Enhancing Educational Engagement through Feedback: A Study on the Reflective Course Evaluation System

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***Abstract*—Traditional end-of-semester course evaluations fail to address students' immediate concerns. This reduces the opportunity for pedagogical improvement and student engagement, affecting the production of statistically sound analyses and making future remedies less effective. The purpose of this study is to encourage students to immediately and continuously evaluate the teaching method using the Reflective Course Evaluation (RCE) system. Additionally, it aims to measure their acceptance of the introduced system. For this study, 136 students used the RCE system, developed using C# on the Microsoft Visual Studio Blazor platform, to record their frequent course evaluations throughout the semester. We administered a second survey at the end of the semester to assess the students' acceptance of the novel reflective evaluation approach, which was based on the Technology Acceptance Model (TAM). Using the SmartPLS statistical package, the study found a strong direct path of 0.303 and an overall indirect path of 0.358 from feedback (FDBK) to the users' Behavioral Intentions to Use the interactive survey (BIU). It also provides valuable insights for teaching improvements. The findings highlight the potential for increasing student involvement and use of the RCE as a replacement for the traditional system, which leads to prompt resolution of any pedagogical concerns. Despite limitations such as reliance on self-reported data, this pilot study lays the groundwork for more extensive research into the benefits of continuous feedback systems.**

***Keywords*—feedback effectiveness, pedagogical method adjustments, Reflective Course Evaluation (RCE), student engagement, Technology Acceptance Model (TAM)**

I. Introduction

Every semester, educators use traditional course evaluations as a common practice to assess instruction and course content. While these evaluations provide valuable insights into course and teaching method modifications, they fail to address the immediate needs of current students for pedagogical adjustments. These limitations prevent students from requesting a course delivery method adjustment, resulting in a missed opportunity for improved learning experiences and consequently lower student engagement.

The conventional course evaluation system suffers from several critical limitations:

- Delayed Feedback: Traditionally, a course assessment survey is offered at the conclusion of the semester, by which time the students have finished the course, and any modifications made in response to their feedback would be of no benefit to the original respondents.
- Lack of Immediate Pedagogical Enhancements: Ignoring timely feedback results in a teaching approach that is not responsive to the needs of the students and does not change with the course evolution. This will mean that there will be a lost chance to make timely pedagogical adjustments that could enhance the learning environment for present students.
- Reduced Student Engagement: When students believe their comments won't immediately result in noticeable changes, they become less motivated to provide thorough and sincere answers. This student's perception may lead to lower response rates and less useful data.

To address the above-mentioned issues an alternative environment is suggested in this study. We developed a Reflective Course Evaluation (RCE) system specifically for this research. The RCE system replaces the static, one-time, evaluation with a dynamic alternative that provides real-time input and continual review from both students and instructors. This innovative approach creates a cooperative feedback environment, encouraging students to participate with meaningful feedback and increasing joint communication with instructors. Since the RCE method allows students to modify their responses at any time during the semester, it encourages greater student engagement and provides a more responsive learning environment.

The RCE's ability to dynamically add thematic questions to the survey allows for the exploration and resolution of specific innovative issues raised during continuous dialogue between the instructor and students. These ongoing reflections and discussions aim to enhance the learning experience by providing feedback in a timely and relevant manner.

Despite its importance, the effect of prompt and interactive feedback on student engagement in an interactive, dynamic environment is still a subject of research. Since the incorporation of feedback mechanisms into the Technology Acceptance Model (TAM) within educational environments remains an underexplored area, this study aims to fill these gaps by investigating the impact of the RCE system on student engagement and the adoption of real-time feedback technologies using an extended TAM framework.

The shift to real-time, interactive course assessments holds tremendous potential to revolutionize educational assessment by increasing responsiveness to student demands and fostering a mindset of continuous improvement. By examining these factors, this research seeks to provide important insights for improving teaching and learning experiences in higher education.

II. Literature Review

The traditional course evaluation is one of the essential practices for measuring course delivery quality in higher education. It provides insights into students' perceptions of course delivery, teaching methods, and course material.

However, the usefulness of these assessments is insufficient and may be misleading [1]. Such an evaluation method has received criticism for its significant constraints that focus on student satisfaction and undermine its efficacy as a means for substantial instructional enhancement [2].

The aforementioned limitations represent a portion of the problems associated with traditional course evaluation. Such evaluations did not suggest enhancements to the learning method or the outcomes. It fails to provide actionable insights into the quality or effectiveness of teaching [3]. The static nature of the traditional evaluation may capture the students' opinions at a time when special circumstances, such as commitment pressure or recently posted grades, may impact the evaluation. All of these factors will result in a decrease in student engagement, thereby preventing the collection of valuable feedback that could enhance the course design or delivery techniques [4]. The evidence shows that traditional course evaluation has limited effectiveness and doesn't meet students' or instructors' needs. A growing demand for alternative evaluation methods is becoming more apparent. To better reflect the student experience, we need evaluation methods that use new approaches, such as machine learning [5] or dynamic multi-phased evaluation (the one we are introducing in this study).

A. Limitations of Traditional Evaluation Methods

The inflexibility of these approaches, combined with their implementation towards the end of the semester, considerably hinders the feedback process and limits prompt pedagogical modifications [6]. The static one-time implementation towards the end of the semester makes such approaches inflexible, which makes the feedback useless for the current students and misses the opportunity for prompt pedagogical modifications [6]. Moreover, the absence of direct engagement between learners and educators minimizes the chance for prompt clarification and dialogue, hence limiting the potential effect of the feedback received [7]. Grade manipulation and punitive responses lead to unfair and biased results, casting doubt on the reliability and integrity of these evaluations [8–10].

Unlike traditional techniques, the RCE system incorporates technology that enables real-time data collection and analysis in order to adapt to the changing nature of evaluation [11]. Focusing on continuous feedback and student engagement, the RCE system is a promising addition to educational assessment [12]. This dynamic technology improves the overall learning experience by enabling teachers to make rapid pedagogical adjustments. Furthermore, the RCE system's adaptability enhances the personalized learning experience by tailoring feedback to each student's needs, thereby improving their retention and understanding of the course material [13].

B. Reflective Course Evaluation (RCE) System

Researchers have investigated several innovative, comprehensive, adaptable methods, as well as reflective practices that are considered highly valuable in addressing such educational issues. To capture the important themes, Dervenis *et al*. [14]" used sentiment analysis to determine such significant feedback. However, the community criticized the input for lacking clarity and being subjective [15].

This work introduces the Reflective Course Evaluation (RCE) system, building on the success of reflection-based learning [16]. Enabling immediate feedback and continuous interaction between students and instructors marks a significant change in this direction.

The system's capability to rapidly collect and incorporate student opinion creates a dynamic feedback atmosphere that encourages increased participation and facilitates agreement on areas that require improvement [7].

The course evaluation practice, as a pedagogical support tool, cannot create a productive learning environment without active student participation. Such participation does not only demonstrate the relevance and effectiveness of students' feedback; it also gives the students opportunities to contribute to the ongoing improvement of the course design and the teaching method [17]. The RCE system incorporates novel elements, such as including thematic questions that arise from interactions between instructors and students, to emphasize the significance of student input in recognizing and resolving specific educational difficulties [18, 19].

One of the major challenges the introduced RCE system faces is keeping the students actively engaged in updating their opinions throughout the semester. The effect of the system will be minimal without students' continuous and active participation [20]. Moreover, the switch from the conventional to the reflective approach may face resistance from instructors and students due to the change in the well-known standard procedure [21]. To overcome these challenges, instructors and students must have strong awareness and thorough training on the benefits and required uses [22].

C. Course Evaluation Challenges

The traditional end-of-semester Student Evaluation of Teaching (SET) techniques' drawbacks were emphasized in the literature [6, 9]. The potential of new approaches such as the RCE system and the critical role that technology and student engagement play in modernizing educational assessments were identified. However, redefining SET procedures is not without challenges, including students' lack of interest in reflective assessments and difficulty implementing participatory techniques [15, 23]. This study seeks to address the existing research gaps by performing a comprehensive analysis of the link between quick feedback, technology integration, and student engagement in the context of SET. This research aims to provide significant insights into improving teaching and learning experiences in higher education by examining these factors using the Extended Technology Acceptance Model (TAM) framework.

The Technology Acceptance Model (TAM), a well-established model that predicts and explains the adoption of technology systems, was originally introduced by [24]. Various fields, including education, use this widely applied model to understand individuals' engagement with new technologies. Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) have an essential impact on technology acceptance. We utilized TAM model, in this study, to find out how students perceived the newly introduced Reflective Course Evaluation (RCE) system's PU and PEOU. Despite

the widespread recognition of the importance of feedback in educational settings, there is a notable lack of research that systematically measures the acceptance of feedback-driven systems.

This gap in the literature underscores the necessity for a deeper investigation into students' perceptions and the integration of feedback in the context of the Reflective Course Evaluation (RCE) platform. To address this gap, our study investigates the RCE platform through the lens of TAM, extending the model to look at how feedback affects the students' behavior and intentions to use the platform. We are attempting to understand how willing they are to use such a platform as an alternative to conventional course evaluation, drawing on TAM theory and empirical evidence. By drawing on TAM theory and empirical evidence, this study aim to understand students' willingness to adopt the RCE as an alternative to traditional course evaluation methods.

The proposed RCE, as an educational technology support system, presents a promising opportunity to improve the quality and promptness of evaluations by utilizing feedback. As an online interactive platform, RCE offers a flexible framework that facilitates continuous updates and interaction between students and instructors, guaranteeing that feedback is both prompt and meaningful [25, 26]. This technology integration represents notable progress in promoting a more interactive and captivating teaching experience.

D. Exploring RCE under TAM

Despite widespread acknowledgement of the potential of feedback-driven changes to enhance educational results, the academic community remains divided on this matter. A number of scholars argue that the effects of these modifications on educational accomplishments are not definitively beneficial, citing contradictory results in the literature [23, 27]. This divide emphasizes the need for empirical research to closely examine the impact of feedback-based modifications on teaching and learning improvement.

1) The research model

To investigate the students' perception of the suggested RCE system, we selected the Technology Acceptance Model (TAM) lens. Through the use of feedback as a prominent external element, the TAM approach enables us to investigate factors influencing students' acceptance and adoption of these systems [28, 29]. Furthermore, the interplay between student motivation and feedback underscores the need for a comprehensive understanding to develop and implement assessment systems that truly include students and promote meaningful engagement [30, 31].

In a dynamic learning environment, Reflective Course Evaluation (RCE) is a critical tool for student involvement and course evaluation. Some of the user-centric factors that influence technology acceptance include Perceived Usefulness (PU), Perceived Ease of Use (PEOU), and Behavioral Intention to Use (BIU), which are the cornerstones of the Technology Acceptance Model (TAM). This empirical research investigates these factors and their interaction with the feedback mechanisms of the RCE system (FDBK). The model in Fig. 1 depicts several hypotheses with the goal of investigating their rationality. This study aims to provide a thorough understanding of the multi-dimensional aspects of the RCE system through empirical testing of the hypotheses. This research's findings will provide practical insights for system modifications and teaching initiatives.

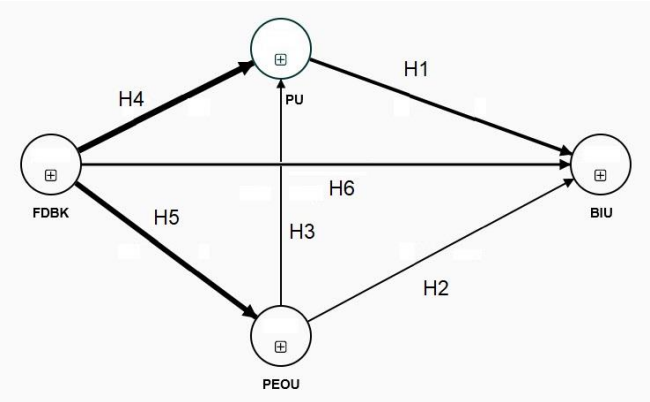


Fig. 1. A research model represents the hypotheses.

2) Extended technology acceptance model

Davis [24] developed the Technology Acceptance Model (TAM), which states that Perceived Ease of Use (PEOU) and Perceived Usefulness (PU) are crucial factors in determining the adoption of technology. PEOU pertains to the user's ease of use of the technology, while PU signifies their perception of its potential to enhance their job performance. Both factors are essential components of the Reflective Course Evaluation (RCE) system, exerting an influence on students' intentions of using it for course assessments.

- Hypothesis 1 (H1) states that the Perceived Usefulness (PU) of the RCE system has a significant impact on students' Behavioral Intention to Use it (BIU). This suggests that if students view the system as advantageous, they are more inclined to use it.
- Hypothesis 2 (H2) posits that the Perceived Ease of Use (PEOU) impacts the Behavioral Intention to Use (BIU), suggesting that a higher level of user friendliness enhances the probability of adopting the system.
- Hypothesis 3 (H3) proposes a correlation between PEOU and PU, indicating that ease of use improves perceived usefulness.

3) Feedback effectiveness as an external variable

The effectiveness of feedback, which includes its value, relevance, clarity, and timeliness, is of utmost importance in systems such as the Reflective Course Evaluation (RCE). We hypothesize that the feedback mechanism enhances the Perceived Usefulness (PU) and Ease of Use (PEOU) of the RCE system while also influencing users' Behavioral Intention to Use (BIU).

- Hypothesis 4 (H4) states that providing appropriate feedback inside the RCE system greatly enhances its perceived usefulness, indicating the system's ability to effectively address educational needs.
- Hypothesis 5 (H5) states that feedback improves the system's ease of use, making it more user-friendly and conducive to academic endeavors.
- Hypothesis 6 (H6) examines the impact of feedback on users' intention to consistently use the system, proposing

that it fosters active user engagement and satisfaction.

The purpose of these hypotheses is to measure the effects of feedback methods on the RCE system's effectiveness. This research could help improve the system in the future and provide valuable information on successful feedback practices in technology-enhanced learning settings.

III. Methodology

A. Study Design

The development of an interactive survey platform was an essential phase in the research process. The application was developed using Visual Studio Blazor, a modern Microsoft framework that was found suitable for generating interactive web user interfaces using the C# programming language. The system was specifically created with an emphasis on preserving user privacy and ensuring the security of data. The development of this platform also included thorough testing to guarantee the system's operation and user friendliness.

The survey design was appropriate for conducting a preliminary study to assess the initial reception and usability of the survey among students. This methodology seeks to establish fundamental data for further, more extensive investigation.

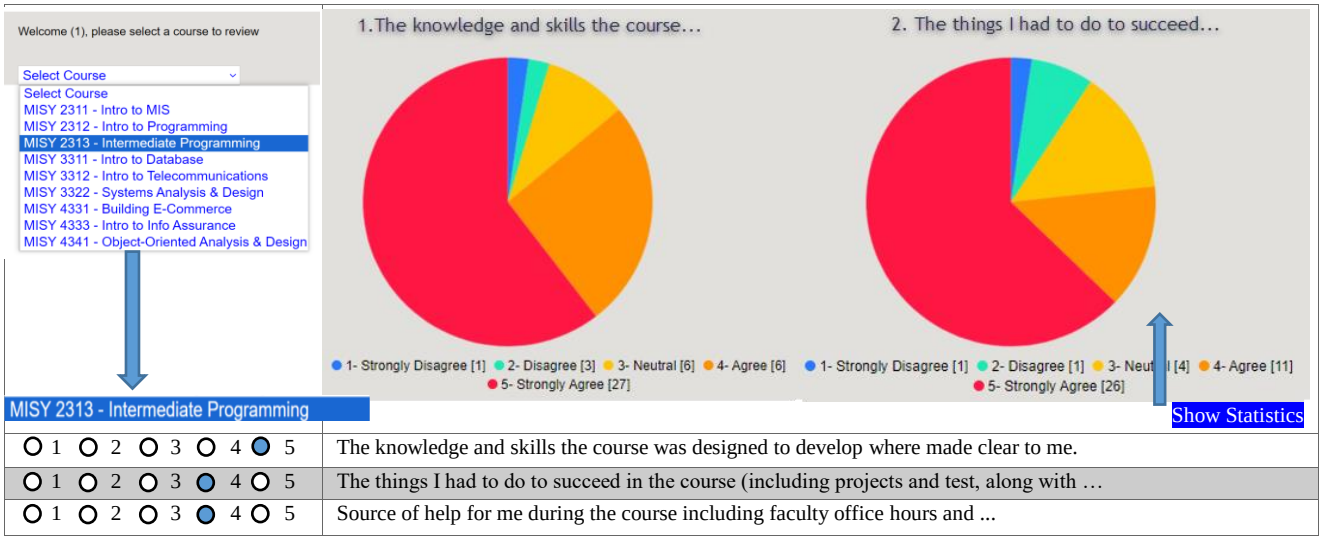
The study included students who were enrolled in different academic programs at the university. All students taking courses with the researcher were issued an invitation to participate in the study, which provided an explanation of the study's purpose and the associated procedures. Students were instructed to enroll in the system using their student identification number. The participants were assured that their identities would be kept confidential from the instructors and that their data would be exclusively utilized for the purpose of this study.

The interactive survey system automatically collected the data. Upon registration, students can access the system, choose a course from a drop-down menu, and proceed to complete the survey specific to that course. This system uses the same questions that the university uses to evaluate the courses at the end of each semester. It comprised a sequence of Likert-scale inquiries pertaining to many facets of the course. As opposed to the one-off survey at the end of the semester, the interactive structure enabled students to read and revise their responses at any time, ensuring a more precise representation of their perspectives as the course advanced. The technology additionally offered students the opportunity to view class-wide survey statistics, fostering transparency and motivating well-informed feedback. The survey statistics show the status of responses through pie charts generated for every question, as shown in Fig. 2. This immediate feedback creates a sort of community consensus that leads to an increase in the students' confidence through collaborative unanimity.

The survey was initiated in the second week of the semester. This time was selected to enable students to express their first perceptions of the course while also allowing sufficient time to incorporate modifications based on the feedback obtained. Students were asked to diligently fill out the survey and were notified that they had the option to revisit and revise their answers at any time during the semester.

Following the preliminary survey, the instructor gathered and examined the students' feedback and survey data. The feedback was subsequently discussed during a class session conducted approximately in the fifth week of the semester. The instructor addresses the students' concerns by offering solutions to rational problems and providing explanations for why some demands were not possible. The purpose of this open discourse was to cultivate a spirit of cooperation and shared comprehension between the lecturer and students.

Throughout the class discussion, a recurring theme or concern came out of the students' comments. The theme approach has been used by [32]. Subsequently, this theme was incorporated into the survey as an additional survey question, offering students a more targeted opportunity to articulate their perspectives on this particular course. Students were prompted to revise their survey responses, specifically about their viewpoint on the recently introduced theme. Fig. 2 shows the survey along with the course selection drop-box, part of the response statistics that appear for all 23 questions when requested through the button, along with the identified "changeable" theme.



○ 1 ○ 2 ○ 3 ● 4 ○ 5	The instructor was fully committed to the delivery of the course …
○ 1 ○ 2 ● 3 ○ 4 ○ 5	The instructor had thorough knowledge of the content of the course.
○ 1 ○ 2 ○ 3 ● 4 ○ 5	The instructor was available during office hours to help me.
○ 1 ● 2 ○ 3 ○ 4 ○ 5	The instructor was enthusiastic about teaching.
○ 1 ○ 2 ○ 3 ● 4 ○ 5	The instructor cared about my progress and was helpful to me.
○ 1 ○ 2 ● 3 ○ 4 ○ 5	Course materials were of up-to-date and useful. (texts, handouts, references etc.)
○ 1 ○ 2 ● 3 ○ 4 ○ 5	In this course I was encouraged to ask questions and develop my own ideas.
○ 1 ○ 2 ● 3 ○ 4 ○ 5	In this course I was inspired to do my best work.
○ 1 ○ 2 ○ 3 ● 4 ○ 5	The things I had to do in this course (class activities, assignments …
○ 1 ○ 2 ○ 3 ○ 4 ● 5	The quizzes, exams and projects were related to the goals of the course.
● 1 ○ 2 ○ 3 ○ 4 ○ 5	The resources I needed in this course (textbooks, library, computers, etc.) …
● 1 ○ 2 ○ 3 ○ 4 ○ 5	In this course, effective use was made of technology to support my learning.
○ 1 ● 2 ○ 3 ○ 4 ○ 5	The amount of work I had to do in this course was reasonable for the hours …
○ 1 ○ 2 ● 3 ○ 4 ○ 5	Projects and tests were graded and returned to me in a timely manner.
○ 1 ○ 2 ○ 3 ● 4 ○ 5	Grading of my tests and assignments in this course was fair and reasonable.
○ 1 ○ 2 ○ 3 ● 4 ○ 5	The link between this course and other courses in my total program were …
○ 1 ○ 2 ○ 3 ○ 4 ● 5	Overall, I was satisfied with the delivery of this course.
○ 1 ○ 2 ○ 3 ○ 4 ● 5	This course helped me to develop my skills in working as a member of a team.
○ 1 ○ 2 ○ 3 ● 4 ○ 5	What I learned in this course is important and will be useful to me?
○ 1 ○ 2 ● 3 ○ 4 ○ 5	This course improved my ability to communicate effectively.
What do you like best about this course or the instructor?	
What do you dislike most about the course or the instructor?	
What change or changes would you suggest to make this a better course?	
○ 1 ○ 2 ○ 3 ○ 4 ● 5	This is a changeable theme question

Theme

Click to Save the form

Fig. 2. Application interface, showing the main survey questions, a portion of the response statistics, and the theme question.

The survey feedback and prevailing views on the subject were utilized to refine the teaching methodologies. These modifications were implemented in order to align with the students' preferences and optimize the learning process. The instructor implemented these modifications while preserving the academic integrity and educational goals of the course. Towards the end of the semester, a second survey was made available to the students. This new survey sought to assess the students' interest and satisfaction with the interactive modification approach to course evaluation and the adaptations implemented in the teaching techniques. The survey encompassed inquiries regarding the students' encounters with the interactive survey system, the efficacy of the instructing technique modifications, and their overall satisfaction with the course. The survey attempted to use the insights from TAM to gain a thorough understanding of how the RCE feedback affected the students. It also aimed to determine how the adjustments made to the teaching methods influenced the students' overall acceptance and satisfaction with the course.

B. *Survey Participants*

The convenience sampling techniques was applied on 136 students enrolled in the researcher's courses representing a diverse of academic majors within the university's business administration college. The convenience sampling was selected by the researcher for its accessibility and practicality. It is easier and more efficient to gather useful data within the constraints of an academic semester.

All students had previously practiced the conventional end-of-semester course evaluation, so it was appropriate to offer the new Reflective Course Evaluation (RCE) system to all students taught by the researcher. We chose this approach to prevent any form of discrimination and to provide every student who chose to participate with the opportunity to express their opinion. We believe that offering the RCE system to all the students is more inclusive and covers a wide range of insights. The diversity of academic programs among the participants was intentional, as it allowed the research to capture a broad spectrum of student experiences and perceptions.

Despite its limitations, including potential bias and lack of representativeness, the preliminary study deemed convenience sampling appropriate. We designed the approach to test the RCE system and gather initial insights that could guide further, more rigorous research.

The study's objectives, the importance of their involvement, and the procedures were properly explained to the invitees. The SmartPLS statistics software is utilized to analyse the data and gain insights into the impact of the RCE system on students' satisfaction by assessing their intention to use the system. The research findings are utilized to make inferences on the efficacy of interactive and dynamic modification methods for course evaluation.

C. Data Collection

Two surveys were administered for the study; the first is for the modifiable dynamic RCE, and the second one represents the final questionnaire that is used to measure the participant's acceptance and the intention to use the platform. These instruments were designed to capture different aspects of the participants' experiences and perceptions of the newly introduced RCE platform.

1) Modifiable interactive survey

The primary purpose of this survey is to facilitate ongoing adjustments in teaching methods based on real-time feedback. We make it available in the second week of the semester. The students are able to update their responses as the course progresses. The students have access to this continuous feedback mechanism for real-time adaptations in teaching practices throughout the semester. Moreover, the instructor administers a changeable "theme question" in this survey, allowing students to vote on specific suggestions or recurring issues.

2) End-of-semester acceptance survey

The acceptance survey is administered online during the final week of the semester. It is designed to capture students' final perceptions and acceptance of the RCE platform after a full semester of use. Since it is based on the Technology Acceptance Model (TAM), this survey includes questions on Perceived Usefulness (PU), Perceived Ease of Use (PEOU), Feedback effectiveness (FDBK), and Behavioral Intention to Use (BIU).

IV. Results

A. Reliability and Validity Analysis

The model was examined using the Partial Least Squares Structural Equation Modeling (PLS-SEM) algorithm. Table 1 shows the internal reliability of the model.

Table 1. Internal consistency reliability

Construct	Cronbach's Alpha	AVE
EOU	0.746	0.657
FDBK	0.749	0.559
BIU	0.748	0.664
PU	0.789	0.701

The constructs showed strong internal consistency, with Cronbach's alpha scores above the acceptable level of .700 [33]. Convergent validity was also confirmed since all the Average Variance Extracts (AVE) are above the recommended 0.500 threshold, showing a significant explanation of the indicators' variance representing the questions listed in Table A1 of the Appendix.

The Fornell-Larcker criterion in Table 2 confirms the establishment of discriminant validity because each construct has a greater value than all the other model's constructs.

Table 2. Fornell-Larcker criterion

	BUI	FDBK	PEOU	PU
BIU	0.815			
FDBK	0.674	0.748		
PEOU	0.552	0.586	0.810	
PU	0.661	0.655	0.423	0.837

The Heterottait-Monotrait (HTMT) ratio also supported the discriminant validity because all the HTMT values were below the threshold of .900 [34], as seen in Table 3.

Table 3. Heterottait-Monotrait Ratio (HTMT) matrix

	BUI	FDBK	PEOU	PU
BIU				
FDBK	0.834			
PEOU	0.700	0.713		
PU	0.838	0.781	0.495	

B. Hypotheses Analysis

Fig. 3 shows the strength of the relationships between the model's latent variables that help in proving or rejecting the hypotheses mentioned in Fig. 1.

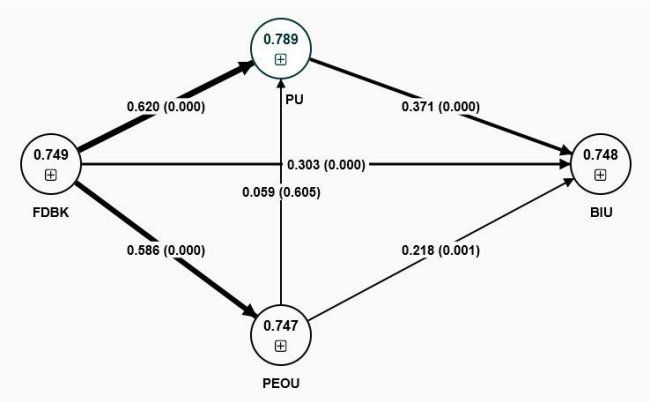


Fig. 3. Relationships between the extended TAM model's constructs showing the path coefficients.

1) Direct paths

PU ≥ BIU (0.371): This path shows a positive relationship that supports the first hypothesis (*H1*). It shows a significant and relatively strong impact of Perceived Usefulness (PU) on the Behavioral Intention of Use (BIU).

PEOU ≥ BUI (0.218): This path shows a positive relationship that supports the hypothesis (*H2*). It shows a significant and moderate effect of Perceived Ease of Use (PEOU) on the Behavioral Intention of Use (BIU).

PEOU ≥ PU (0.059): Although this path shows a positive relationship, it is insignificant and very weak, which cannot support the hypothesis (*H3*). Therefore, Perceived Ease of Use (PEOU) has no effect on Perceived Usefulness (PU). We will elaborate on this relationship in the discussion section.

FDBK ≥ PU (0.620): This path shows a positive relationship that supports the hypothesis (*H4*). It shows a significant and strong effect of the feedback on the enhancement of Perceived Usefulness (PU). Feedback, therefore, demonstrates the great benefits of the proposed system.

FDBK ≥ PEOU (0.586): This path shows a positive relationship that supports the hypothesis (*H5*). It shows a significant and strong effect of the feedback on the

enhancement of Perceived Ease of Use (PEOU). It suggests that the feedback mechanism is probably offering students the guidance and support they need to make the proposed system user-friendly.

FDBK ≥ BUI (0.303): This indicates a moderate positive impact that supports the hypothesis (*H6*). It implies that feedback (FDBK) has a direct influence on users' Behavioral Intentions to Use the interactive survey (BIU). This suggests that feedback not only aids users in the use of the technology but also motivates them to utilize it.

2) Indirect effects of FDBK on BIU

FDBK ≥ PU ≥ BIU: The effect of this indirect path is the product of FDBK ≥ PU (0.620) and PU ≥ BIU (0.371) that makes (0.230).

FDBK ≥ PEOU ≥ BIU: The effect of this indirect path is the product of FDBK ≥ PEOU (0.586) and PEOU ≥ BIU (0.218) that makes (0.128).

C. Surveyors' Comments

The data collected from the open-ended student comments confirms the additional benefits of the RCE over the traditional static end-of-semester course evaluation survey. It represents a more profound comprehension of student experiences and viewpoints. The statistical results support these observations, providing qualitative evidence of the positive effects of the RCE system as perceived by students. The analysis is conducted using TAGUETTE, an open-source tool for qualitative research. Themes were identified from the students' responses, and eight tags were assigned to represent these themes. Table 4 displays the themes extracted from students' comments, as well as the number of occurrences.

Table 4. TAGUETTE Thematic Tags and the frequency of their occurrences

Theme	Occurrences
Course understanding	08
Feedback appreciation	07
Like to reuse	07
Students' engagement	04
Unlike traditional	03
Useful	12
Wonderful	07
Collect students' opinions	06

The comments are listed in Table A2 of the Appendix.

This qualitative study enhances our understanding of the effectiveness of the RCE system by verifying and reinforcing the quantitative findings. The word cloud map produced from the comments, using Python programming language, is shown in Fig. 4.

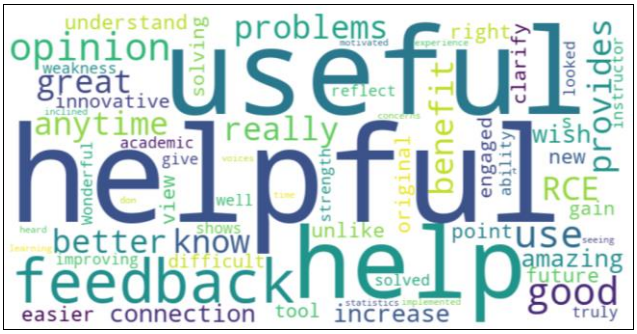


Fig. 4. Word cloud extracted from the students' comments.

The size of the words is proportional to the frequency of mentioning them in the comment text. Accordingly, the RCE is helpful and useful; its feedback is good, wonderful, and amazing; it is better than the traditional survey system; and the students like to see it applied in other courses.

Both Table 4 and Fig. 4 prove that the RCE system is qualitatively useful, and they intend to use it, which is consistent with the results found through the quantitative analysis.

V. Discussion

The results of this study indicate that the RCE system significantly improves both the level of student involvement and the perceived usefulness of feedback mechanisms within the context of the educational process. This is consistent with prior studies that emphasize the critical role of timely feedback in improving educational outcomes [27]. The prompt feedback provided by the students is important because it has a direct impact on the level of engagement they have with the course content and provides a valuable contribution to their learning environment.

The strong positive effect of feedback on Perceived Usefulness (PU) and Behavioral Intention to Use (BIU) is in line with the Technology Acceptance Model (TAM). This supports the idea that people will use a system more if they think it is useful [24]. This finding is especially useful in educational settings, where the perceived effectiveness of the tool has a significant impact on its adoption by both students and instructors. In our study, we found that perceived ease of use had a weaker impact on perceived usefulness. Despite its deviation from the original TAM, recent studies also reported a similar result [30]. This means that after achieving a minimum level of usability, attention shifts towards how relevant and effective a system can be within a learning process. Qualitative information also supports this finding; the majority of students emphasized more on the usefulness than the easy-to-use system.

The introduction of the RCE system not only addresses the limitations of traditional end-of-semester evaluations, but it also provides a more dynamic and responsive approach to course evaluation. The RCE system effectively resolves the issue of delayed feedback, which hinders immediate pedagogical adjustments, by allowing continuous updates to student feedback throughout the semester [13]. This continuous feedback offers a substantial improvement over old methods. It ensures that student input can lead to modifications in real time, which in turn makes the learning experience more responsive and adapted to the requirements of the students. This feedback loop ensures that timely changes to their teaching strategies can be made by the instructors, which will lead to enhancement of the overall learning experience.

This study contributes to current literature knowledge by demonstrating how to implement real-time reflective evaluation effectively to achieve the objectives of enhancing the learning process and raising student engagement. By validating these effects within the framework of the extended TAM, the study provides a robust theoretical basis for the adoption of such systems in educational contexts. It also demonstrates that the RCE system created a collaborative learning environment that was highly effective because the

students felt their input could make a direct change to the course structure. There is a good alignment between this and the constructivist learning theory, which asserts that learning is most effective when students actively participate in the process of learning [35]. This alignment between theory and practice highlights the RCE system's potential to foster a more interactive and student-centered learning environment. Not only does the RCE system's adaptability and flexibility make it an important tool for educators, but it also suggests that it has the potential to be applied in a wider variety of educational contexts, which ensures that its impact goes beyond the scope of the current study. This research emphasizes the significance of timely feedback in improving students' learning and offers a practical solution to the limitations associated with traditional assessment systems. The findings indicate that the RCE system could lead to a noticeable improvement in educational practices and performance.

VI. Conclusion

In conclusion, instant feedback has demonstrated the effectiveness of the RCE system in enhancing student engagement and pedagogy. It supports an extended TAM that demonstrates a complex relationship between perceived ease of use, perceived usefulness, and behavioral intention to use. This research identifies a significant nature of feedback that has implications for both students' behaviors and perceptions. It emphasizes the need for a system design that goes beyond usability by focusing on educational value. To ensure the validity of the findings, future studies would include more exploration of the relationships applied to a variety of demographics, as well as objective data sources.

Despite its informality, the use of self-reported data might be biased and affect the accuracy and generalizability of the results. In addition, the sample was limited to courses taught by the researcher; therefore, the outcomes were less representative. Furthermore, there is a gender imbalance among participants with fewer number of females than males hence influencing the findings as well. These issues should be taken into account in interpreting the findings, and future research should address them by including larger and more diverse samples as well as using objective sources of data to confirm these findings.

Appendix

Table A1. The questions and their constructs

Question	Construct
- The RCE system was effective in identifying areas of strength and weakness in the course. - The addition of a thematic question provided a useful way to gauge student opinions and perceptions. - I feel that the RCE system improved my ability to learn.	PU
- The navigation and use of the RCE system were easy. - I experienced technical difficulties while using the RCE system. (R) - The RCE system was found to be user-friendly.	PEOU
- The feedback from the RCE system provided useful insights into my progress throughout the semester. - The option to modify my survey selections or comments at any time enhanced my ability to provide meaningful feedback. - The feedback received through the RCE system was valuable in helping me understand the course material. - The instructor's response to the students' concerns was effective.	FDBK
- Given that the RCE system didn't add any benefit over the conventional end-of-semester survey, I don't plan to use it again. (R) - I have no intention of using the RCE system in future courses, as it was not a good addition. (R) - I'd like to see the RCE system implemented in other courses.	BUI

Table A2. Students' comments

- It was very useful in my opinion and i would like to see it in other courses.
- Should be in all the courses that I take.
- It is an amazing system that I wish more courses would implement this system to their courses.
- The RCE System was a great system to increase the connection with the doctor and help us understand if we are going in the right direction in the class room and outside the classroom.
- I think they should implement this system in future courses to make point of view of other students on the course easier.
- It is a useful survey it helps to get feedback any time during the semester unlike the original survey from the college.
- It is a good system because it helps to know the state of the course, and good thing about it is that you can do it any time during the semester.
- A new innovative way to get student engaged.
- It's a very good tool to use to gain the feedback and solving the problems if there were any.
- It is helpful for student to clarify any difficult they face.
- The system was useful to me and to the course it helps in improving our academic levels.
- It is a very great program that provides the student the ability to have a better opinion on the course.
- It was truly helpful.
- It is very helpful to make the student a opinion a part of the course.
- It shows the strength and weakness in the course which will make it even better.
- It is a helpful way for the students to reflect and give a feedback to the instructor and I hope it can be applied to other courses as well.
- It is very helpful i would like to see it again and again.
- Wonderful and I hope that the students' problems are really looked into and solved.
- I really like it and i would like to see it implemented in other courses. i especially like seeing the statistics and that our voices/concerns/feedback is heard and would be useful to us at the time that we're taking the class. With the survey the university provides, i don't feel motivated to use it since i won't benefit from it. I do feel inclined to use the RCE a lot since i know it would benefit my learning experience.

Conflict of Interest

The author declares no conflict of interest.

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