The Establishment of the Evaluation Index System for Assessing Student Performance in Bilingual Engineering Management Courses

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Abstract: The bilingual education for engineering disciplines in universities is necessary to meet the demands of globalization in modern society. By providing an immersive English-speaking environment, personalized learning experiences, and cost-efficiency, it can help universities deliver high-quality bilingual education to engineering students. In order to generate more accurate and efficient assessments of students' performance in this context, it is essential to establish an evaluation index system to assist teachers in conducting comprehensive evaluations among students. This paper presents a study on the establishment of an evaluation index system for students' performance in bilingual engineering management courses, which could provide a comprehensive and objective measurement basis for students' performance. By implementing this evaluation index system, it will help students identify their strengths and areas for improvement but also provide valuable feedback to teachers and administrators on the effectiveness of their teaching methods and course design.

Keywords: Engineering Management, bilingual education, student performance evaluation

1. Introduction

In the modern era of globalization, the need for bilingual education in engineering disciplines has become increasingly evident. Bilingual engineering management courses aim to provide students with the skills and knowledge required to thrive in this globalized landscape [1-2]. To ensure the quality of education and the readiness of students, it is essential to have an effective evaluation index system in place, which would not only evaluate students' academic performance but also their non-academic skills that are crucial for success in the industry. For the bilingual engineering management courses, they often demand a unique set of skills and knowledge, making the establishment of an evaluation index system for students' learning performance crucial. To develop this evaluation index system, a mixed methods approach will be utilized. This includes literature review, interviews and questionnaire surveys. Their insights and experiences will inform the development of the evaluation indices, providing a rich source of data to inform the design of the system [3]. The findings of this study will contribute to the field of engineering education by providing a structured and reliable method for evaluating student performance in bilingual engineering management courses. This study will also help teachers to identify students' strengths and areas for improvement, enabling them to deliver personalized feedback and guidance. Furthermore, the evaluation index system will enable universities to assess the effectiveness of their bilingual engineering management programs, identifying areas that require improvement.

2. The Establishment of a Comprehensive Evaluation Index System

To comprehensively evaluate engineering students' bilingual learning performance, multiple indicators are first gleaned by literature review and then further screened by consultation with experts. As suggested by the experts and experienced teachers, a brief and effective evaluation index system incorporating several key dimensions is required, as a complex index system would consume much time on data processing and thus prolong the entire assessment. First of all, various factors are gleaned by literature review to evaluate students' academic performance in a bilingual, e-learning environment. The selected factors include exam scores, teamwork skills, regular homework quality, attendance rate, interactive participation, critical thinking, language proficiency, problem-solving skills and learning attitude. Afterwards, 30 experienced are invited to rate the importance levels of each collected factor by

a 5-point Likert scale through questionnaires and face-to-face interview. The average score for each criterion signifying its importance degree can then be obtained, which is presented in Figure 1. Finally, the criteria with the highest ratings of importance are obtained which include exam scores (C_1), regular homework quality (C_2), attendance rate (C_3), interactive participation (C4), language proficiency (C_5) and problem-solving skills (C_6). Based on these criteria, an evaluation index system for students' bilingual e-learning performance is established and shown in Figure 2. The detailed explanation and evaluation methods of each criterion are provided in the following subsections.
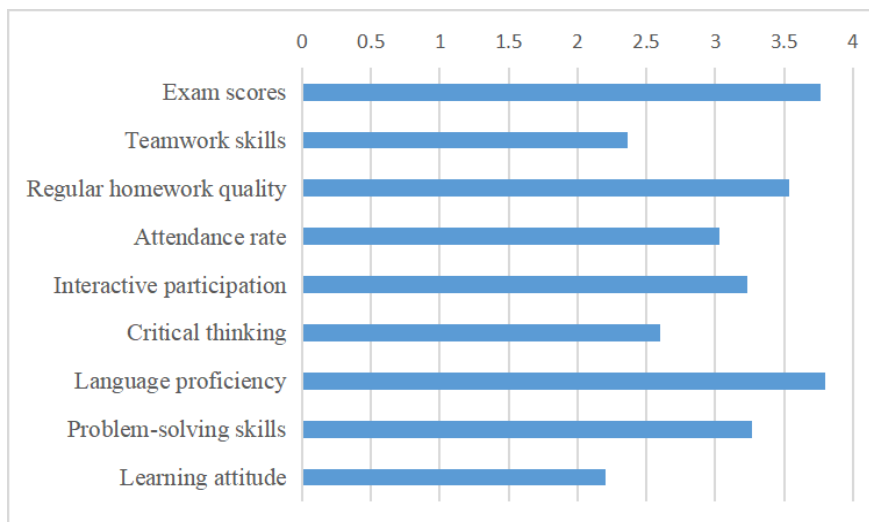

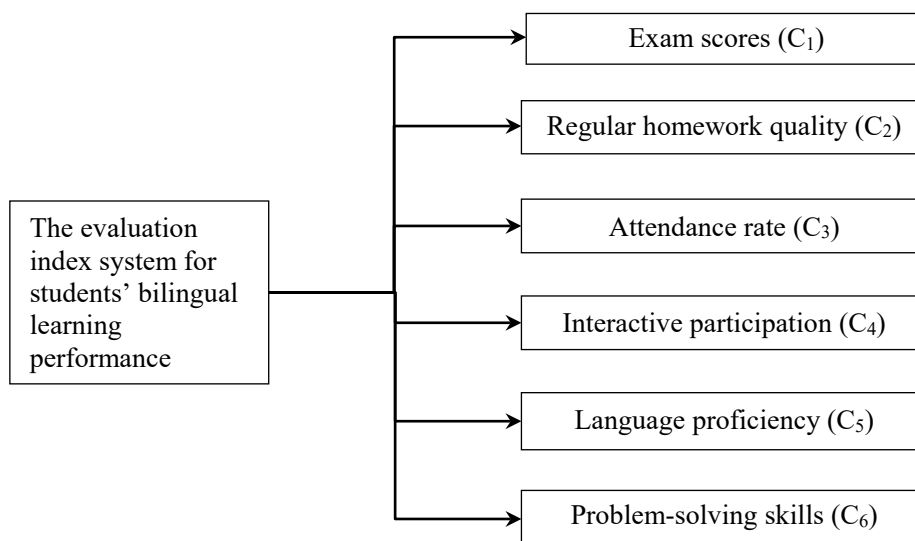*Figure 1: The average values of gleaned criteria based on questionnaire survey*

Figure 2: The evaluation index system for students' learning performance over bilingual engineering management courses

2.1 Exam Scores

Exam scores can be obtained through regular in-class tests, midterm exams, and final exams via online learning platforms, and are often the most direct indicator for evaluating a student's academic performances, learning attitude and habits, as well as their mastery of knowledge [4]. This criterion can be used as one of the criteria to measure students performance over bilingual engineering management courses. Meanwhile, this criterion scores should be given a certain weight in the overall evaluation of students' performance according to the course objectives and teaching requirements. For example, if the course emphasizes knowledge and skills, the weight of exam scores may be higher; if the course emphasizes practical ability and innovation, the weight of exam scores may be lower.

2.2 Regular Homework Quality

The quality of regular homework can measured based on homework completion, content quality, format specification, etc. It is a common criterion used to measure students' performance and can be applied to bilingual engineering management courses. Regular homework quality can help teachers identify students' strengths and weaknesses, provide feedback for students to improve their performance, and promote students' active participation in learning processes. To apply this criterion, teachers should design a homework assignment plan that covers key topics and requires students to demonstrate their knowledge and skills in a wide range of areas. The assessment over this evaluation criteria can be made comprehensively from the aspects of the accuracy and completeness of solutions, the depth and breadth of knowledge, the use of professional language, the creativity and innovation of ideas, etc. Homework evaluations should be made along with the feedback on student performance and identify areas where improvement is needed.

2.3 Attendance Rate

The attendance rate reflects whether students attend classes on time, and whether they have a good learning attitude and habits. The attendance rate can help teachers identify students who need extra support or encouragement and provide feedback for students to improve their performance. It can also promote students' active participation in learning processes and encourage them to take ownership of their learning. The attendance rate can be calculated by dividing the number of students who meet the attendance requirements by the total number of students enrolled in the course. This rate can be calculated at regular intervals during the course duration. Also, teachers can track student attendance in real time with the assistance of modern technology to record student attendance.

2.4 Interactive Participation

Interactive participation refers to students' active engagement and participation in learning activities, discussions, and collaborations. This criterion helps lead students to develop their communication skills, critical thinking, and collaboration abilities, which are essential for their future success in engineering management fields. The evaluation of students participation can be assessed via the frequency and quality of participation in online discussions, the level of interaction with other students, the contribution to collaborative projects or tasks, and the ability to ask meaningful questions or provide constructive feedback [5]. In bilingual engineering management courses, by applying this criterion for evaluation, students will be encouraged to actively participate in learning activities and discussions, which not only enhances their knowledge acquisition but also improves their language proficiency and communication skills.

2.5 Language Proficiency

Language proficiency refers to students' ability to use English effectively in the context of bilingual engineering management courses. The application of this criterion helps to ensure that students have the necessary language skills to understand and apply course content effectively. To measure students' language proficiency over bilingual engineering management courses, the language proficiency levels need to be specified and can be assessed by written assignments, oral presentations, participation in class discussions, and tests or exams [6]. Meanwhile, it is also important to provide feedback on students' language proficiency levels and areas where they need improvement, and help students set clear language proficiency goals that are aligned with the course objectives and teaching requirements.

2.6 Problem-Solving Skills

Problem-solving skills refer to the ability of students to identify, analyze, and solve engineering management problems effectively [7]. By focusing on problem-solving skills, students will be better equipped to apply their knowledge in real-world engineering management situations and demonstrate effective decision-making abilities. Therefore, this criterion is essential for student evaluation and can further be evaluated based on students' abilities to identify and analyze problems, generate and evaluate solutions, communicate effectively, and collaborate with others. This evaluation can be based on written reports, oral presentations, group discussions, or projects where students apply their problem-solving skills to practical situations, by assessing students' ability to identify problems, analyze root causes and

generate solutions.

3. Summary

The development and implementation of a comprehensive evaluation index system for bilingual engineering management learning courses is crucial for improving student learning outcomes and ensuring the quality of education in this field. By incorporating both English and Chinese into the curriculum, students are better equipped to handle the complexity and international nature of engineering management in today's globalized world. Bilingual learning not only enhances language proficiency but also cultivates cross-cultural communication and problem-solving abilities. In this study, the establishment of an evaluation index system for student performance in bilingual engineering management courses is crucial for effective learning and accurate assessment. The established evaluation index system take into account various factors including exam scores, regular homework quality, attendance rate, interactive participation, language proficiency and problem-solving skills. By incorporating these factors into the evaluation, students can be comprehensively assessed based on their knowledge, skills, and abilities gained through learning process. This assessment basis can be fundamental to obtain valuable feedback to students on their progress and identify areas that require further improvement. It can also inform teachers about the effectiveness of their teaching methods and course design.

Acknowledgments

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