Journal of Information System and Technology Management
JISTM
EISSN: 0128-1666
Volume 10 Issue 40 (September 2025) PP. 243-255
DOI: 10.35631/JISTM.1040017


JOURNAL OF INFORMATION SYSTEM AND TECHNOLOGY MANAGEMENT (JISTM)
www.jistm.com

# RELIABILITY ANALYSIS OF STUDENT ENGAGEMENT MODEL IN USING COLLABORATIVE TECHNOLOGY

Nur Zharif Sofea Khairul Anuar[1]*, Noorihan Abdul Rahman[2], Zuriani Ahmad Zukarnain[3], Noor Ilanie Nordin[4]

[1] Faculty of Computer and Mathematical Sciences, Universiti Teknologi MARA Cawangan Kelantan, 15050 Kota Bharu, Kelantan, Malaysia
Email: 2021731485@student.uitm.edu.my
[2] Faculty of Computer and Mathematical Sciences, Universiti Teknologi MARA Cawangan Kelantan, 18500 Machang, Kelantan, Malaysia
Email: noorihan@uitm.edu.my
[3] Faculty of Computer and Mathematical Sciences, Universiti Teknologi MARA Cawangan Kelantan, 18500 Machang, Kelantan, Malaysia
Email: zurianiaz@uitm.edu.my
[4] Faculty of Computer and Mathematical Sciences, Universiti Teknologi MARA Cawangan Kelantan, 18500 Machang, Kelantan, Malaysia
Email: ilanie@uitm.edu.my
* Corresponding Author

**Article Info:**

**Article history:**
Received date: 26.06.2025
Revised date: 16.07.2025
Accepted date: 28.08.2025
Published date: 19.09.2025

**To cite this document:**

Anuar, N. Z. S. K., Abdul Rahman, N., Zukarnain, Z. A., & Nordin, N. I. (2025). Reliability Analysis of Student Engagement Model in Using Collaborative Technology. *Journal of Information System and Technology Management, 10* (40), 243-255.

**DOI:** 10.35631/JISTM.1040017

**Abstract:**

This paper examines the reliability of a student engagement model within the context of collaborative technology use in secondary education. As digital tools such as online discussion platforms, shared documents, and virtual collaboration spaces become increasingly integrated into teaching and learning, it is essential to assess how effectively student engagement can be measured in these environments. The model focuses on three dimensions of engagement: behavioral, emotional, and cognitive. Data were collected from secondary school students who participated in collaborative learning activities using digital tools. Statistical analyses, including Cronbach's alpha, were conducted to evaluate the reliability and how well the components of student engagement fit together as a model. The results indicate high reliability across all dimensions confirming that the model provides a consistent and valid measure of student engagement in technology-supported collaborative learning. These findings offer valuable insights for educators and researchers aiming to assess and enhance student engagement through digital collaboration in secondary schools.

Journal of Information System and Technology Management
JISTM
EISSN: 0128-1666
Volume 10 Issue 40 (September 2025) PP. 243-255
DOI: 10.35631/JISTM.1040017



**Keywords:**

Student Engagement, Collaborative Technology, Reliability Analysis, Cronbach's Alpha

## Introduction

Student engagement in online learning refers to the time, effort, and commitment that students intentionally invest in digital learning activities. It includes behavioral engagement, shown through active participation in online tasks; cognitive engagement, reflected in students' motivation and ability to manage their own learning; and emotional engagement, demonstrated by positive feelings and attitudes toward the online learning experience (Salas-Pilco et al., 2022). Student engagement refers to the level of interest, effort, and participation that students show in their learning activities, both inside and outside the classroom. It involves how actively students take part in tasks, interact with others, and stay focused on achieving meaningful learning outcomes (Dubey et al., 2023).

Using technology in the classroom offers teachers a great chance to increase how much students take part in lessons and improve their academic results. Technology helps to make learning more interesting and engaging for students. Additionally, regularly monitoring students' academic progress is very important because it helps teachers make informed decisions based on real data. This is especially useful when using technology to support learning (Balalle, 2024). Balalle also mentioned that the rapid transition to online learning has introduced challenges in maintaining student interest and focus. Synchronous learning activities play an important role in helping both students and instructors feel connected within the virtual classroom. Effective teaching strategies that emphasize student-centered learning and collaboration are essential for enhancing engagement. Furthermore, the integration of technology into lessons can significantly increase student participation. Instructional tools such as podcasting promote collaboration, creativity, and critical thinking, thereby improving the quality of online learning experiences.

Student engagement plays a key role in successful learning, especially in online environments. It involves students actively taking part in meaningful learning activities and staying committed to their learning goals. Engaged students are more likely to achieve better academic results and develop important skills. In online learning, student engagement is strongly linked to motivation. When students are motivated, they are more likely to put energy and effort into their learning. Different types of motivation influence how students behave and how much they participate in learning tasks (Chiu, 2022).

However, keeping students highly engaged in virtual learning environments has been a difficult task for many educators (Haerawan et al., 2024). Online settings often come with many distractions, such as social media, background noise, or other responsibilities at home, which can make it hard for students to stay focused. In addition, Haerawan also states that the absence of a physical classroom and face-to-face interaction with teachers and classmates can lead to feelings of isolation and disconnection from the learning process. These factors can reduce students' motivation and make it harder for them to actively take part in lessons. As a result, maintaining strong engagement in online learning requires careful planning and the use of

Journal of Information System and Technology Management
JISTM
EISSN: 0128-1666
Volume 10 Issue 40 (September 2025) PP. 243-255
DOI: 10.35631/JISTM.1040017
strategies that help students feel more connected and supported throughout their educational experience.

It is important to conduct a study that explores the reasons behind students' low levels of engagement, especially in online learning environments. Understanding these reasons can help identify which areas of student engagement need the most improvement. Research shows that online learning often does not support effective teaching methods or encourage meaningful interaction between students and teachers (Pratiwi & Priyana, 2022). Because of this, many students feel isolated, disconnected, and less motivated to participate in their learning. These feelings can negatively affect their academic performance and overall learning experience. When teachers are aware of the specific challenges students face in online settings, they are in a better position to make informed decisions. This awareness allows them to use strategies that can improve communication, create a sense of community, and increase student involvement in the learning process. Therefore, gaining a deeper understanding of student engagement in online education is essential for improving teaching practices and student outcomes.

The rapid growth of digital technologies in education has opened up new opportunities to improve teaching and learning. These technologies are now widely used in schools and have become an important part of the learning process. While they offer many benefits, they also bring new challenges to education in today's world. The use of digital tools is changing how teaching and learning take place, helping to expand learning beyond the traditional classroom (Mhlongo et al., 2023). Technology alone cannot solve the challenges of learning and collaboration. Although collaborative tools are designed to support group work, they are often used simply to deliver information. The way these technologies are used in schools is a key factor in their effectiveness. However, there is still limited research on important questions, such as whether collaborative learning technologies can succeed without a strong understanding of how collaboration works, or whether new ways of thinking and learning can be introduced through technology (Lipponen, 2023).

This study aims to test how reliable a student engagement model is in online learning by checking how consistently it measures behavioral, emotional, and cognitive engagement when students use collaborative technology.

## Literature Review

Based on a survey of previous research studies, several theoretical models and frameworks were identified that focus on student engagement, particularly in the context of online and technology-enhanced learning. These frameworks have been developed by various researchers to better understand how students interact with their learning environments, both emotionally, behaviorally, and cognitively. While they share common themes, such as the importance of active participation, emotional connection, and deep thinking, each framework offers unique perspectives and emphasizes different factors influencing engagement. Some models are designed specifically for face-to-face learning, while others address the growing need for effective engagement strategies in digital and blended learning settings. The diversity in these frameworks highlights that student engagement is a complex and multi-dimensional concept that cannot be explained by a single approach. By reviewing and comparing these models, educators, instructional designers, and policymakers can gain valuable insights into how to enhance learning experiences, promote motivation, and support academic success in various educational contexts.

Journal of Information System and Technology Management
JISTM
EISSN: 0128-1666
Volume 10 Issue 40 (September 2025) PP. 243-255
DOI: 10.35631/JISTM.1040017

***Nkomo's Model***

Nkomo's model identifies three main types of student engagement: behavioral, emotional, and cognitive. These dimensions help provide a clear understanding of how students behave, feel, and think during the learning process. This model is helpful in both classroom and online learning environments. When teachers use good teaching strategies, students are more likely to stay engaged and perform better. In addition, when students are interested in learning, they often create a more positive learning environment that can influence their classmates. Supporting all three types of engagement helps teachers meet the different needs of students and promote both academic success and personal growth (Md Sabri et al., 2024).

According to Nkomo (2022), combining the three main types of engagement which is behavioural, emotional, and cognitive offers a fuller understanding of student engagement. Measuring only one type may limit insights, as these dimensions are closely connected and vary across individuals. Despite the addition of other engagement types over time, these three remain the most widely studied. Behavioural engagement involves students' participation in class activities, completing assignments, and regular attendance. Emotional engagement refers to students' feelings toward their learning environment, peers, teachers, and their sense of belonging. Cognitive engagement includes self-regulation, goal-setting, focus, and valuing academic success. Engagement is shaped by both personal and institutional factors, and often a combination of the two influences how students connect with their learning.

***Academic Communities Framework***

The Academic Communities Framework was developed to better understand what supports student engagement in online learning (Borup et al., 2023). Like Nkomo's model, it includes behavioral, emotional, and cognitive engagement. However, this model focuses more on the online environment, where students often study on their own without direct support. Many studies have looked at traditional classroom learning, but fewer have examined the unique challenges of online learning. For instance, in online courses that are not live, students may feel lonely and need to manage their time and learning independently. These difficulties may cause some students to lose motivation or drop out. Therefore, it is important to provide the right kind of support to help them stay engaged.

The ACE framework is a theoretical model that focuses on how support from learning communities can enhance students' academic engagement. The outer layer of the model shows the level of engagement required for academic success, divided into three main dimensions: affective, behavioral, and cognitive (Borup et al., 2020). Researchers have modified the ACE framework to fit different learning environments. Three key adaptations have offered valuable insights into: how independent engagement connects with both personal and course communities; the role and benefits of having course communities at both local and global levels; and the need to include support from the wider school or institutional community. This kind of research works best when done in collaboration with key stakeholders, and it is especially useful for finding effective ways to improve student engagement (Borup et al., 2023).

***Kahu and Nelson's Student Engagement Model***

Kahu and Nelson developed a model that looks at student engagement as a complex and ongoing process, especially in higher education (Clarke & Zhao, 2023). The model includes the same three engagement types and shows how engagement is influenced by both the student and the learning environment. It highlights how personal factors like motivation, as well as

Journal of Information System and Technology Management
JISTM
EISSN: 0128-1666
Volume 10 Issue 40 (September 2025) PP. 243-255
DOI: 10.35631/JISTM.1040017
institutional support, can affect how students participate in learning. This framework is useful for improving teaching practices and helping students succeed academically. It also encourages a deeper understanding of how students connect with their learning experiences (Trowler et al., 2021).

A large amount of research has shown a strong link between student engagement and positive student outcomes. Studies consistently find that higher levels of engagement are associated with better results in key areas of student success and personal growth. These include increased student satisfaction, stronger critical thinking skills, higher self-esteem, improved psychosocial development, clearer identity formation, and greater social involvement (Hews et al., 2022). The framework includes the traditional three dimensions of student engagement namely behavioral, emotional or affective, and cognitive. In addition, it recognizes that student engagement is shaped by, and leads to, various outcomes that are influenced by the broader social and cultural context in which learning takes place.

***Community of Inquiry (CoI) Framework***

The Community of Inquiry (CoI) framework focuses on how people learn together through social interaction, thinking, and teaching (Li, 2022). It includes three elements: social presence, cognitive presence, and teaching presence. Social presence means students feel connected to each other, cognitive presence is about deep thinking and understanding, and teaching presence refers to the teacher's role in guiding learning. When all three elements work together, students are more likely to feel engaged and learn more effectively. This framework can be used in online, blended, and face-to-face learning to create a more meaningful and supportive learning experience.

The CoI framework is a well-known model that describes online learning as open, flexible, and collaborative. Despite its popularity, it has been criticized for lacking clear implementation guidelines, assessment tools, and completeness. Research on the framework often relies on subjective methods, such as analysing discussion posts or student surveys. Rather than only interpreting online learning experiences, there is a growing call to use the CoI framework to actively design effective, research-based online learning environments (Wilson & Berge, 2025).

***Social Presence Theory in Online Learning***

Social presence theory explains how people feel emotionally connected and "real" in online communication. This idea was first introduced by Short et al. (1976), who said that different communication tools can create different levels of social presence. In general, face-to-face communication gives a stronger sense of presence than online communication. However, later research shows that social presence in online learning can still be strong if the learning environment includes interaction, clear communication, and a supportive social context (Ali et al., 2022). This theory is useful for designing online learning that helps students feel involved, respected, and part of a community (Bali et al., 2024).

In conclusion, the reviewed models and frameworks all contribute to a better understanding of the different ways students engage in their learning, especially in online and blended learning environments. Each model highlights the three key areas of student engagement: behavioral (how students act), emotional (how students feel), and cognitive (how students think and understand). While some models were developed for traditional classroom settings and others

Journal of Information System and Technology Management
EISSN: 0128-1666
Volume 10 Issue 40 (September 2025) PP. 243-255
DOI: 10.35631/JISTM.1040017
for online education, they all agree on the importance of providing support, encouraging interaction, and maintaining motivation. These factors play a crucial role in helping students stay involved in their learning, overcome challenges, and succeed academically. Understanding and applying these frameworks can help educators design learning experiences that are more engaging, inclusive, and effective. Moreover, these models can guide institutions in shaping policies and teaching strategies that meet the diverse needs of learners in a changing educational landscape. By using these theoretical tools, teachers and educational leaders can create learning environments where students not only achieve academic goals but also develop confidence, independence, and a positive attitude toward learning.

***Collaborative Technology***

Collaborative technology is an important part of modern libraries, as it supports effective information sharing, the creation of new knowledge, and the management of resources (Fasola & Abimbola, 2023). These technologies include tools that help researchers, educators, and learners to interact, exchange ideas, and work with digital content in meaningful ways. Such tools assist in carrying out tasks related to research, teaching, and learning. In general, collaborative technology refers to digital platforms and tools that allow individuals and groups to work together, communicate clearly, and share information efficiently. Existing research shows that these technologies can greatly enhance student participation, increase motivation, and develop teamwork skills in inclusive classrooms (Çakir & Ünal, 2020).

In conclusion, although collaborative technologies support inclusive education by improving student engagement, motivation, cooperation, and personalized learning experiences, successful implementation depends on strong technological infrastructure, thorough teacher training, and continuous evaluation through research and monitoring. Research on the use of technology-enhanced learning (TEL) environments in K–12 education shows that collaborative tools like Google Docs, Google Classroom, and Edmodo are positively related to student engagement (Suero Montero et al., 2022). To support the development of educational technology, this study focuses on behavioural, emotional, and agentic engagement. These types of engagement are considered the most useful for identifying potential new features in learning tools and are also the easiest for both students and teachers to recognize, understand, and reflect upon.

## Methodology

This paper adopts a quantitative case study to evaluate the reliability of a survey measuring student engagement in online learning context using Cronbach's Alpha. The instrument used are developed based on existing literature on student engagement of online learning with the elements of social presence theory and was designed to measure the key dimensions student engagement: behavioral, cognitive and emotional. The survey data collected was exported into Microsoft Excel and then analysed using specialized data analysis software. This process allowed for organized data management and facilitated accurate and efficient analysis of the results. The survey instrument consisted of 8 items and each of the item designed to examine dimensions of students' engagement of online learning context. These items were developed to review the different nature of online learning experiences ensuring that the survey could provide a comprehensive assessment of student’s engagement. The flowchart of the process illustrates in Figure 1.

Journal of Information System and Technology Management
JISTM
EISSN: 0128-1666
Volume 10 Issue 40 (September 2025) PP. 243-255
DOI: 10.35631/JISTM.1040017

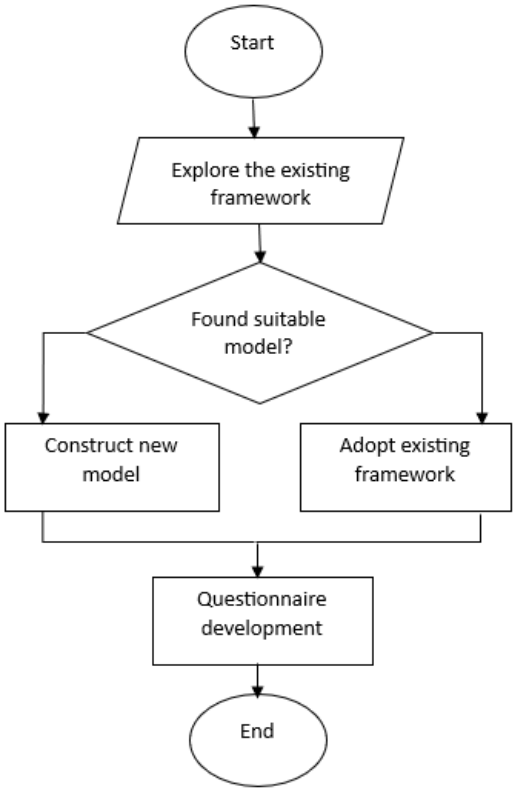


**Figure 1: Flowchart Of Methodology For This Study**

***Participants***

The target population for this study consists of secondary school students in Kelantan, selected from different geographical areas: North, South, East, and West. Due to the difficulty in determining the exact number of students in each selected school, cluster sampling was used. The total number of participants is estimated to be between 300 and 500 students, with approximately 120 students representing each region. The selected areas include Gua Musang, Kota Bharu, Machang, Jeli, Tanah Merah, Bachok, and Pasir Puteh. The respondents were students from Form 1 to Form 3 who were asked to complete the questionnaire. To reduce the risk of nonresponse bias, data collection was carried out on different days over a three-month period. This approach is also time-efficient and cost-effective, especially when working with a large and widely distributed population. It is particularly useful in situations where it is difficult to access a complete list of all individuals in the population, but possible to identify and reach groups or clusters.

***Instruments***

This study developed a questionnaire based on the proposed research model to collect data. The responses were measured using a 5-point Likert scale: 5 = Strongly Agree, 4 = Agree, 3 = Neutral, 2 = Disagree, and 1 = Strongly Disagree. Students were asked to complete the questionnaire based on their experiences using collaborative technology for online learning. The goal was to assess their engagement levels in relation to specific factors identified in the research framework.The questionnaire was adapted from existing instruments that focus on student engagement dimensions and elements of Social Presence Theory. The data collection process involved distributing printed questionnaires directly to students at selected schools.

Journal of Information System and Technology Management
EISSN: 0128-1666
Volume 10 Issue 40 (September 2025) PP. 243-255
DOI: 10.35631/JISTM.1040017

The students completed the forms on-site under the supervision of the researcher and were monitored by school teachers.

Based on previous studies in similar contexts, the sample size was set between 300 and 500 students. All responses were recorded and saved in Excel format for data analysis.
The questionnaire consisted of two main sections. Section A collected demographic information such as gender, age, and prior experience with online learning. Section B focused on student engagement during online learning and included three main parts: Collaborative Technology, Social Presence, and Student Engagement. In total, the questionnaire contained 77 items that all participants were required to answer.

This research used a self-administered questionnaire method, where students completed the survey independently, with guidance from the researcher and oversight from teachers. This method was chosen because it is commonly used in similar studies and allows participants to respond at their own pace in a controlled setting.

***Research Procedure***

This study uses a quantitative research approach to collect numerical data that helps answer the research questions. In quantitative research, data is often collected through surveys using questionnaires, which allow researchers to gather information from a large number of participants. The numerical data collected is typically analysed using statistical methods with the help of software such as SPSS. For this study, a survey was conducted by visiting several randomly selected schools across different areas of Kelantan to ensure a broad and diverse group of respondents. The main purpose of data collection was to examine students' level of engagement in online learning when using collaborative technologies. The survey questions were developed based on key elements from the proposed model and focused on the different dimensions of student engagement. The questionnaire was adapted from existing instruments that were previously used to measure student engagement in online learning settings.

***Analysis Tools***

After all, completed questionnaires were collected from the respondents, the data were carefully reviewed for completeness and accuracy before being organized using an electronic database. The individual responses were initially entered manually into Microsoft Excel, which served as the first step in managing and structuring the raw data. This allowed for preliminary sorting, coding, and cleaning of the dataset. Once the data had been properly formatted and checked for any errors or inconsistencies, it was then imported into SPSS statistical software. SPSS was used to conduct more advanced statistical analyses, enabling a deeper examination of the patterns and relationships within the data.

## Results and Findings

***Reliability Analysis***

Reliability is an important indicator of the stability of measurement results when the same instrument is used multiple times. For a measurement tool to be considered reliable, the results it produces must be consistent and dependable. There are several methods available to assess reliability, and one commonly used method is Cronbach's Alpha, which measures internal consistency. This method is typically applied to instruments that include multiple items.

Journal of Information System and Technology Management
JISTM
EISSN: 0128-1666
Volume 10 Issue 40 (September 2025) PP. 243-255
DOI: 10.35631/JISTM.1040017

Cronbach's Alpha helps to determine how closely related the items in a scale are to each other. It is especially useful when Likert-scale questions are used, as it shows whether the scale produces consistent results.The reliability of the questionnaire was assessed using Cronbach's Alpha, and the results are presented in Table 1. The table shows the Cronbach's Alpha values for each variable tested. The values range from 0 to 1, with values above 0.70 generally considered acceptable, indicating that the items are consistent and reliable. In this study, three variables were tested during the pilot phase. Values are above 0.80, which indicates a strong level of reliability.Cronbach's Alpha is used to measure how closely related a set of items are within a group. Higher values suggest that the items effectively measure the same underlying concept.

***Results of Reliability Analysis***

The reliability outcomes for each variable in this study are displayed in Table 1. The variables tested include collaborative technology, social presence, and student engagement. All three variables recorded high reliability, with Cronbach's Alpha values exceeding the commonly accepted minimum of 0.70. In detail, the reliability score for collaborative technology was 0.856, for social presence 0.925, and for student engagement 0.894. These scores indicate that the questionnaire items used to measure each variable are consistent and dependable. A high Cronbach's Alpha value shows that the items in each set are strongly related and measure the same concept. As each value is above 0.80, it confirms that the items are well-constructed and appropriate for this research.

**Table 1: Reliability Analysis Results**

| Variables | Cronbach's Alpha value |
|---|---|
| Collaborative Technology | 0.856 |
| Social Presence | 0.925 |
| Student Engagement | 0.894 |

The strong reliability scores confirm that the survey instrument effectively represents the theoretical framework of the study, which focuses on collaborative technology, social presence, and student engagement. These three variables are not only conceptually linked but are also clearly supported by the data collected. The reliable measurement of each construct supports the use of this tool in further analysis and confirms its value in examining how students engage with online learning. This provides a strong base for the main study and contributes positively to research in education, especially in areas exploring digital learning environments and student engagement.

The high reliability scores observed for all three variables suggest that the survey instrument is well-designed and effective in measuring the intended concepts. For collaborative technology, a Cronbach's alpha of 0.856 indicates that the questions consistently capture students' perceptions and experiences with digital tools used for learning. This means that the items grouped under this variable are closely linked and provide a reliable measure of how students interact with and benefit from collaborative technologies in their online learning environments.

The even higher reliability score of 0.925 for social presence reflects a very strong internal consistency among the items assessing this variable. This suggests that the questions effectively measure how connected and socially involved students feel while participating in online

Journal of Information System and Technology Management
EISSN: 0128-1666
Volume 10 Issue 40 (September 2025) PP. 243-255
DOI: 10.35631/JISTM.1040017
learning. A strong sense of social presence is often linked to better communication, stronger relationships among learners, and increased motivation, so having reliable measurement of this variable is critical for understanding its role in student engagement.

For student engagement, the Cronbach's alpha of 0.894 demonstrates that the survey items accurately assess multiple dimensions of engagement, including behavioral, emotional, and cognitive involvement. This level of reliability confirms that the instrument consistently captures the degree to which students are focused, motivated, and actively participating in their online courses.

Overall, these results indicate that the survey can be trusted to yield consistent data, which is essential for drawing meaningful conclusions. High internal consistency also implies that the variables are measured without excessive error, allowing for stronger statistical analyses and more confident interpretation of relationships among collaborative technology, social presence, and student engagement. This foundation is important for both the validity of the current study and for future research that may build on these findings.

**Discussion**

When comparing tools used to measure student engagement in traditional classrooms and technology-based classrooms, important differences are seen in how engagement is encouraged and assessed. In traditional classrooms, students usually engage through face-to-face interactions, group discussions, and hands-on activities. Engagement is often observed by teachers through students' behaviors like speaking, eye contact, and group work. Tools to measure engagement in these settings often include paper surveys, interviews, and teacher observations. However, these methods can sometimes be affected by personal bias and may not always capture students' true level of engagement.

On the other hand, technology-mediated classrooms use digital platforms and collaborative tools such as Google Docs, online forums, and learning management systems. These tools allow students to communicate and work together online. Technology also enables the collection of data in real time, such as survey responses and records of online activity, which can help in measuring student engagement more accurately. Research shows that technology tools can increase students' motivation and participation by providing interactive and social features that are harder to achieve in traditional classrooms. However, to measure engagement effectively in these digital settings, reliable tools like those evaluated using Cronbach's Alpha are essential to ensure that the data collected is consistent and meaningful.

Studies comparing traditional and technology-based classrooms indicate that while traditional tools focus more on visible and behavioral signs of engagement, technology-based tools provide a deeper understanding of different types of engagement, including emotional and cognitive involvement. The high reliability values found in this study for collaborative technology and social presence support earlier findings that technology tools can measure engagement reliably and offer useful insights into how students interact with online learning. However, the success of any engagement tool depends on clear and simple design, as well as the ability to adapt these tools to different learning environments. This shows the need for ongoing testing and improvement of measurement methods in both traditional and technology-mediated education.

Journal of Information System and Technology Management
EISSN: 0128-1666
Volume 10 Issue 40 (September 2025) PP. 243-255
DOI: 10.35631/JISTM.1040017

### *Possible Improvements and Limitations of the Model*

While the current model demonstrates strong reliability in measuring collaborative technology, social presence, and student engagement, several limitations should be considered. First, the model relies heavily on self-reported data, which may be influenced by students' personal biases or misunderstanding of the survey questions. This could affect the accuracy of the results. Additionally, the model focuses on only three main variables, which may not fully capture the complexity of student engagement in online learning. Other factors, such as instructor presence, technological access, or learning styles, could also play important roles but are not included in this model.

Furthermore, the model was tested within a specific educational context and age group, which may limit its generalizability. Differences in culture, school infrastructure, and student backgrounds might influence how well the model applies in other settings. Future research could improve the model by incorporating a wider range of engagement factors and testing it with diverse student populations to ensure broader applicability.

### *Practical Implications for Educators and Instructional Designers*

Despite these limitations, the model offers valuable guidance for educators and instructional designers aiming to improve student engagement in online learning environments. The strong reliability of the collaborative technology and social presence variables highlights the importance of selecting digital tools that encourage interaction and connection among students. Educators should prioritize platforms that support communication, teamwork, and social interaction to foster a sense of community and enhance motivation.

Instructional designers can use the model to create learning experiences that address behavioral, emotional, and cognitive engagement by integrating features that promote active participation and personal connection. For example, incorporating group projects, discussion forums, and real-time feedback can help increase student involvement. Additionally, understanding the role of social presence emphasizes the need for instructors to actively engage with students online, which can improve students' feeling of belonging and support.

Overall, the model encourages educators to carefully consider both technology and social elements in course design. By doing so, they can create more effective and engaging online learning environments that meet students' diverse needs and improve learning outcomes.

## Conclusion

This study demonstrates that the research instrument used to measure collaborative technology, social presence, and student engagement is reliable and consistent. The high Cronbach's alpha values for all variables indicate that the survey items effectively capture the intended concepts and provide stable measurements. These results support the use of the questionnaire in further research aimed at understanding student engagement in online learning environments.

Moreover, the findings highlight the importance of integrating collaborative technology and fostering social presence to enhance student engagement. The strong relationship among these variables suggests that technology tools should not only support learning tasks but also promote social interaction and connection among students. This approach can improve motivation, participation, and overall learning experiences, especially in technology-mediated classrooms.

Journal of Information System and Technology Management
EISSN: 0128-1666
Volume 10 Issue 40 (September 2025) PP. 243-255
DOI: 10.35631/JISTM.1040017

In conclusion, the findings of this study indicate that the research objectives have been successfully met. The primary aim of the study was to examine the reliability of a student engagement model within the context of online learning. Specifically, the research focused on assessing how consistently the model measures the three core dimensions of student engagement: behavioral, emotional, and cognitive engagement. This was done in the setting of collaborative technology use, where students engage with peers and course materials through digital platforms. The results provide evidence that the model is a reliable tool for capturing these dimensions of engagement in online learning environments. By confirming the model's consistency, the study contributes valuable insights to the ongoing development of effective, evidence-based approaches to enhancing student engagement in virtual learning contexts.

Finally, while the model shows promise, it is important to recognize its limitations, such as reliance on self-reported data and the focus on a limited number of variables. Future research should aim to include additional factors that influence engagement and test the model in diverse educational settings. Nonetheless, the current study provides a solid foundation for educators and instructional designers to develop strategies that increase student engagement through effective use of technology and social interaction.

**Acknowledgements**
I appreciate all the authors that contribute in providing advice, data, and MARA University of Technology that provides resources and support. Also, thanks to anonymous reviewers and editors for their contribution. The authors would like to acknowledge and extended special gratitude to the Global Academic Excellence (M) Sdn Bhd, who granted the Publication Grant Scheme for this project

**Co-Author Contribution**
Author1 has defining the issues in online learning that is related to social presence and prepared the literature review. Author2 provide guidance in writing up the whole article. Author3 assist in the reconstruction of the model with student engagement model variables. Author4 helps in carried out the analysis for both variables in the model.

**References**
Ali, M., Don, M., Rosli, M. R., Shukri, M., & Senin, M. (2022). Exploring Social Presence Theory in The Online Classroom : The Case for Online Presence. January. https://doi.org/10.6007/IJARBSS/v12-i1/11440

Balalle, H. (2024). Exploring student engagement in technology-based education in relation to gamification, online/distance learning, and other factors: A systematic literature review. In Social Sciences and Humanities Open (Vol. 9). https://doi.org/10.1016/j.ssaho.2024.100870

Bali, S., Liu, M.-C., & Sari, H. (2024). Examining Key Determinants of Social Presence and Satisfaction in Online Learning: An Exploration with Undergraduate Student. International Journal of Education in Mathematics, Science and Technology, 12(4), 1071–1089. https://doi.org/10.46328/ijemst.4095

Borup, J., Graham, C., West, R., Archambault, L., & Shin, J. (2023). Academic Communities of Engagement (ACE) Framework. EdTechnica. https://doi.org/10.59668/371.12259

Çakir, H., & Ünal, E. (2020). Use of collaborative technologies in engineering education. Engineering Education Trends in the Digital Era, 3, 125–149. https://doi.org/10.4018/978-1-7998-2562-3.ch006

Journal of Information System and Technology Management
EISSN: 0128-1666
JISTM
Volume 10 Issue 40 (September 2025) PP. 243-255
DOI: 10.35631/JISTM.1040017
Chiu, T. K. F. (2022). Applying the self-determination theory (SDT) to explain student engagement in online learning during the COVID-19 pandemic. Journal of Research on Technology in Education, 54(S1), S14–S30. https://doi.org/10.1080/15391523.2021.1891998

Clarke, M., & Zhao, A. X. (2023). EUR Research Information Portal Dependency Theory. In Edward Elgar Publishing (Issue Cc).

Dubey, P., Pradhan, R. L., & Sahu, K. K. (2023). Underlying factors of student engagement to E-learning. Journal of Research in Innovative Teaching and Learning, 16(1), 17–36. https://doi.org/10.1108/JRIT-09-2022-0058

Fasola, O. S., & Abimbola, M. O. (2023). Collaborative technology for information sharing, knowledge creation and management in libraries. Gateway Information Journal, 24(1 & 2), 33–46. https://www.gatewayinfojournal.org/index.php/gij/article/view/34

Li, L. (2022). Students' Isolation Challenges in Blended EFL Learning During COVID-19: How Can Social Presence and Interaction Help Develop Sense of Community? Psychology Research and Behavior Management, 15, 3117–3131. https://doi.org/10.2147/PRBM.S388317

Lipponen, L. (2023). Exploring Foundations for Computer-Supported Collaborative Learning. Computer Support for Collaborative Learning, 72–81. https://doi.org/10.4324/9781315045467-12

Md Sabri, S., Ismail, I., Annuar, N., Abdul Rahman, N. R., Abd Hamid, N. Z., & Abd Mutalib, H. (2024). a Conceptual Analysis of Technology Integration in Classroom Instruction Towards Enhancing Student Engagement and Learning Outcomes. International Journal of Education, Psychology and Counseling, 9(55), 750–769. https://doi.org/10.35631/ijepc.955051

Mhlongo, S., Mbatha, K., Ramatsetse, B., & Dlamini, R. (2023). Challenges, opportunities, and prospects of adopting and using smart digital technologies in learning environments: An iterative review. Heliyon, 9(6), e16348. https://doi.org/10.1016/j.heliyon.2023.e16348

Pfadt, J. M., Bergh, D. van den, Sijtsma, K., & Wagenmakers, E. J. (2023). A tutorial on Bayesian single-test reliability analysis with JASP. Behavior Research Methods, 55(3), 1069–1078. https://doi.org/10.3758/s13428-021-01778-0

Salas-Pilco, S. Z., Yang, Y., & Zhang, Z. (2022). Student engagement in online learning in Latin American higher education during the COVID-19 pandemic: A systematic review. British Journal of Educational Technology, 53(3), 593–619. https://doi.org/10.1111/bjet.13190

Suero Montero, C., Goagoses, N., Winschiers-Theophilus, H., Pope, N., Suovuo, T., Rötkönen, E., & Sutinen, E. (2022). Supporting Academic Engagement Through Immersive Technologies. 101–105. https://doi.org/10.36315/2022v2end022