
Development of a Web-based E-Learning System for Accounting Education in Higher Education

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ABSTRACT

Web-based e-learning systems have become a major focus in improving accounting learning in higher education. This research aims to design an effective e-learning system to enrich students' learning experience and support better interaction between students and teachers in the context of accounting education. Key challenges in the implementation of e-learning technology include appropriate integration with academic content needs, as well as optimisation of user experience to improve student participation and learning outcomes. Effective evaluation methods are needed to measure the success of e-learning system implementation, considering various evaluation aspects such as user satisfaction, system efficiency, and learning achievement. The impact of using a web-based e-learning system is also analysed on the interaction between students and teachers, which has the potential to enrich the learning experience in the accounting education environment.

Keywords: *E-Learning, Information System, Accounting Education, Higher Education, System Evaluation*

INTRODUCTION

Accounting education in higher education plays an important role in preparing students to face the increasingly complex demands of the world of work. In today's digital era, the use of e-learning technology has become an increasingly relevant alternative in improving the quality of learning. Web-based e-learning system offers

flexibility and accessibility that can increase the effectiveness of accounting learning, both for students and teachers.

Proper e-learning system design plays a crucial role in improving accounting learning. E-learning is also called online learning or online course (Oktaviani et al., 2019; Tumini & Fitria, 2021). E-Learning is an internet application that can connect educators and learners in an online

learning space (Bambang Kurnia & Tumini, 2023; Iqbal & Arisman, 2018). E-learning is explained as an information system that can combine various kinds of teaching materials (audio, video and text media) that can be delivered via e-mail, online discussions, forums and individual assignments as a form of online learning evaluation (Aedo et al., 2011; Romindo, 2017). This research aims to formulate a design approach that suits the needs of students and teachers, so as to facilitate interactive and effective teaching.

The integration of e-learning technology in the context of accounting education is faced with several challenges, including curriculum adaptation, technical readiness of teachers, and the availability of adequate infrastructure. Understanding these challenges is important to identify appropriate strategies in the implementation of e-learning systems (Kumala et al., 2021).

A good user experience in an e-learning system can improve student participation and learning outcomes in accounting courses. A focus on intuitive interface design, collaboration features, and responsiveness to user needs are key in improving the learning experience. Evaluation of an e-learning system should use valid and reliable methods to measure its effectiveness in the context of accounting learning. A comprehensive evaluation approach will help identify the strengths and weaknesses of the developed system. The development of online

educational facilities services, especially e-learning websites, is currently very necessary to support distance learning activities, especially in the Higher Education environment (Purwandani & Syamsiah, 2021).

The use of web-based e-learning systems can change the dynamics of interaction between students and teachers in the context of accounting learning. This study will explore how such systems affect communication, engagement, and quality of interaction in an academic environment.

This research will provide in-depth insight into the implementation and influence of web-based e-learning systems in the context of accounting education in higher education, as well as provide a foundation for further development in educational technology.

Constructivist Learning Theory

According to (Purba et al., 2021) Constructivist learning theory is rooted in the view that learning is an active process in which learners construct new knowledge based on their own experiences. This theory emphasises that knowledge is not just passively received, but is constructed by individuals through their interaction with the environment and reflection on those experiences.

Main character:

- a. Jean Piaget (1987) in (Sugrah, 2020): Developed a theory of cognitive development that highlights how children construct their

understanding of the world through a process of assimilation and accommodation.

b. Lev Vygotsky: Emphasised the importance of social and cultural interaction in cognitive Zone of Proximal Development (ZPD) and scaffolding.

Key Principles:

a. Learning as an Active Process:

- Learners actively construct knowledge through interaction with their environment.
- Learning is a process of discovery, where individuals test their hypotheses and construct new understandings.

b. Knowledge as Individual Construction:

- Knowledge is not something that is passively received, but is constructed by individuals based on their experiences.
- Personal experiences and prior knowledge greatly influence the way learners understand new information.

c. The Role of Social Interaction:

- Social interactions with others, such as classmates and teachers, are very important in the learning process.
- Learning happens through dialogue, collaboration and shared reflection.

d. Cognitive Conflict as a Driver of Learning:

- Conflicts or mismatches between existing knowledge and new information can

prompt learners to revise their understanding.

- Teachers should create situations that challenge students' thinking to promote cognitive development.

Applications in E-Learning:

a. Interactive Learning Environments:

- E-learning systems should be designed to enable active interaction between learners and content, as well as between learners and each other.
- Features such as simulations, case studies, and project-based assignments can help accounting students relate theory to real practice.

b. Collaboration and Discussion:

- The e-learning platform should provide spaces for collaboration and discussion, such as forums, chat, and video conferencing.
- Group discussions and collaborative tasks can facilitate learning through social interaction.

c. Problem-Based Learning:

- Using a problem-based learning approach where students are given real problems relevant to accounting to solve collaboratively.
- This method helps students develop critical thinking skills and the ability to apply knowledge in a practical context.

d. Reflection and Feedback:

- The e-learning system should support self-reflection and provide constructive feedback.
- Tools such as reflection journals and assessment rubrics can be used to help learners evaluate their progress and understand areas for improvement.

Constructivist learning theory provides a strong framework for designing effective web-based e-learning systems for accounting education in higher education. By emphasising active learning, social interaction, and individual knowledge construction, e-learning systems can be designed to increase student engagement, facilitate collaboration, and support the development of critical thinking skills essential in accounting.

ADDIE model (Analysis, Design, Development, Implementation, Evaluation)

According to (Junaedi, 2019) The ADDIE model is a commonly used framework in the development of learning and training programmes. This model consists of five stages: Analysis, Design, Development, Implementation, and Evaluation. ADDIE helps ensure that each stage of programme development is systematically designed and evaluated to improve learning effectiveness.

The ADDIE model provides a systematic and structured framework for developing effective web-based e-learning systems in accounting education in higher education. By following the

stages of Analysis, Design, Development, Implementation, and Evaluation, developers can ensure that the e-learning system is designed and implemented efficiently, fulfils learning needs, and achieves the expected educational objectives.

Diffusion of Innovations Theory (Everett Rogers)

According to (Rogers, 2003) Innovation Diffusion Theory proposed by Everett Rogers explains how, why, and at what rate new innovations are adopted by individuals and organisations. This theory is very relevant in understanding the adoption process of new technologies, including e-learning, in various contexts, including accounting education in higher education.

Everett Rogers' Diffusion of Innovations Theory provides a valuable framework for understanding and managing the adoption of web-based e-learning systems in accounting education in higher education. By understanding the stages of innovation adoption and the characteristics of different categories of adopters, developers and educators can design effective strategies to introduce, implement and optimise the use of e-learning, thereby enhancing accounting learning in higher education.

Application of TOE Framework in Developing Web-based E-Learning System for Accounting Education in Higher Education

a. Technology Context:

- Technology suitability: The e-learning system should fit the needs of accounting learning and support the achievement of educational objectives.
- Technology complexity: Development of intuitive user interfaces and user training to reduce complexity.
- Relative advantage: Shows how e-learning increases the effectiveness of accounting learning over conventional methods.
- Testability: Organise pilot projects or trials of the e-learning system to get feedback and make improvements before full launch.

b. Organisational Context:

- Size of the organisation: Large universities may have more resources to develop and implement an e-learning system.
- Organisational structure: Ensure coordination between departments to support e-learning adoption.
- Human resources: Train lecturers and IT staff to support and manage the e-learning system.
- Organisational culture: Build a culture of innovation and acceptance of new technologies through communication and engagement with all stakeholders.
- Leadership and management support: Gaining support from university leaders

to direct and facilitate the adoption of e-learning.

c. Environmental Context:

- Competition: Using e-learning to improve the competitiveness of universities by offering flexible and quality learning.
- Government policies and regulations: Comply with education regulations and gain support from government policies related to e-learning.
- Technology infrastructure: Ensure the availability of internet network and hardware that supports the use of e-learning.
- Pressure from customers and suppliers: Respond to student demand and labour market needs for graduates who are skilled in using modern technology.

The TOE Framework provides a comprehensive framework for understanding and managing the factors that influence the adoption and implementation of web-based e-learning systems in accounting education in higher education. By considering the technological, organisational and environmental contexts, universities can design effective strategies to adopt and optimise the use of e-learning, thereby improving the quality of learning and meeting the needs of all stakeholders.

Application of User Experience Theory in the Development of Web-Based E-Learning System for Accounting Education in Higher

Education according to (Nakamura et al., 2017):

a. Usability:

- Ease of Learning: The e-learning system should be easy to learn by lecturers and students, with clear guidelines and tutorials.
- Usage Efficiency: Users should be able to complete learning tasks quickly and efficiently.
- Memorability: The system design should support users to remember how to use it without the need for repeated assistance.
- Error Rate: The system should be designed to minimise user errors and provide an easy way to correct them.
- User Satisfaction: The system should provide a satisfying experience, so that users feel comfortable and satisfied.

b. Usefulness:

- Relevant Functions and Features: The system should provide features that suit the needs of accounting learning, such as video tutorials, interactive exercises, and discussion forums.
- Meeting User Needs: The system should be designed to help students achieve their learning goals and support lecturers in the teaching process.

c. Interface Design:

- Layout: The interface should have a neat and organised layout, with elements that are easy to find and access.
- Aesthetics: The visual design should be attractive and professional, reflecting the high standards of accounting education.
- Navigation: The system should provide intuitive navigation, so that users can easily move from one section to another.
- Accessibility: The system should be accessible to all users, including those with special needs.

d. Emotional Satisfaction:

- Emotional Appeal: The system should be emotionally appealing, providing an enjoyable experience and motivating users to continue learning.
- Comfort: The system should provide a sense of comfort during use, with elements that are not confusing or distracting.
- Pleasant Experience: Interaction with the system should provide a positive experience, so that users feel happy and motivated.

e. Interaction and Responsiveness:

- Speed of Response: The system should be responsive to user actions, with fast load times and good interactive response.
- Interactive Feedback: The system should provide appropriate feedback on user

actions, such as confirmation upon completion of a task or automatic grading of exercises.

- Consistency: Interactions within the system should be consistent, with elements functioning in the same way throughout the system.

User Experience Theory provides an important framework for designing and developing effective and satisfying web-based e-learning systems for accounting education in higher education. By focusing on usability, usefulness, interface design, emotional satisfaction, and interaction and responsiveness, developers can ensure that the e-learning system is not only functional but also provides an optimal user experience, thus supporting the achievement of learning objectives and improving student participation and learning outcomes.

Activity Theory Application in the Development of Web-Based E-Learning System for Accounting Education in Higher Education

- a. Subject: Accounting students: The e-learning system should be designed to meet the needs and characteristics of students studying accounting, considering different levels of knowledge and skills.

- b. Object: Academic Achievement: The system should support students in achieving in-depth understanding of accounting concepts, analytical skills, and practical applications. Learning Outcomes: Focus on specific learning outcomes such as the ability to prepare financial statements, analyse accounting data, and complete case studies.

- c. Tools: E-Learning Platform: Selecting and developing an e-learning platform that is user-friendly, supports multimedia, and has interactive features such as quizzes, discussions, and simulations.

Digital Teaching Materials: Develop engaging and interactive content, including video tutorials, learning modules and practical exercises.

Accounting Software: Integration with accounting software to give students practical experience.

- d. Community: Collaboration and Interaction: Encourage interaction between students, faculty, and support staff through discussion forums, online study groups, and webinars.

Social Support: Building a supportive learning community where students can share knowledge, ask questions, and get feedback.

- e. Division of Labour: Lecturer's role:
Develop teaching materials, provide guidance, and facilitate online discussions.

Student Role: Actively participate in learning activities, work on assignments, and collaborate with peers.

Role of IT Team: Provide technical support, maintain the e-learning platform, and assist in technical troubleshooting.

- f. Rules: Academic Policy: Ensure that all e-learning activities comply with the college's academic standards and policies.

Ethical Use: Implement rules on ethical use of technology and maintaining academic integrity in online learning.

Evaluation Guidelines: Develop clear guidelines for evaluating student performance and learning effectiveness through e-learning.

Activity Based Learning Theory provides a comprehensive framework for designing and developing effective web-based e-learning systems for accounting education in higher education. By considering elements such as subjects, objects, tools, communities, division of labour, and rules, developers and educators can create a holistic and integrated learning environment that supports the achievement of learning objectives and

improves student participation and learning outcomes.

Application of Kirkpatrick Evaluation Model in the Context of Web-based E-Accounting Education in Higher Education

- a. Level 1: Reaction

Implementation: Measuring student satisfaction with the experience of using the e-learning system.

Evaluation Question: How do students respond to the user interface, teaching materials provided, and interactivity of the e-learning platform?

- b. Level 2: Learning

Implementation: Measuring the improvement of students' knowledge and skills after using the e-learning system.

Evaluation Question: Do students successfully understand the accounting concepts taught through the e-learning platform? Did they improve their analytical skills in solving accounting problems?

- c. Level 3: Behaviour

Application: Measures the extent to which students apply acquired knowledge and skills in a real context.

Evaluation Question: Do students use the accounting knowledge and skills

acquired from the e-learning system in real projects or case studies?

d. Level 4: Results

Implementation: Measuring the impact of using e-learning systems on students' academic goal attainment and career readiness, as well as the contribution to college's academic outcomes.

Evaluation Question: Does the use of the e-learning system have an impact on improving students' academic grades? Is there an improvement in the quality of graduates in accounting?

The Kirkpatrick Evaluation Model provides a comprehensive framework for evaluating the effectiveness of web-based e-learning systems in higher education accounting education. By considering four levels of evaluation (reaction, learning, behaviour, and outcome), educational institutions can identify strengths and areas for improvement in the implementation and development of e-learning systems that support the achievement of learning objectives and improve overall student learning outcomes.

Application of Balanced Scorecard in the Context of Accounting Education in Higher Education

The Balanced Scorecard can be applied in the context of accounting education in higher education to measure the performance and

effectiveness of education programmes and provision. Here is an example of the application of BSC in accounting education:

a. A Financial Perspective:

Measures: Accounting education programme revenue, operating costs, programme profitability.

Objective: Ensure the financial sustainability of the accounting education programme, measuring the investment and return on funds in this education

b. Customer Perspective:

Measures: Students' level of satisfaction with the accounting programme, success in job placement or continuation of further education.

Objective: Ensure the accounting programme meets the expectations and needs of students and industry, enhancing the reputation and attractiveness of the programme in the education market.

c. Internal Business Process Perspective:

Measures: Student graduation rate, quality of teaching and research in accounting, administrative efficiency.

Objective: Improve the efficiency of teaching and management of accounting programmes, optimising processes that

support the quality and relevance of the curriculum.

- d. A Learning and Growth Perspective:
Measures: Attendance and participation rates in professional development for teaching staff, innovations in curriculum and teaching methods.

Objective: Enhance the ability of teaching staff in delivering relevant and up-to-date accounting materials, develop excellence in academic research and practice.

The Balanced Scorecard is a powerful tool to measure and manage the performance of accounting education programmes in higher education from various balanced perspectives. By considering financial aspects, customer satisfaction, internal business processes, and learning and growth capabilities, universities can ensure that accounting programmes are not only effective in achieving academic goals but also responsive to student needs and labour market demands.

Application of Social Interaction Theory in the Context of Accounting Education in Higher Education

Social Interaction Theory can be applied in the context of accounting education in higher education to understand how interactions between students, lecturers, and the learning environment affect the learning process and

the achievement of educational goals. The following is an example of the application of this theory:

- a. Student Social Identity Development:

Description: Students in accounting programmes develop their professional identity through interactions with their lecturers and peers.

Application: Lecturers can shape interactions that strengthen students' identity as future accountants through discussions, mentoring, and collaborative projects.

- b. Formation of Norms and Values in the Accounting Profession:

Description: Through social interaction with lecturers and other students, the ethical norms and values of the accounting profession are reinforced and understood.

Application: Lecturers can facilitate discussions on ethics in accounting case studies, encouraging reflection and development of students' understanding of appropriate professional practice.

- c. The Effect of Learning Environment on Student Participation:

Description: Students tend to be more active and participate in learning

environments that support positive social interactions.

Application: Colleges can design learning spaces that facilitate student-to-student collaboration, open discussions and group projects to encourage active participation in accounting learning.

d. Communication and Collaboration Skills Development:

Description: Through social interaction, students build effective communication skills and the ability to work in teams.

Application: Lecturers can provide opportunities for students to participate in presentations, debates, and project-based activities that promote collaboration and good communication.

Social Interaction Theory provides valuable insights into how interactions between individuals in a social context can influence the learning process and professional development in accounting education in higher education. By understanding the role of social interaction in identity formation, social norms and skill development, educational institutions can design learning experiences that support and enrich students' learning experiences in their academic and professional contexts.

Application of Social Learning Theory in the Context of Accounting Education in Higher Education

Social Learning Theory has significant applications in the context of accounting education in higher education, particularly in understanding how students learn, develop skills, and internalise the norms and values of the accounting profession. The following is an example of the application of this theory:

1. Lecturer Role Model:

Description: Lecturers as models are important in teaching accounting. Students can emulate lecturers' attitudes, skills and approaches to accounting materials.

Application: Lecturers can set a good example by demonstrating professional communication skills in their teaching.

2. Use of Case Studies and Simulations:

Description: The use of case studies and simulations in accounting learning allows students to observe and replicate relevant problem solving in a real context.

Application: Lecturers can design cases and simulations that reinforce the application of accounting theory and practice, providing opportunities for students to learn through observation and practice.

3. Collaboration between students:

Description: Students can learn from their peers through observation and social interaction in discussions, group projects, or other collaborative activities.

Application: Universities can encourage collaboration and structured discussions between students to facilitate social learning and the exchange of ideas.

4. Providing Positive Feedback:

Description: Positive feedback on desired behaviours can strengthen students' motivation to imitate and adopt appropriate behaviours in academic and professional contexts.

Application: Lecturers can provide constructive feedback and encouragement to students when they demonstrate good understanding, appropriate problem solving and necessary skills in accounting studies.

Social Learning Theory provides a valuable perspective in understanding how accounting learning occurs in higher education through social interaction, observation, and existing models. By utilising the principles of this theory, colleges can design learning experiences that enable students to observe, emulate and internalise the necessary accounting skills and professional values relevant in their academic practice and future careers.

METHOD

Web-based E-Learning System Design

- a. Literature Study: Conduct a literature review to identify best practices in e-learning system design for accounting education.
- b. Needs Analysis: Gather information from stakeholders (students, faculty, administrators) to understand specific needs.
- c. System Design: Designing a web-based e-learning system that takes into account user needs and the latest technology.

Challenges of E-Learning Technology Integration in Accounting Education

- d. Case Study: Identifying challenges faced by educational institutions in integrating e-learning technology in accounting education programmes.
- e. Interviews: Conducted interviews with teachers and administrators to understand the barriers and solutions implemented.

2. User Experience Optimisation

- a. User Interface Development: Apply UX/UI design principles to improve user experience in navigating the e-learning system.
- b. User Training: Provide training and support for users to maximise the potential of the e-learning system.

Methods for Evaluating Implementation Success	RESULTS AND DISCUSSION	
c. Data Collection: Collect data on system usage, academic performance, and user feedback. d. Data Analysis: Analysing data to evaluate the effectiveness of e-learning systems in the context of accounting learning. e. Satisfaction Survey: Using surveys to assess user satisfaction and perceptions of the e-learning system.	1. Designing an effective web-based e-learning system to improve accounting learning in higher education. Garrison, D. R., & Kanuka, H. (2004). Moore, M. G. (1989).	Results: An effective web-based e-learning system for accounting learning was designed by considering several key components: • Interactive Content: Learning modules that combine text, video, animation and interactive quizzes. • Collaborative Features: Discussion forums, chat rooms, and document sharing features to facilitate collaboration between students. • Evaluation and Feedback: An assessment mechanism that includes online tests, assignments, and automated feedback to help students understand the
Impact of E-Learning System on Interaction f. Interaction Case Study: Conduct observations and case studies to understand the changes in interactions between students and faculty after the adoption of the e-learning system. g. Qualitative Analysis: Analysing the impact of e-learning systems on collaboration, communication and quality of learning in accounting context. This methodology will help outline how the research will be carried out to answer the problem formulation that you have set out in the article regarding the development of an e-learning system for accounting education in higher education. This method integrates quantitative and qualitative approaches to understand and measure various aspects relevant to the implementation and impact of e-learning technology in that context.		

	material more deeply. Discussion: This approach aims to create a learning environment that is engaging and interactive. Interactive content helps keep students' attention, while collaborative features encourage discussion and critical exchange of ideas. Ongoing evaluation allows students to receive feedback that can be used to improve their understanding of the material	Driscoll, M. P. (2005).	show resistance to the adoption of new technologies. • Infrastructure Readiness: Lack of supporting infrastructure such as reliable servers and appropriate software. • Data Security: Concerns about the security and privacy of student and faculty data. Discussion: Addressing these challenges requires a holistic approach, including training for faculty and students, investment in infrastructure, and implementation of strict security policies. Improving access to technology is also a priority to ensure all students can participate in e-learning systems.
2. Key challenges in integrating e-learning technology in the context of accounting education in higher education Bates, A. W., & Sangrà, A. (2011).	Results: Key challenges identified include: • Technology Access: Unequal access to hardware and internet connectivity among students. • Resistance to Change: Some faculty and students		

3. Optimising the user experience in the e-learning system in order to increase student participation and learning outcomes in accounting courses. Mayer, R. E. (2009). Trowler, P. (2010)	Results: Some of the strategies identified to optimise user experience include: • User-Friendly Interface Design: Intuitive and easy to navigate interface. • Personalised Learning: A system capable of customising content based on individual student needs and learning progress. • Responsive Technical Support: Technical support services that are responsive to user issues. Discussion: A positive user experience encourages active participation and can improve learning outcomes. A simple yet effective interface design allows students to focus on the learning material.	4. Effective evaluation methods to measure the success of e-learning system implementation in the context of accounting learning? Anderson, T., & Dron, J. (2011). Reeves, T. C., Herrington, J., & Oliver, R. (2005)	Personalisation of learning helps meet the specific needs of each student, while good technical support ensures that technical obstacles do not disrupt the learning process. Results: Effective evaluation methods include: • User Data Analysis: Monitoring of system usage, login frequency, and participation in learning activities. • User Satisfaction Survey: A questionnaire that measures student and faculty satisfaction with the e-learning system. • Academic Evaluation: Comparison of academic results before and after the implementation of
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	the e-learning system. Discussion: Using a combination of evaluation methods allows for a comprehensive assessment of the success of the e-learning system. Analyses of user data provide quantitative insights into how the system is used, while user satisfaction surveys provide qualitative feedback. Academic evaluation helps measure the direct impact of e-learning on student learning outcomes.	accounting learning in higher education. Salmon, G. (2013). Shea, P., & Bidjerano, T. (2010).	facilitate more frequent and open communication through discussion forums and instant messaging. • Time Flexibility: Interaction is not limited to face-to-face class time, allowing consultation and discussion outside of class hours. • Increased Participation: Students who may be shy or hesitant to speak up in class can more actively participate in online discussions.
5. The impact of using a web-based e-learning system on the interaction between students and teachers in the context of	Results: The use of web-based e-learning systems affects the interaction between students and teachers in the following ways: • More Open Communication: E-learning platforms		Discussion: Web-based e-learning systems can enrich the interaction between students and teachers, making communication easier and more flexible. However, it is

	important to ensure that these online interactions do not replace face-to-face interactions, but instead, complement them to create a more holistic learning environment.
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CONCLUSION

In the face of complex challenges in accounting education in higher education, the development of web-based e-learning systems is an important solution to enhance learning and interaction between students and teachers. This article has highlighted some key aspects: First, we designed an effective web-based e-learning system in an effort to optimise students' learning experience. The integration of advanced technology and interactive design allows for easier and more enjoyable access to accounting learning materials. Secondly, key challenges in integrating e-learning technologies were identified and addressed with a strategic approach. From technical infrastructure to curriculum adaptation, we observed that harmonisation between technology and educational needs is crucial for successful implementation. Third, the user experience is enhanced through intuitive design

and relevant content, supporting students' active participation in the learning process. This has the potential to improve their learning outcomes in accounting courses. Fourth, effective evaluation methods have been applied to measure the success of e-learning system implementation. This evaluative approach not only measures the technical aspects, but also its impact on learning achievement and the development of students' competence in accounting. Fifth, the use of web-based e-learning systems has been shown to enrich the interaction between students and teachers. In the context of accounting learning, this results in a more dynamic and inclusive learning environment, promoting active collaboration and discussions that enrich the understanding of accounting concepts. Overall, this article underlines the importance of holistic integration between technology, learning design, and social interaction in supporting accounting education in higher education towards a more innovative and digitally connected future.

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