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NAVIGATING ASSESSMENT ALIGNMENT IN BLENDED LEARNING: A COMPARATIVE ANALYSIS OF MAJOR AND NON-MAJOR SUBJECTS

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A B S T R A C T

A powerful pedagogical strategy has evolved in the age of developing educational technology: blended learning, which combines traditional instruction with online resources. In particular, it examines distinctions between major and non-major subjects in order to address the essential issue of assessment alignment in blend-ed learning. While investigations frequently evaluate the effectiveness of blended learning, few examine how examinations fit with its distinctive features.

The assessment alignment in major and non-major subjects is compared in this study using the Correlation and Regression Tree (CART) model. Determining how assessments should align and how to make sure they measure topic mastery in this blended setting are among the key issues discussed. The study contributes to conversations about curriculum design and policy by assessing the literature and examining assessment procedures.

The study offers knowledge that can be used to create evaluations for blended learning that are efficient while also promoting engagement among learners and academic success. Through this investigation, teachers receive tips on instructional design that will help them in the digital age to promote a unified learning experience across all topics.

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1. INTRODUCTION

The rapid progress of educational technology in recent years has fundamentally changed how we approach instruction and learning. The careful blending of conven-tional classroom instruction with online and digital resources is known as blended learning, and it has become recognized as a potent instructional strategy that brings the best of both worlds together. It is crucial to make sure that examinations, a cru-cial component of the learning process, are properly aligned with the primary objec-tives and goals of each topic as instructors continue to use this continually evolving form of education.

The important topic of evaluating alignment within the framework of blended learning is explored in-depth in the aforementioned study, which focuses on the vari-ations in congruence across major and non-major subjects. There is a lack of in-depth investigations that examine how assessments, particularly those in major and non-major subjects, align with the distinctive characteristics of this instructional mo-dality, despite the fact that there has been a lot of research on the effectiveness of blended learning in improving the performance of students (Klein & Tamin, 2019; Clark & Mayer, 2016).

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This study aims to provide answers to numerous important concerns by carefully evaluating the alignment of examinations in major and non-major subjects within a blended learning environment. Do these two types of subjects' alignment of judg-ments differ noticeably from one another? How can educators, while adjusting to the hybrid character of blended learning, guarantee that assessments effectively measure the mastery of content and skills in both major and non-major subjects? What tech-niques may be used to improve the fit between assessments and learning goals, thereby enhancing the effectiveness and coherence of the educational process for students?

2. LITERATURE REVIEW

This study article uses an empirical examination of assessment processes in various educational institutions along with a thorough review of the prior literature to address these problems (Dziuban et al., 2018; Hew & Cheung, 2019). Teachers, instructional professionals, and policymakers in the education sector can collaborate to improve methods of evaluation and create a more equitable and productive educational set-ting for all students by developing a more comprehensive awareness of the alignment difficulties experienced in blended education for both major and non-major subjects (Miller et al., 2021).

This research investigation adds insightful information to the ongoing discussion surrounding efficient instructional planning, student participation, and the realization of positive learning outcomes in the digital age by examining the alignment between assessments and the particular demands of blended learning across major and non-major subjects (Means et al., 2019; Cavanaugh, 2017).

Examining assessment alignment in the context of blended instruction, which combines traditional face-to-face educational experiences with online and digital elements, is the main objective of this study. With its ability to provide flexibility, engagement, and increased learning possibilities, this educational strategy has signifi-cantly increased in popularity in recent years. The evaluations utilized in this ap-proach must, however, adequately measure the desired learning objectives while meeting the specific requirements of both major and non-major courses as blended learning evolves to develop.

Any possible difference in assessment alignment between major and non-major subjects is a crucial aspect to investigate. Non-major courses include a wider range of disciplines and can be studied by learners from a variety of educational backgrounds, whereas major subjects frequently serve as the core courses within a particular field of study. Due to the different levels of topic proficiency, baseline information, and educational objectives, the alignment of assessments in many different areas may show variances.

It is crucial to comprehend whether there are appreciable variations in the align-ment of assessments between major and non-major disciplines. Teachers, instruc-tional designers, and educational administrators can use these insights to build evalu-ation mechanisms that are efficient for each topic area while taking into account their particular needs in the blended learning environment.

Additionally, this study aims to investigate the precision with which assessments in the blended learning modality measure subject knowledge and abilities. Assessments are crucial in determining how well students comprehend, apply, and retain the course contents. It is essential to make sure that the examinations appropriately represent the learning objectives of the course in the context of blended learning, when students engage with both conventional classroom activities and online resources. This study aims to provide insight on the efficacy of existing assessment procedures within the blended learning paradigm by examining the alignment of assessments.

In the end, the study looks for ways to improve how evaluations and instructional goals are aligned in blended learning. By addressing this problem, the study hopes to advance the creation of more efficient assessment techniques that smoothly inte-grate the objectives of blended learning, giving students in both major and minor topics a unified and productive learning experience. Through this investigation, in-structors can acquire essential tips and tricks for making sure evaluations reinforce the desired learning goals while also adjusting to the unpredictable aspect of blended learning.

Blended learning is an approach that combines conventional classroom tech-niques with online materials as a result of the quick development of technology in education (Garrison & Vaughan, 2018). The alignment of assessments becomes in-creasingly important for optimal learning when educators adopt this dynamic ap-proach (Hew & Cheung, 2017).

While evidence has shown that blended learning has advantages, there hasn't been much focus on how evaluations are aligned, especially in major and minor courses. The need to investigate evaluation systems that work in the mixed learning context is emphasized by Klein & Tamin (2019). Assessments must support instructional goals in order for results to be successful, according to Clark and Mayer (2016).

This study explores the gap in assessment alignment within the context of blended learning, drawing on an examination of the body of previous research and empirical investigation (Dziuban et al., 2018; Hew & Cheung, 2019). Educators can collaborate improve techniques by recognizing alignment issues in main and non-major topics (Miller et al., 2021).

This study provides insights into instructional design and student participation by comparing assessment alignment between major and non-major topics (Means et al., 2019; Cavanaugh, 2017). Assessments that accurately measure the intended learning outcomes are

necessary for maximizing the adaptability and participation potential of blended learning (Graham, 2017). This study investigates methods to improve alignment and contribute to the changing blended learning environment.

Gasevic et al.'s (2020) new studies explore learning analytics to comprehend how in-dividuals act and perform in blended environments. Granic and Marinkovic (2018) examine how motivation and self-control play a part in the success of blended learn-ing. Additionally, Garrison and Vaughan's (2018) work offers a framework for effi-cient blended learning design, emphasizing the cooperation between both virtual and in-person aspects.

Being aware of latest advances is essential because technology is always influenc-ing schooling. As an illustration, Chen et al. (2020) suggest that the employment of AI and adaptive learning platforms may improve assessment alignment. up addition to filling up existing gaps, this study tries to capture the modern intricacies of assessment alignment in blended learning.

3. METHODOLOGY

The proposed conceptual framework is centered on assessment alignment and evaluation (ATEE) in a blended learning setting for both major and minor topics (Figure 1). This approach tries to examine how well assessment procedures ensure that learning ob-jectives are met. The approach integrates data-driven study of assessment outcomes and draws inspiration from Knowledge Discovery in Databases (KDD) concepts, con-tributing to a deep understanding of alignment trends.

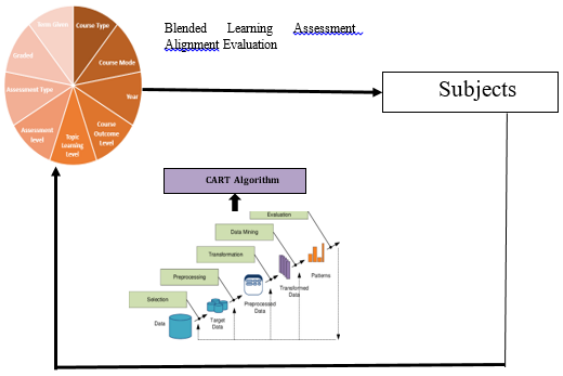

Figure 1. Conceptual Framework

The comparison of assessment alignment between major and non-major subjects is at the heart of this paradigm. The analysis aims to identify potential variations in alignment tactics depending on the subject matter. We seek to find effective ap-proaches that are appropriate to both categories whilst also recognizing any particular issues that may occur based on topic characteristics by examining how assessments in major subjects match with the goals they have for learning and compare this with non-major subjects.

Reflecting the RASE (Resources, Activities, Support, Evaluation) framework, which emphasizes the influence of these components on assessment alignment, this model seeks to offer perspectives on designing curricula and professional growth within the blended learning environment.

The framework also takes into account a model put forth by Asaqli, which em-phasizes a hexagonal model for e-learning and incorporates elements like diversity, relevance, and support. This component encourages us to use a wider viewpoint when analyzing the alignment of assessments. A thorough understanding of the success of alignment is made possible by the variety and relevance of evaluation methodologies as well as the provision of strong support systems.

4. RESULTS AND DISCUSSION

After extensive data cleansing and processing, the distribution of various qualities (Figure 2). For the academic years 2016–2019, disciplines from the College of Science and Computer Studies were combined in the dataset. It included 1650 instances of gen-eral education subjects and 4692 instances of course-specific (major) subjects. These courses were taught using three different delivery methods: lecture-only (3447 in-stances), laboratory-only (1845 instances), and lecture and laboratory (1050 instanc-es). Students in different academic years received varied course offerings: 2331 sec-ond-year students, 1749 first-year students, 1467 third-year students, and 795 fourth-year students. To determine the desired learning traits that students are anticipated to gain, course level and topic level outcomes were chosen as attributes. The six levels of Bloom's taxonomy were used to categorize these learning outcomes. To identify evaluations that received a certain number of points, the "graded" feature was used. 5184 of the 6342 evaluations were discrete and 1158 were non-discrete, for a total of 6342 assessments. There were evaluations given throughout prelims, midterms, and finals. There were 2523 assessments given during prelims, 2202 during the midterm examinations and 1617 during finals. Finally, while 1197 assessments were used as summative assessments 5145 assessments were created as enabling tests.

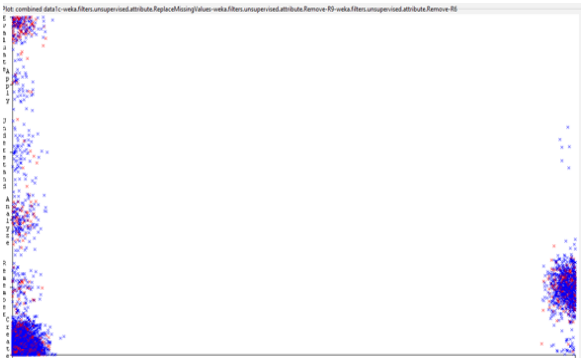

Figure 2. Major and Non-major Subject Assessment Classification

The information shown in the illustration provides thorough comparisons of course kinds and assessment results at various levels of cognitive ability. This indicates that both classifications of subjects emphasize the development of higher-order thinking skills while still addressing critical lower-level thinking skills. Based on the aforemen-tioned results, it is evident that examinations for general education subjects primarily emphasize the analytical abilities of "Create," "Remember," and "Evaluate," while evaluations for course-specific subjects prioritize the cognitive skills of "Create," "Remember," and "Analyze."

These findings suggest that both general education and course-specific coursework are carefully created to encourage a broad spectrum of cognitive talents, which are essential for students' overall intellectual development and growth. This analysis illus-trates the institution's dedication to providing a balanced curriculum that emphasizes the development of a variety of cognitive talents, giving students the necessary skills and capacities to meet both current and future challenges.

The results shown in the picture provide important information about the levels of assessment and cognitive abilities the academic program is aiming at. This demon-strates the organization's unwavering commitment to giving pupils a thorough and balanced education.

The decision tree that the researcher built included a wide range of attributes, in-cluding course mode, academic year, course and topic-level outcomes, assessment results, grading, term of assessment, and assessment style. The researcher used the Classification and Regression Tree (CART) approach within the Weka 3.8.6 software to construct the decision tree. The extent to which the educational goals were met was evaluated using this extensive list of criteria.

The decision tree's accuracy was evaluated using a 10-fold cross-validation meth-od. As evaluative factors, a variety of measures including Kappa statistics, Matthews Correlation Coefficient, and a confusion matrix were constructed. The alignment of numerous parameters was examined using the software's visualization tool.

The study's findings have ramifications for both curriculum development and pol-icy concerning education. The study provided a thorough evaluation of Outcome-Based Education (OBE) in blended learning environments by examining archived blended courses. In the field of technological innovation, these findings are especially important since they provide useful information for informing curriculum design choices and influencing policy concerning education.

The subsequent studies in this area will be guided by how decision tree analysis and data mining methods were used in this work. These techniques give instructors and educational designers an adequate foundation for data-driven decision-making, allowing for a more objective and empirical assessment of the effectiveness of vari-ous approaches to instruction.

Particularly, the focus of the study on archived blended courses is an important factor because it allowed researchers to assess the effectiveness of OBE in the actual world rather than just using modeled circumstances. This emphasis increases the study's findings' relevance and adaptability to contemporary instructional techniques.

5. SUMMARY

The study used a variety of parameters, including course mode, year of study, course and topic-level outcomes, evaluation outcomes, grading, examination period, and assessment technique, to create a decision tree using the Classification and Regression Tree (CART) approach within the Weka 3.8.6 software. These characteristics were carefully chosen to gauge their fit with learning goals. The accuracy of the decision tree was assessed by the study using a 10-fold cross-validation approach, which also included confusion matrix, Matthews correlation coefficient, and kappa statistics. The software's display function was used to investigate how different parameters lined up.

The investigation has consequences for developing curricula and setting policies for education, especially in the area of technological advancements. It conducted a thorough analysis of outcome-based education (OBE) in blended learning environments by assessing recorded blended courses. This study establishes a significant foundation for prospective studies by using decision tree analysis and data mining methods to evaluate instructional strategies quantitatively and make data-driven decisions.

6. CONCLUSIONS

The results of the research highlight the importance of evaluating assessment align-ment in blended education settings. A complex knowledge of OBE's efficacy is made possible by the decision tree model's usage of a wide range of attributes along with its thorough evaluation metrics. The study's conclusions are relevant and applicable in modern educational environments thanks to the real-world appraisal of archived blended courses.

7. RECOMMENDATION

Multiple suggestions are put forth in light of the investigation's findings. To start, edu-cational institutions ought to think about implementing decision tree analysis and data mining methods to evaluate and enhance assessment alignment. These ap-proaches provide an evaluation of teaching strategies that is more quantitative and objective. The study also highlights the significance of topic-level and course-level objectives in curriculum design, recommending that teachers

concentrate on these elements to guarantee students' comprehensive learning. The assessment must be expanded to include a range of fields of study, and it must be investigated how the results might be used to guide the development of curricula and educational policies in a variety of fields. Finally, this field needs more research.

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