methodology

4.1. Participants and teaching context

The participants were first-year non-English majors at a Chinese university. The university focuses on application-oriented education and places great importance on project-based learning and outcome-based education. The participants were taking the first-semester College English course, which followed a

regular curriculum. As part of this course, a POA-PDCA project model was added to an 8-week teaching session. Students worked in groups and were expected to complete products, including a project proposal, a resource bank, a video or oral presentation (including the scripts), and a reflection log. This framework was designed to engage students in communicative tasks, encouraging them to turn input resources into output presentations. During the process, the teacher provided output task design, resource guidance, process supervision, and feedback.

4.2. Process

4.2.1. Cycle one: Planning and resource preparation

The first PDCA cycle matched the motivating and enabling stages in POA. The teacher guided the students to select resources and online platforms in line with the output task. At the end of this stage, students were supposed to submit a preliminary project topic proposal and build a project resource bank.

Specifically, each of the PDCA stages moved along with the POA scaffolding. In the Plan stage, the teacher mainly motivated the students by introducing the project task according to the course content and students' learning background. Since the participants came from various major backgrounds, they were encouraged to relate the communicative task to their majors and future careers. Based on the communicative needs, students identified possible topics and target audiences, designed expected products, and assigned group roles. On top of that, students were guided to search for and select proper ubiquitous learning resources to build their resource banks. They were guided to work backward from the expected output by considering the background knowledge, vocabulary, and discourse structures required for project completion. In this part, the teacher mainly enabled the students by providing scaffolding and offering suggestions when needed.

In the Do stage, students executed the plan, collected information, wrote a topic proposal, and built a resource bank with the support of ubiquitous learning resources. The resources students collected covered graded reading materials, vocabulary tools, translation support, and other online aids. AI-supported functions were also used as enabling resources for output-oriented learning under teacher mediation.

When it comes to the Check stage, students presented the preliminary topic proposal along with the resource bank through a report. The feedback from the teacher and the students was guided to focus on four criteria: topic clarity, audience reception, resource relevance, and project feasibility. This stage prevented resource use from becoming disconnected from the output goal, while the teacher mainly provided assessment as part of the POA scaffold.

With the previous stages done, students moved into the Act stage. They revised their topic, adjusted or added to the resource bank. It helped clarify the project's purpose and verify their strategy for collecting and selecting resources. The Act stage was important because it prepared the students for the next cycle of PDCA.

4.2.2. Cycle two: Output development and reflection

The second PDCA cycle matches the enabling and assessing stages of POA. In this stage, students were guided to process selected resources and turn them into language output. Also, they kept improving the output through feedback and reflection. By the end of this cycle, students were expected to hand in their final project product, which included a video or oral presentation with scripts and a reflection log.

In the first stage of planning, students finalized the topic proposal based on feedback from the last

PDCA cycle, adjusted the resource bank, and then analyzed resources for the final product. Using the revised topic proposal, they developed a detailed output plan.

In the Do stage, students designed project content, started to draft the English script, and practiced oral presentation. In this stage, resources were further processed for the final product. The teacher offered guidance as needed throughout the process as part of the enabling stage in POA.

The Check stage in cycle two also emphasized feedback and reflection. Students submitted the draft script of the final production for feedback from both the teacher and peers. Teacher feedback focused on the use of resources, language accuracy, discourse organization, and communicative appropriateness, while peer feedback focused more on audience reception and communicative effectiveness.

In the final stage of acting, students adjusted the project content, improved the script, reorganized the presentation, and completed the final product. The product was finalized based on feedback from the teacher and peers, and will also undergo further assessment after the presentation. After the two cycles were completed, students were required to write a reflection log.

Through the two PDCA cycles, POA's output-oriented logic was operationalized in a project-based classroom. Resource use was planned, checked, and redirected toward output goals, while language output was drafted, assessed, and revised before final submission. Thus, PDCA transformed project work from one-time product completion into a staged process of resource organization, feedback-based adjustment, and revised production.

4.3. Questionnaire design

Pre- and post-questionnaires were used to examine changes before and after. Since RQ1 mainly concerns the instructional mechanism, it was addressed through the conceptual framework and teaching procedures. The questionnaire data were used primarily to answer RQ2, which focuses on the effects of the POA-PDCA model on students' resource use, confidence in language skills, and project learning experience.

Accordingly, the questionnaire items analyzed in this study were organized into three dimensions. The first dimension is resource use, which included 3 questions about the students' perceived ability to find online learning resources, their perceived necessity of using online resources for English learning, and their preferred learning methods, such as doing exercises, reading English materials, and using online resources. The aim is to examine whether students' learning shifted from practice based on exercises toward more purposeful resource use.

The second dimension is confidence in language skills, which was measured through 5 questions concerning students' self-evaluation of English abilities related to output, including listening, speaking, reading, writing, and translating.

The third dimension is project learning experience, which included 5 questions to examine items on teacher-student interaction, project management, communication, collaboration, and autonomous learning. All of these items were selected because they correspond to the feedback, revision, and coordination processes emphasized in the PDCA cycle.

102 valid pre-questionnaires and 105 valid post-questionnaires were collected from 105 participants. Descriptive statistics, percentage comparison, mean comparison, and significance testing were used. The analysis focused only on items directly related to the research questions.

5. Findings

The findings are presented according to the three dimensions of RQ2: resource use, confidence in language skills, and project learning experience.

5.1. Resource use

According to the questionnaire results, students reported that their ability to select and use online learning resources improved after the POA-PDCA project learning. On a Likert 5-point scale, their average score went from 3.392 to 3.790, with an increase of 0.398. Their willingness to use online resources for English learning also rose from 3.490 to 3.829, with a gain of 0.339. Students also reported that they have changed their learning methods. Before the project, 70.59% of students reported that "doing exercises" was their main way of learning. After the project, that number dropped to 49.52%.

5.2. Confidence in language skills

Students also felt more confident about their language skills, especially speaking. In the pre-questionnaire, only 14.71% thought speaking was one of their stronger English abilities. After the project, the percentage rose to 26.67%, up by 11.96%. Other abilities, including writing, reading, listening, and translating, also showed moderate improvement.

5.3. Project learning experience

Students reported more positive project learning experiences after the POA-PDCA project learning. The mean score for the recognition of the statement "project-based learning helps teacher-student interaction" increased from 3.441 to 3.876 on a 5-point Likert scale.

Post-questionnaire results also showed that 68.57% of students reported improvement in project management ability, 70.48% reported improvement in communication ability, and 72.38% reported improvement in collaboration ability; 80.95% of students reported improvement in autonomous learning ability.

These results suggest that students experienced project-based learning as a more interactive and manageable process.

6. Discussion

The findings can be interpreted in relation to the two research questions.

For RQ1, the study shows that POA and PDCA can be integrated into a project-based classroom from the perspective of the teacher and the students. POA provides the teachers' scaffolding mechanism, promoting students' learning by clarifying the output task, organizing enabling input, and providing assessment. PDCA provides the students' process regulating mechanism by guiding students to build their own working cycle to plan resource needs, use resources, check output quality through feedback, and revise the product. In this way, ubiquitous learning resources are efficiently structured as task-oriented support for project output.

The POA-PDCA integration therefore addressed the two key limitations of ubiquitous resources and project-based learning. By linking resource selection, evaluation, and revision to project goals, the PDCA cycles enabled the students to use ubiquitous resources in a structured way. By providing a pedagogical and operational framework, the model shifted the focus of project-based learning from product completion to

process regulation and improvement.

In response to RQ2, the questionnaire results indicate positive changes in the three dimensions. In resource use, students performed better at selecting online resources and using them more purposefully. Students moved away from traditional methods and started leaning more on ubiquitous learning resources. Meanwhile, their confidence in language skills improved, especially in speaking. This improvement may come from the fact that the project put more emphasis on an oral output, and the frame was designed with the focus of a communicative speaking task. Also, students reported better interaction with the teacher, stronger project management skills, and progress in communication, collaboration, and autonomous learning. It shows that the POA-PDCA approach has properly enhanced the project-based learning experience, which will also facilitate students' future career management.

7. Conclusion

This study constructed and examined a POA-PDCA approach to structure the ubiquitous learning resources for output in the project-oriented College English classroom. Two PDCA cycles form the basic framework. The first cycle focused on planning and resource preparation, while the second focused on output development and revision.

The study tried to solve two common limitations in College English teaching concerning ubiquitous resources and project-based learning. One is that students often use online resources in a fragmented, unorganized way. The other is that project-based learning tends to focus more on the final product. The findings suggest that the integrated POA-PDCA approach to constructing ubiquitous learning resources for output in a project-based English classroom had positive effects on students' resource use, confidence in language skills, and project learning experience.

The main implication is that College English teaching should not simply provide more online resources or assign more project tasks. Instead, resources need to be organized around output goals, and project work needs to be supported through feedback and revision.

This study has several limitations. First, the findings were based only on questionnaire data, and the research has only been conducted in a single institutional context. Future research may include student interviews, project product evaluation, platform learning data, and long-term tracking to further examine how the POA-PDCA approach structures ubiquitous learning resources to support project-based language learning.

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