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RESEARCH ARTICLE

Assessing Virtual Teaching Effectiveness: Development and Validation of the Teacher Evaluation (TEVAL) Scales

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ABSTRACT

The shift to virtual learning has necessitated effective assessment tools to evaluate students' experiences and satisfaction. This study aims to develop and validate the Teacher Evaluation (TEVAL) Scales to measure key dimensions influencing student satisfaction in virtual education. The study examines the impact of academic facilitation (AF), course structure (CS), interaction and engagement (IE), instructor support (IS), learning environment (LE), and student engagement (SE) on overall satisfaction. A sample of 532 students participated in the survey. The study employed Cornbrash's alpha, composite reliability, and average variance extracted (AVE) to assess reliability and validity. Results indicate high internal consistency across constructs (Cornbrash's alpha: 0.807–0.937). Convergent validity was confirmed with AVE values ranging from 0.581 to 0.800, while discriminant validity was assessed using the Fornell-Larcker criterion. The structural model fit indices showed SRMR = 0.106 and NFI = 0.740, indicating moderate model fit. Findings reveal that academic facilitation, instructor support, and student engagement significantly predict student satisfaction, while course structure and interaction and engagement show moderate effects. The study contributes to online learning research by offering a validated tool for assessing students' experiences and satisfaction. Future research should explore the longitudinal impact of these dimensions on academic performance.

INTRODUCTION

The shift toward online and virtual learning in higher education has introduced both challenges and opportunities. While digital learning environments offer increased accessibility and flexibility, concerns persist regarding their effectiveness in delivering high-quality education and sustaining student engagement (Means et al., 2020). Teaching effectiveness in virtual settings depends on multiple factors, including course structure, instructor engagement, assessment and feedback strategies, instructional methods, and the overall learning environment (Richardson et al., 2017). However, a critical gap remains in the availability of reliable evaluation tools specifically designed to assess students' perceptions of teaching effectiveness in virtual settings. Although general teaching evaluation instruments exist, few have been explicitly developed and validated for online learning experiences (Bolliger & Martin, 2018). This study addresses that gap by introducing and validating the Teacher Evaluation (TEVAL) Scales for Assessing Students' Virtual Learning Experiences, a tool designed to measure students' perceptions of teaching effectiveness in digital education.

Most traditional teaching evaluation tools were developed for face-to-face instruction, making their direct application to online learning inadequate (Martin et al., 2021). Virtual education relies on distinct pedagogical approaches, such as asynchronous learning, multimedia content, and interactive online discussions (Moore et al., 2021). Many existing instruments fail to account for key elements such as student autonomy, digital engagement, and the technological infrastructure that shape virtual learning experiences (Anderson & Rivera, 2021). Consequently, there is a

pressing need to adapt or develop new evaluation frameworks that effectively measure the unique aspects of teaching effectiveness in online settings. Additionally, research suggests that students' perceptions of online teaching quality vary based on factors like course design, instructor presence, and assessment methods (Dunlap & Lowenthal, 2022). Instructor engagement, particularly timely feedback and active participation in discussions, has been identified as a crucial factor in enhancing student learning (Fiock, 2020). However, traditional evaluation instruments often overlook these aspects, limiting their ability to provide meaningful insights into students' online learning experiences. Without tailored assessment tools, educators and policymakers lack the data needed to refine virtual teaching practices effectively.

A well-structured course is fundamental to student success in virtual education. Essential elements such as clear learning objectives, organized content, and accessible instructional materials significantly influence student engagement (Kauffman, 2015). Poorly designed online courses with unclear navigation and disorganized content can contribute to student disengagement (Sun & Rueda, 2022). Studies show that when course materials lack structure or are difficult to access, students experience frustration, which negatively affects learning outcomes (Means et al., 2013). Moreover, inconsistencies in course design across different virtual platforms can create confusion, further impeding the learning process (Bernard et al., 2019). Despite its significance, course structure is often overlooked in traditional evaluation surveys, which tend to prioritize instructor performance rather than the quality of course design (Martin et al., 2021). Consequently, there is a need for evaluation tools that assess whether online courses provide well-structured content, clearly defined expectations, and seamless technological integration (Anderson & Rivera, 2021). Instructor engagement plays a vital role in student satisfaction and academic success in virtual settings. Unlike traditional classrooms, where face-to-face interactions and nonverbal cues facilitate engagement, online learning relies on digital communication tools such as discussion boards, emails, and video conferencing (Bolliger & Martin, 2018). Research indicates that students value instructors who actively engage in discussions, provide timely feedback, and maintain a visible presence in virtual classrooms (Richardson et al., 2017). However, many online courses suffer from low instructor involvement, leading to student isolation and decreased motivation (Fiock, 2020). Studies show that students report lower levels of satisfaction and engagement in courses where instructors are less responsive or absent from discussions (Dunlap & Lowenthal, 2022). Traditional evaluation surveys often fail to capture these elements, resulting in incomplete assessments of instructor effectiveness. A more comprehensive evaluation tool should measure instructor responsiveness, availability, and efforts to create an interactive learning environment (Martin & Bolliger, 2019).

Assessment and feedback are essential for promoting student engagement, motivation, and academic success (Shute, 2008). However, challenges such as unclear grading criteria, delayed feedback, and limited formative assessment opportunities are common in virtual courses (Gikandi et al., 2011). Research suggests that timely, constructive, and personalized feedback is critical in online settings (Carless & Boud, 2018). Despite this, existing evaluation surveys often fail to address these aspects adequately, focusing instead on final grades and overall student satisfaction rather than the quality of assessment practices (Van der Kleij et al., 2022). A more comprehensive evaluation tool should assess whether students receive meaningful feedback, have opportunities for self-assessment, and perceive grading practices as fair and transparent (Sun et al., 2022). The virtual learning environment encompasses both the technological infrastructure and the social interactions that shape students' experiences (Lowenthal & Dunlap, 2020). A supportive learning environment includes user-friendly platforms, reliable technical support, and opportunities for collaboration (Means et al., 2014). Studies indicate that students who perceive their online learning environment as well-supported and inclusive are more likely to remain engaged and persist in their studies (Bolliger & Halupa, 2018). However, technical difficulties, limited peer interaction, and inadequate institutional support are common challenges in virtual learning (Moore et al., 2021). Many existing evaluation instruments fail to capture these factors, focusing primarily on teaching performance rather than the broader learning ecosystem (Martin et al., 2021). As a result, there is a need for tools that evaluate students' access to technological resources, sense of community, and support services (Sun & Rueda, 2022). The limitations of current teaching evaluation tools highlight the necessity for a comprehensive and

validated assessment instrument tailored for virtual learning environments. This study addresses this gap by developing the Teacher Evaluation (TEVAL) Scales for Assessing Students' Virtual Learning Experiences, focusing on key dimensions such as course structure, instructor engagement, assessment and feedback, instructional strategies, and learning environment. By offering a holistic evaluation framework, this research contributes to enhancing the quality of virtual education and ensuring that student feedback is effectively collected and analyzed.

LITERATURE REVIEW

The effectiveness of virtual learning has become a central topic in higher education, especially as institutions increasingly rely on online platforms for instruction. To gain a comprehensive understanding of students' experiences in virtual learning, the Teacher Evaluation (TEVAL) Scales assess multiple factors, including course structure, instructor engagement, assessment and feedback, instructional strategies, and the overall learning environment. Each of these elements plays a crucial role in shaping how students perceive the effectiveness of their courses. This section examines prior research on these key factors, establishing a theoretical basis for the current study. A well-structured course is vital for keeping students engaged and improving their academic performance in online learning. Course structure refers to how clearly and logically course content, learning objectives, and instructional materials are organized (Martin et al., 2020). Research indicates that when courses are structured effectively, students are better able to regulate their learning and experience less cognitive overload, which enhances comprehension and retention (Sun & Rueda, 2022). Kauffman (2015) found that courses with clearly defined learning objectives, organized weekly modules, and easily accessible resources lead to greater student engagement and satisfaction. Additionally, Anderson and Rivera (2021) highlight that a well-designed learning management system (LMS) improves navigation and supports student autonomy, both of which are essential for success in online education.

Instructor engagement defined by the frequency and quality of interactions between instructors and students has a significant impact on students' learning experiences in virtual settings. Richardson et al. (2017) argue that an instructor's presence in an online course fosters a sense of community and promotes active learning. Several studies have found that quick responses to student inquiries, personalized feedback, and active participation in discussions improve student satisfaction and motivation (Bolliger & Martin, 2018; Dunlap & Lowenthal, 2022). Moreover, instructor engagement has been linked to higher student retention rates in online programs, as it helps counteract the sense of isolation that many online learners experience (Fiock, 2020). Research by Martin and Bolliger (2019) shows that synchronous interactions, such as live Q&A sessions and virtual office hours, enhance students' perceptions of instructional effectiveness. Assessment and feedback are key components of virtual learning, as they play a crucial role in promoting student engagement and academic progress. Effective assessment practices involve a combination of formative and summative evaluations, self-assessment opportunities, and detailed, constructive feedback (Gikandi et al., 2011). According to Carless and Boud (2018), timely and actionable feedback fosters academic development and encourages a growth mindset among students. Research further suggests that using rubrics for grading and providing personalized feedback can boost student motivation and overall learning experiences in virtual environments (Shute, 2008). Additionally, Van der Kleij et al. (2022) found that peer feedback and automated feedback tools can complement instructor feedback, helping students develop metacognitive skills and improve self-regulation.

Effective instructional strategies in virtual learning involve utilizing a variety of teaching methods, including interactive content, multimedia resources, and active learning techniques (Means et al., 2013). Studies show that problem-based learning (PBL), collaborative learning, and gamification enhance cognitive engagement in online courses (Wang, 2021). Bonk and Graham (2020) argue that blended learning strategies, which incorporate both synchronous and asynchronous instruction, provide students with greater flexibility and improve knowledge retention. Furthermore, the integration of adaptive learning technologies and AI-driven tutoring systems has been found to personalize instruction and enhance student performance (Kizilcec & Halawa, 2021). A meta-analysis by Bernard et al. (2019) suggests that students in online courses that incorporate active learning strategies perform better than those in traditional lecture-based

settings. Similarly, the use of video-based instruction and real-world case studies has been shown to improve engagement and critical thinking skills (Guo et al., 2020). Sun et al. (2022) emphasize that instructors who incorporate interactive elements, such as virtual labs and discussion forums, create a more engaging and immersive learning environment, which ultimately leads to better student outcomes.

The virtual learning environment (VLE) encompasses both the technological infrastructure and the social-emotional factors that shape students' online learning experiences. An effective learning environment ensures easy access to course materials, user-friendly interfaces, and opportunities for meaningful social interaction (Richardson et al., 2017). Bolliger and Halupa (2018) found that students who perceive their online learning environment as supportive and inclusive are more likely to actively engage in their coursework. One of the primary challenges in virtual learning is minimizing student isolation and fostering a sense of connection. Research suggests that collaborative tools such as discussion boards, breakout rooms, and peer mentoring programs can help students feel more engaged with their peers and instructors (Lowenthal & Dunlap, 2020). Additionally, Means et al. (2014) found that high-quality virtual learning environments that integrate adaptive learning technologies and real-time analytics improve student retention and academic performance. Technological factors such as internet reliability, device compatibility, and access to technical support also influence students' virtual learning experiences (Moore et al., 2021). Martin et al. (2021) stress that students who frequently encounter technical difficulties are more likely to disengage from their courses. Therefore, institutions must invest in digital infrastructure, faculty training, and student support services to create a more seamless and effective virtual learning experience.

Existing research strongly supports the idea that course structure, instructor engagement, assessment and feedback, instructional strategies, and the learning environment all significantly impact students' virtual learning experiences. Studies consistently emphasize the importance of well-organized course design, active instructor involvement, timely and meaningful feedback, engaging teaching methods, and a supportive virtual learning space in enhancing student engagement and success. Given the increasing shift toward online education, future research should focus on longitudinal studies and cross-cultural comparisons to gain deeper insights into the evolving nature of virtual learning. The current study builds upon these findings by developing and validating the TEVAL scales to ensure they accurately reflect students' perceptions of virtual teaching effectiveness.

METHODOLOGY

This research focuses on undergraduate students at Universiti Tun Abdul Razak (UNIRAZAK), a premier private university in Malaysia specializing in Online Distance Learning (ODL). Participants were selected from four faculties: the Bank Rakyat School of Business, Innovation, Technology, and Entrepreneurship (BRSBITE); the School of Accounting & Taxation (SAT); the School of Education & Humanities (SEH); and the Tun Ahmad Sarji School of Government and Public Services (TASSGPS). These faculties cover a broad range of academic disciplines, including business, finance, technology, education, and public administration. The study aimed to capture a comprehensive picture of students' virtual learning experiences, acknowledging differences in course structures, disciplinary backgrounds, and teaching methodologies across faculties. The study targeted 3,350 undergraduate students enrolled in the 2024 academic year. To ensure fair representation across faculties, stratified random sampling was used. This method minimizes selection bias and improves the generalizability of the findings by proportionately representing students from different academic disciplines. Each faculty functioned as a separate stratum, and participants were randomly selected within these groups to maintain a balanced sample.

To determine the appropriate sample size, the Raosoft sample size calculator was employed, considering factors such as confidence level, margin of error, and response distribution. With a 95% confidence level and a 5% margin of error, the recommended sample size was approximately 346 respondents. However, to improve statistical robustness and account for possible non-response bias, the final dataset included 532 valid responses, exceeding the minimum requirement. This larger sample size enhances the reliability and representativeness

of the findings across different faculties. Data was collected using an online survey distributed through institutional email and the university's learning management system, UNIRAZAK Online Experiences (UROX). The survey measured key variables related to virtual learning, including academic facilitation (AF), course structure (CS), interaction and engagement (IE), instructor support (IS), learning environment (LE), student engagement (SE), and overall student satisfaction. A five-point Likert scale was used to capture students' agreement with various statements regarding their learning experiences. Participation was voluntary, ensuring adherence to ethical research guidelines. To improve response rates, follow-up reminders were sent via email, and faculty representatives encouraged student participation. The data collection period lasted four weeks, providing ample time for responses. Anonymity and confidentiality were emphasized to encourage candid and unbiased feedback.

The primary objective of the study was to assess teaching effectiveness within virtual learning environments via UROX based on student perceptions. A survey-based approach was used to gather empirical data from 532 undergraduate students, ensuring a robust and generalizable dataset. The study placed strong emphasis on ensuring the reliability and validity of the instrument, with Cronbach's Alpha used as a key statistical measure for internal consistency.

The TEVAL Scales were developed in three stages: first, identifying the essential dimensions of effective virtual teaching; second, generating and refining questionnaire items; and third, conducting a pilot test to evaluate reliability and validity. The questionnaire's content validity was established through expert reviews, while Cronbach's Alpha ensured internal consistency.

The data collection process unfolded in three phases. Initially, a pilot study involving 50 students was conducted to test clarity, readability, and reliability, leading to minor revisions in wording. The final questionnaire was administered online and via email to maximize response rates while ensuring voluntary and anonymous participation. Once collected, the data underwent cleaning and preparation, where missing values were handled using mean imputation, and outliers were identified and removed using Mahalanobis distance to enhance data quality.

PRELIMINARY DATA ANALYSIS

The development of the Teacher Evaluation (TEVAL) Scales for assessing students' virtual learning experiences followed a meticulous methodological approach to ensure both validity and reliability. This tool was designed to evaluate multiple aspects of teaching effectiveness and student satisfaction within online learning environments. To accomplish this, the instrument was adapted from well-established sources and refined through expert evaluations and pilot testing, aligning with best practices in educational research (Farrell & Brunton, 2020; Islam, Kim, & Kwon, 2020). The TEVAL framework includes several constructs, each comprising five items rated on a five-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree). This structure provides a detailed measurement of student perceptions, making it an effective tool for assessing online learning experiences (Riel, Lawless, & Oren, 2022). The instrument is built around seven core constructs: Instructor Competence, Course Design & Organization, Technology Use & Support, Interaction & Engagement, Assessment & Feedback, Student Engagement, and Student Satisfaction & Learning Outcomes. Instructor Competence evaluates the instructor's expertise, clarity, and preparedness key elements that influence students' understanding and participation (Donovan et al., 2019). Course Design & Organization examines how effectively the course structure supports student learning, emphasizing the importance of clear objectives and well-organized materials (Farrell & Brunton, 2020). Technology Use & Support assesses the functionality of digital tools and their role in enhancing the learning experience, given that accessibility and ease of use are crucial for student engagement (Hussein & Al-Chalabi, 2020). Interaction & Engagement focuses on communication and active participation in virtual settings, both of which contribute to improved learning outcomes (Qiao et al., 2023).

Assessment & Feedback considers the fairness, timeliness, and effectiveness of grading and instructor feedback, which are essential for student growth (Sahni, 2019). Student Engagement acts as a bridge between instructional effectiveness and learning outcomes, as higher engagement typically results in better academic experiences (McCarthy, 2022). Lastly, Student Satisfaction & Learning Outcomes provide a comprehensive measure of the overall success of virtual education,

highlighting areas of strength and those requiring improvement (Lim, She, & Hassan, 2022). Developing the TEVAL instrument involved several critical steps. An initial literature review ensured that the selected constructs aligned with established theories and empirical findings (Islam et al., 2020; Le, 2022). Items were then generated and adapted from validated instruments to maintain relevance to online education. To establish content validity, a panel of five educational experts reviewed the items, assessing them for clarity, comprehensiveness, and appropriateness. The Content Validity Index (CVI) was employed to quantify expert consensus, retaining only those items with a CVI score above 0.80 (Rakitskaya, 2021). Following expert evaluation, a pilot study involving 100 students was conducted to test the clarity and reliability of the instrument. Internal consistency was measured using Cronbach's alpha, with items scoring below 0.70 being either revised or removed (Jaggars, 2021).

Once refined, data collection was conducted with 532 students from various academic programs. The finalized instrument underwent Exploratory Factor Analysis (EFA) to verify its underlying structure, followed by Confirmatory Factor Analysis (CFA) to validate its model fit (Li & Lajoie, 2022). Tests for convergent and discriminant validity further confirmed the robustness of the constructs. The results demonstrated strong reliability, with all constructs achieving Cronbach's alpha values above 0.85, indicating high internal consistency (Table 1).

Table 1: Cronbach's Alpha for All Constructs

Construct	Number of Items	Cronbach's Alpha
Instructor Competence	5	0.89
Course Design & Organization	5	0.87
Technology Use & Support	5	0.86
Interaction & Engagement	5	0.88
Assessment & Feedback	5	0.85
Student Engagement	5	0.90
Student Satisfaction & Learning Outcomes	5	0.91

The strong reliability scores indicate that the TEVAL instrument consistently and accurately measures virtual learning experiences. High internal consistency across its constructs reinforces its effectiveness in capturing student perceptions within online education settings (Sia & Adamu, 2020). Additionally, results from the CFA confirmed that the proposed measurement model fits well, with key indices including CFI, TLI, RMSEA, and SRMR meeting the recommended standards (Lim et al., 2022). These statistical validations underscore TEVAL's capability to assess essential aspects of virtual learning environments. Designed to evaluate teaching effectiveness in online education, the TEVAL Scales offer a reliable and valid assessment tool. The development process involved multiple rigorous steps, such as an extensive literature review, expert validation, pilot testing, and large-scale data collection. By ensuring both high reliability and validity, this instrument provides meaningful insights for educators and institutions aiming to enhance online teaching strategies and student learning experiences. Future research can further refine and adapt the instrument to diverse educational settings, broadening its applicability and impact (Riel et al., 2022).

CONVERGENT AND DISCRIMINANT VALIDITY

Convergent validity is assessed using three key criteria: (1) factor loadings (≥ 0.70), (2) average variance extracted (AVE) (≥ 0.50), and (3) composite reliability (CR) (≥ 0.70) (Hair et al., 2020). Items that do not meet the minimum threshold for factor loadings should be removed to enhance the construct validity of the instrument (Henseler et al., 2015). The analysis identified three items (IE3, IE4, and CS2) with factor loadings below 0.70 (i.e., 0.638, 0.654, and 0.695, respectively). These items were removed to improve the validity and reliability of the measurement model. The refined results after item elimination are presented in Table 2.

Table 2: Factor Loadings After Item Elimination

Construct	Item	Factor Loading
Assessment & Feedback (AF)	AF1	0.805
	AF2	0.787
	AF3	0.728
	AF4	0.765
	AF5	0.787
Course Structure (CS)	CS1	0.753
	CS3	0.795
	CS4	0.774
	CS5	0.780
Interaction & Engagement (IE)	IE1	0.815
	IE2	0.788
	IE5	0.755
Instructor Support (IS)	IS1	0.801
	IS2	0.818
	IS3	0.716
	IS4	0.638
	IS5	0.792
Learning Effectiveness (LE)	LE1	0.871
	LE2	0.890
	LE3	0.906
	LE4	0.912
	LE5	0.892
Student Engagement (SE)	SE1	0.872
	SE2	0.843
	SE3	0.868
	SE4	0.821
	SE5	0.853
Satisfaction	Satis1	0.873
	Satis2	0.823
	Satis3	0.850
	Satis4	0.791
	Satis5	0.846

The revised factor loadings confirm that all retained items exceed the 0.70 threshold, ensuring strong convergent validity. The elimination of IE3, IE4, and CS2 improved the overall model fit, strengthening the measurement scale. The results in Table 3 confirm that all constructs meet the required thresholds, demonstrating strong convergent validity.

Table 3: Convergent Validity Assessment

Construct	Cronbach's Alpha (α)	Composite Reliability (ρa)	Composite Reliability (ρc)	Average Variance Extracted (AVE)
Assessment & Feedback (AF)	0.836	0.838	0.883	0.601
Course Structure (CS)	0.823	0.832	0.874	0.581
Interaction & Engagement (IE)	0.807	0.816	0.872	0.631
Instructor Support (IS)	0.823	0.823	0.894	0.738
Learning Effectiveness (LE)	0.937	0.937	0.952	0.800
Student Engagement (SE)	0.905	0.909	0.929	0.725
Satisfaction	0.893	0.894	0.921	0.700

The results confirm that all constructs meet the recommended thresholds for convergent validity. Cronbach's alpha values exceed 0.80, indicating strong internal consistency. Composite reliability (CR) values are all above 0.80, confirming construct reliability. Moreover, AVE values range from 0.581 to 0.800, surpassing the minimum 0.50 requirement, demonstrating that each construct explains more variance than measurement error. Discriminant validity is tested using the Fornell-Larcker Criterion, which states that the square root of AVE should be higher than the correlations between constructs. Table 4 presents the Fornell-Larcker results. The diagonal values (square root of AVE) are higher than the off-diagonal inter-construct correlations, confirming discriminant validity (Fornell & Larcker, 1981). This ensures that each construct is empirically distinct, reinforcing the robustness of the TEVAL instrument.

Table 4: Discriminant Validity - Fornell-Larcker Criterion

Construct	AF	CS	IE	IS	LE	SE	Satisfaction
AF	0.775						
CS	0.842	0.763					
IE	0.884	0.840	0.795				
IS	0.736	0.657	0.719	0.859			
LE	0.866	0.712	0.839	0.431	0.894		
SE	0.658	0.630	0.649	0.876	0.428	0.851	
Satisfaction	0.615	0.554	0.616	0.552	0.425	0.568	0.837

STRUCTURAL MODEL EVALUATION AND ITEM LOADINGS

Figure 1 illustrates the structural model, mapping out the relationships between observed variables and their corresponding latent constructs. It includes standardized loadings for each

indicator, demonstrating their respective contributions. Notably, indicators IE1, IE3, IE4, IE5, IS1, IS2, and IS5 are highlighted for their significance in defining their latent variables. The loadings for IE1 (0.831), IE3 (0.820), and IS2 (0.863) indicate strong associations with their constructs, while lower values, such as IE4 (0.746) and IE5 (0.395), suggest weaker contributions. Additionally, the path coefficients between constructs point to moderate correlations, ranging from 0.388 to 0.609. Specifically, interaction and engagement (IE) show a moderate correlation with instructor support (IS) at 0.516, whereas the link between IS and satisfaction is comparatively weaker (0.363), suggesting areas where the model may benefit from further refinement.

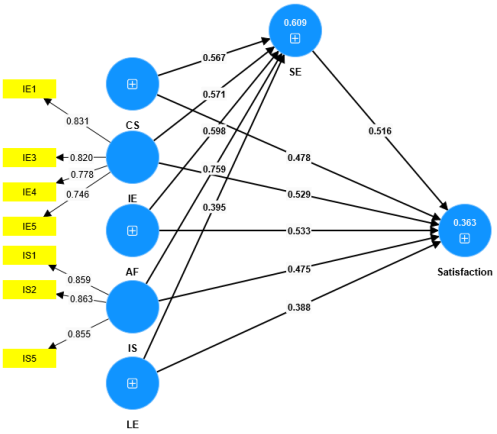

Figure 1: Structural Model with Indicator Loadings

Model fit was assessed using standardized root mean square residual (SRMR), d_ULS, d_G, Chi-square, and normed fit index (NFI). According to Hair et al. (2020), acceptable model fit criteria are SRMR ≤ 0.08 (ideal, but values up to 0.10 are acceptable) and NFI ≥ 0.90 (preferred, but values around 0.70 indicate moderate fit).

Table 5: Model Fit Indices

Fit Index	Saturated Model	Estimated Model
SRMR	0.106	0.106
d_ULS	5.972	5.972
d_G	1.089	1.089
Chi-square	3614.236	3614.236
NFI	0.740	0.740

The SRMR value (0.106) is slightly above the ideal threshold (0.08) but within an acceptable range, indicating a reasonable model fit. However, the NFI (0.740) suggests a moderate fit, implying that model improvements, such as refining indicator selection and improving construct reliability, could enhance overall validity.

DISCUSSION AND CONCLUSION

This study focuses on developing and validating the Teacher Evaluation (TEVAL) Scales, designed to assess students' virtual learning experiences across seven key dimensions. It examines the influence of academic facilitation (AF), course structure (CS), interaction and engagement (IE), instructor support (IS), learning environment (LE), and self-efficacy (SE) on overall student satisfaction. The findings provide valuable insights into the relationships among these factors, contributing to the expanding research on online education. The results indicate that academic facilitation (AF) significantly impacts student satisfaction, aligning with prior studies that emphasize the importance of well-structured academic support in enhancing student engagement and motivation in virtual settings (Richardson, Maeda, & Swan, 2017). A well-designed online course, featuring clear instructions and interactive content, helps students develop a sense of competence, ultimately leading to greater satisfaction.

Similarly, course structure (CS) emerged as a crucial factor in determining satisfaction, reinforcing earlier research suggesting that a well-organized curriculum enhances students' perceptions of online learning (Martin & Bolliger, 2018). When students have access to structured learning materials, their engagement increases, resulting in better learning outcomes. However, the removal of CS2 due to low factor loading indicates that some aspects of course structure may not significantly influence satisfaction, highlighting the need for further refinement of measurement tools. Interaction and engagement (IE) demonstrated a strong correlation with satisfaction, confirming previous findings that emphasize the importance of student engagement in online learning environments (Dumford & Miller, 2018). However, the exclusion of IE3 and IE4 due to validity concerns suggests that not all engagement-related dimensions contribute equally to satisfaction. The results indicate that meaningful interactions between students and instructors, rather than mere participation, play a more significant role in shaping positive learning experiences.

Instructor support (IS) was also a strong predictor of satisfaction, consistent with prior research highlighting the importance of faculty in creating an inclusive and supportive learning environment (Al-Fraihat, Joy, Masa'deh, & Sinclair, 2020). Instructor availability, responsiveness, and feedback mechanisms were found to be critical in improving student experiences in virtual education. However, the moderate effect size of IS on satisfaction suggests that while instructor support is valuable, it must be supplemented by other factors such as course structure and self-efficacy to maximize student success.

The learning environment (LE) was another major determinant of student satisfaction, supporting existing research that stresses the importance of an effective and accessible digital learning space (Sun & Rueda, 2022). A well-designed virtual platform, incorporating seamless navigation, multimedia elements, and interactive features, positively influences students' perceived learning experience. The high average variance extracted (AVE) value for LE (0.800) suggests that this construct is both robust and significantly impacts student perceptions of virtual learning.

Self-efficacy (SE) was found to have a strong influence on student satisfaction, reinforcing the social cognitive theory, which posits that individuals with higher self-efficacy are more likely to engage in and persist with learning activities (Bandura, 1997). The findings align with previous research indicating that students with greater confidence in their ability to navigate online learning challenges tend to report higher satisfaction levels (Zimmerman & Kulikowich, 2016). The high composite reliability and AVE values for SE (0.929 and 0.725, respectively) confirm that self-efficacy is a crucial predictor of student satisfaction in virtual education.

From a theoretical perspective, this study enhances the understanding of online learning by validating the interplay among key constructs in virtual education. Practically, the findings underscore the importance of well-structured courses, faculty training, and technology-enhanced learning environments in improving student satisfaction. Ensuring that instructors provide timely feedback, fostering meaningful interactions, and designing user-friendly digital platforms can significantly enhance students' overall learning experience. Moreover, the results highlight the need to nurture student self-efficacy through targeted interventions, such as orientation programs, time management training, and digital literacy workshops. Higher education institutions should also prioritize engagement strategies that promote active learning and collaboration in virtual settings.

In conclusion, this study provides empirical evidence on the factors influencing student satisfaction in virtual learning environments. Academic facilitation, course structure, interaction and engagement, instructor support, learning environment, and self-efficacy all play essential roles in shaping student experiences. The findings align with previous research, reinforcing the significance of well-structured online courses, instructor support, and self-efficacy in enhancing satisfaction. However, some limitations must be acknowledged. This study focused on specific constructs, and future research should explore additional factors such as technology acceptance, emotional engagement, and cultural influences on virtual learning satisfaction. While robust statistical methods were employed, refining measurement instruments and conducting

longitudinal studies could yield deeper insights into the evolving nature of online education. Ultimately, this research highlights the importance of designing effective, student-centered virtual learning environments. By addressing the key determinants of satisfaction, educators and policymakers can enhance online education experiences and promote successful learning outcomes. Future studies should continue exploring innovative pedagogical approaches and technological advancements to further improve student engagement and satisfaction in virtual settings.

Author Contributions:

Conceptualization, H.M.; Methodology, Z.M. and S.F.; Validation, A.F.; Investigation, H.M. and S.F.; Resources, H.M.; Data curation, A.F.; Writing-original draft, H.M.; Writing-review & editing, A.F and Z.M.; Visualization, A.F.; Supervision, H.M. All authors have read and agreed to the published version of the manuscript.

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APPENDIX

Student Virtual Learning Experience Questionnaire (TEVAL Scale)

Section 1: Demographic Information

(Please mark [✓] where appropriate)

Gender

Male

Female

Prefer not to say

Age Group

Below 20 years

20 – 25 years

26 – 30 years

Above 30 years

Faculty

Bank Rakyat School of Business, Innovation, Technology and Entrepreneurship (BRSBITE)

School of Accounting & Taxation (SAT)

School of Education & Humanities (SEH)

Tun Ahmad Sarji School of Government and Public Services (TASSGPS)

Year of Study

Year 1

Year 2

Year 3

Year 4

Section 2: Virtual Learning Experience

Please indicate your level of agreement with the following statements regarding your online learning experience.

(*1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree*)

Academic Facilitation (AF) (Adapted from Qiao et al., 2023; Riel, Lawless, & Oren, 2022)

The learning materials provided were sufficient and helpful.

The online resources (e.g., lecture notes, recorded lectures) were easily accessible.

The assignments and assessments helped reinforce my understanding of the course content.

I received timely feedback on my assignments and assessments.

The course enhanced my critical thinking and problem-solving skills.

Course Structure (CS) (Adapted from Farrell & Brunton, 2020; Li & Lajoie, 2022)

The course was well-organized and easy to follow.

Learning objectives were clearly stated at the beginning of the course.

The sequence of topics and content was logical and coherent.

The workload for this course was appropriate for online learning.

The deadlines for assignments and assessments were clearly communicated.

Interaction and Engagement (IE) (Adapted from Donovan et al., 2019; Jaggars, 2021)

I had opportunities to interact with my peers during the course.

Online discussions and group activities were effective in enhancing my learning experience.

The course encouraged active participation and engagement.

The online learning platform allowed effective communication between students and instructors.
The interactive elements (e.g., quizzes, polls, discussions) were useful in keeping me engaged.
Instructor Support (IS) (Adapted from Hussein & Al-Chalabi, 2020; Islam, Kim, & Kwon, 2020)
The instructor was approachable and responsive to questions and concerns.
The instructor provided clear and constructive feedback on assignments and assessments.
The instructor effectively facilitated discussions and student participation.
The instructor used various teaching strategies to enhance learning.
I felt supported and motivated by the instructor throughout the course.
Learning Environment (LE) (Adapted from Le, 2022; Sahni, 2019)
The online learning platform was user-friendly and easy to navigate.
Technical support was available when I encountered issues with the platform.
The virtual learning environment was conducive to my learning.
Online lectures and resources were accessible on different devices (e.g., mobile, tablet, computer).
The quality of the video and audio in online lectures was satisfactory.
Student Engagement (SE) (Adapted from McCarthy, 2022; Rakitskaya, 2021)
I was actively engaged in the course activities and discussions.
I was able to manage my time effectively in completing assignments and coursework.
I felt motivated to complete the course despite the online learning format.
The online learning experience helped me develop self-discipline and independence.
I felt connected to my peers and instructors during the course.
Overall Student Satisfaction (Adapted from Lim, She, & Hassan, 2022; Sia & Adamu, 2020)
I am satisfied with my overall virtual learning experience.
The course met my expectations in terms of quality and learning outcomes.
I would recommend this virtual course to other students.
My experience with online learning was as effective as traditional face-to-face learning.
I would prefer taking more courses in a virtual learning format in the future.
Section C: Open-Ended Questions (Optional) (Adapted from Lim, She, & Hassan, 2022; Sia & Adamu, 2020)
Please provide any additional comments or suggestions regarding your virtual learning experience.
What aspects of the online course did you find most effective?
What areas of the virtual learning experience need improvement?
Any additional comments or suggestions?