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# A Review on Outcome-Based Education Through Learning Management Systems

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***Abstract:-*** **Undergraduate students who are future responsible citizens benefit greatly from the educational system. The thriving IT sector is in need of technical knowledge, which has hampered its growth in recent years due to the adoption of online learning methods. This initiated a thought of implementing competency-based courses for students which keep them updated on technical skills. Analysing competency is computed by building an intelligent tutoring system (ITS) that enables a user-friendly application for students' enhancement in learning. To reshape students' technical ability, identifying their outcomes and moulding them into a better version is necessary. Henceforth we conclude by bringing up new features in the application that measure the effectiveness of competency-based learning in students.**

***Keywords:- Artificial Intelligence, Intelligent Tutoring Systems, Competency-Based Learning, Adaptive Learning, Linguistic Labels, Outcome Based Learning***

## 1. INTRODUCTION

Making a machine think intelligently like a human brain using artificial intelligence (AI) entails giving it the ability to adapt, offer the proper logic or reasoning, and find solutions.

To deliver better education to students we can incorporate AI in education to provide a differentiated and individualized learning experience. So each student learns concepts at their own pace accelerates there learning experience or decelerate them on particular regions where AI observes the areas they need more support.

AI in education can be upgraded by using competency-based learning (CBE) which acts like a catalyst for rethinking teaching and learning. Most schools and college curriculum mainly concentrate on how much time is spent on each course but learning is a variable As a result, CBE shifts the emphasis away from how much time is allotted to students and towards whether or not they demonstrate well-defined competencies.

Instead of being a single summative event, the assessment of these competencies is a continuous process. So, students are given multiple chances to attain the learning result necessary for each competency that has been designed.

In order for students to level up their knowledge in preparation for the current competition in the field of education, adaptive learning is one of the techniques needed. Doing online quizzes and assignments can improve technical abilities and encourage students to answer questions confidently.

Next is the concept of outcome-based education must be used to highlight changes in students' success levels that can be measured. Every student will be eagerly anticipating improvements in the teaching strategy that will enable them to evaluate their performance based on the outcomes of those specific skills.

Overall, it increases one's awareness of where they are and the skillset required to reach their personal chosen area of expertise, as well as empowers them to think critically about all of the experiments to determine which approach might be worth trying in their own context.

It does have a few drawbacks like Limited flexibility for automated assessment tools may be limited in their ability to evaluate certain types of assignments, particularly those that require more complex problem-solving or creativity. In such cases, human grading may be necessary to ensure that students are being evaluated fairly and accurately.

As well as cost for automated evaluation and monitoring tools can be expensive to implement and operate, especially for smaller institutions or those with limited resources. This might restrict access to these resources to a small number of students or institutions.

RELATED WORK

| NO. | Name of the Author | Description and Methodology proposed | Advantages and Disadvantages |
|---|---|---|---|
| 1. | H. Vargas, R. Heradio, J. Chacon, L. De La Torre, G. Farias, D. Galan, and S. Dormido,''Automated assessment and monitoring support for competency-based courses,'' IEEE Access, vol. 7, pp. 41043–41051, 2019. | • The article presents the use of automated assessment and monitoring has the potential to improve the effectiveness of competency-based education and provide more accurate and timely feedback to students. | • Increased efficiency: Automated assessment tools can significantly reduce the time and resources required for grading and providing feedback to students. |

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| | | • The system is composed of two main components: an assessment engine and a monitoring system. The assessment engine uses machine learning algorithms to automatically evaluate student assignments, while the monitoring system tracks student progress and provides real-time feedback to instructors. | • Improved assessment accuracy: The use of automated assessment tools can help to reduce subjective biases and increase the accuracy of the assessment process. This is particularly important in competency-based courses, where assessments are often based on specific learning outcomes that need to be evaluated objectively.<br>• Lack of personal interaction: Automated assessment and monitoring tools may not be able to provide the same level of personal interaction and support as human instructors. This can be particularly challenging for students who require more individualized attention and support. |
| 2. | Pedro N. Vasconcelos , and A. C. Zambroni De Souza , "A Problem-Based Introduction to Technical, Social, and Systemic Thinking in Engineering Courses", IEEE Access, vol. 10, 2022. | • The article begins by discussing the challenges facing engineering education today, including the need for students to be able to apply their technical knowledge in real-world contexts and to understand the broader social and ethical implications of their work.<br>• The article then describes a specific pedagogical approach that the authors have developed, which is based on a set of core principles. These principles include the use of real-world problems as a starting point for learning, the integration of technical and non-technical perspectives, and the promotion of active and collaborative learning. | • Improved problem-solving skills: Problem-based learning encourages students to apply their technical knowledge to real-world problems, improving their problem-solving skills and their ability to think critically<br>• Initial resistance to change: Implementing problem-based learning can be challenging as it may require a significant shift in teaching methods and student expectations, which can lead to initial resistance from students and faculty. |
| 3. | Fermín Sánchez Carracedo & Antonia Soler & Carme Martín & David López & Alicia Ageno & Jose Cabré & Jordi Garcia & Joan Aranda & Karina Gibert , "Competency Maps: an Effective Model to Integrate Professional Competencies Across a STEM Curriculum" | • A competency map is a tool that identifies the skills and knowledge required for success in a particular field or job. By using competency maps, educators can design a curriculum that integrates the necessary technical skills and professional competencies needed for success in the workplace.<br>• Incorporating these competencies into the curriculum can be done through a variety of methods, including project-based learning, collaborative group work, and experiential learning. | • Relevance: Competency maps help ensure that the curriculum is relevant to current and future industry needs. This relevance helps students stay current with the skills and knowledge required for success in their field.<br>• Limited focus: Competency maps tend to focus on specific technical skills and professional competencies that are necessary for success in a particular field or job. This narrow focus can lead to a lack of exposure to broader topics and skills that may be valuable to students in the long run.<br>• Lack of standardized competency maps: While there are many competency maps available, there is no standardized model. This can make it difficult to compare competencies across different programs and institutions. |
| 4. | Jiabin Zhu , Juebei Chen, Nathan McNeill, Tianyi Zheng, Qunqun Liu, Bing Chen, and Jun Cai ,"Mapping Engineering Students' Learning Outcome From International Experiences: Designing an Instrument to Measure Attainment of Knowledge, Skills, and Attitudes" | • The article outlines the process of designing and validating the instrument, which involved developing a set of learning outcomes based on existing literature, as well as conducting surveys and focus groups with engineering students who had participated in international experiences. The instrument includes questions on knowledge, skills, and attitudes related to intercultural competence, technical knowledge, and personal development.<br>• The article also discusses the results of a pilot study that was conducted to test the instrument. The study involved administering the instrument to a group of engineering students who had participated in international experiences, as well as a control group of students who had not. The results showed that the instrument was able to detect significant | • Potential for program improvement: The evaluation of learning outcomes can provide feedback for program improvement. For example, if the instrument shows that students are not developing intercultural competence as much as expected, program organizers can make changes to address this issue.<br>• Customizable to specific international experiences: The instrument can be customized to specific international experiences, such as study abroad programs or international internships. This allows for a more targeted evaluation |

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| | | differences in the learning outcomes of the two groups. | of the learning outcomes of specific international experiences.<br>• Difficulty in measuring attitudes: Measuring attitudes, such as intercultural competence or personal development, can be challenging as they are subjective and difficult to quantify. This could lead to difficulties in interpreting the results of the instruments. |

## 3. FUTURE SCOPE AND CONCLUSION

There is scope for future development for this project. According to the previous methods used for competency is applied considering based on a few concepts but majorly not focused on technical skills. The model is trained by collecting real-time data for computing the competency of the students and retrieving their course outcomes by considering achievement levels based on the linguistic labels which are a set of parametric ranges decided by the course curator. As many researchers have not specifically monitored student performance on particular courses, this may help in reconsidering this field of aspect. This paper concludes by comparing various factors mentioned by the researchers which can be improvised in providing confidence and self-analysis of students' technical capabilities.

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