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Evaluation of Technology-Based Learning on Effectiveness and Student Satisfaction: a Case Study at the Tax Center UNPAD

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ABSTRACT

This study aims to evaluates the effectiveness and satisfaction of technology-based instruction that combines Blended Learning and Student-Centered Learning (SCL) in Income Tax courses at the Tax Center, Universitas Padjadjaran (UNPAD). Using a mixed-methods design, survey data from 52 students were analyzed with multiple regression to test the effects of student involvement, student roles, and implementation challenges on learning effectiveness and satisfaction; interviews and document analysis enriched the interpretation. Quantitative results show that both student involvement and student roles are positively associated with learning effectiveness, whereas implementation challenges do not exert a meaningful impact on effectiveness in this context. In contrast, student satisfaction is shaped by all three factors, with challenges emerging as the strongest driver, indicating that even highly engaged, well-positioned learners may report lower satisfaction when facing technical or organizational barriers. Qualitative findings corroborate these patterns: students value flexibility, interactivity, and the ability to review recordings, yet cite connectivity issues, reduced hands-on practice, and concentration lapses during long online sessions. Students propose practical remedies such as on-camera policies, contingency plans for disruptions, and recording face-to-face sessions for later review. The study highlights the need to pair active, role-rich pedagogy with robust facilitation and infrastructure to sustain both effectiveness and satisfaction in vocational tax education.

Introduction

Technological developments have brought about major changes in the world of education, especially in terms of teaching taxation in higher education. Vocational-based taxation teaching requires learning that is not just theoretical, but also practical and applicable. Traditional learning

methods that are one-way (one side) will begin to be replaced by interactive and technology-based learning methods such as Blended Learning and Student Centered Learning (SCL). According to Badaruddin et al., (2019) Blended learning is a learning instruction model that meets the changes in industry 4.0 which combines face-to-face learning (offline) and e-learning (online) with technology that creates various opportunities such as an effective and attractive learning environment, encouraging and exploring students' potential independently to achieve maximum achievement. While Student Centered Learning (SCL) is a directed method in the form of task design and activity structure, which emphasizes the active role of students in learning both independently or in groups which can provide positive effects such as self-confidence in utilizing technology and adaptability Capone and Lepore, (2022). Weimer (2013) also emphasized that the Student Centered Learning approach is effective in increasing student involvement and understanding of the concepts being studied. The Blended Learning and Student Centered Learning methods can also improve students' experience and involvement in resolving tax cases, but face-to-face interaction is still considered important to provide more understanding and real support for students on an ongoing basis Setiyani et al., (2020). The challenges of implementing the blended learning and student centered learning methods from the teacher's perspective are that the learning conditions still use conventional methods such as lectures, practicums and discussions that are sourced from teacher centered Distyasa et al., (2021), while from the student's perspective, there is still a gap in understanding that makes learning feel less than optimal because of mis

In the context of taxation, this learning method has high relevance because of the dynamics of tax regulations that continue to develop. Tax Center UNPAD has adopted the Blended Learning and SCL approaches in teaching Income Tax courses as an effort to utilize digital media, including through tax webinars, learning videos, online quizzes and interactive discussions. This step aims to encourage students to gain a comprehensive learning experience and also provide the skills needed in the world of work that has been fully impacted by digitalization. This study aims to evaluate the effectiveness of technology-based learning through the collaboration of Blended Learning and Student-Centered Learning in Income Tax Courses, specifically the research questions will discuss Analyzing the impact of Blended Learning and SCL on students' understanding and skills in tax learning, identifying challenges and opportunities in implementing this method, both from the perspective of students and lecturers and exploring the role of e-learning and digital media in supporting the effectiveness of tax learning.

Although many studies have demonstrated the effectiveness of blended learning and student-centered learning (SCL) in general education, empirical investigations within the context of tax education remain limited. Previous research has emphasized advantages such as time flexibility and accessibility, but has not deeply examined how these methods enhance the understanding of complex and applicable tax concepts Miller, (2018). Moreover, studies focusing on the transition from teacher-centered to student-centered models in Indonesian tax education are still scarce. Challenges such as lecturer resistance to pedagogical change and the technological readiness of institutions have also received little attention Distyasa et al., (2021). In addition, few studies employ a mixed-method approach to comprehensively assess the effectiveness of blended learning and SCL in terms of both quantitative and qualitative perspectives.

Building on this gap, the present study seeks to examine how student involvement, student roles, and challenges in implementing SCL influence both learning effectiveness and student satisfaction in Tax Center UNPAD. Accordingly, the research questions are as follows:

1. How does student involvement affect learning effectiveness?
2. How do student roles affect learning effectiveness?
3. How do implementation challenges affect learning effectiveness in tax education?
4. How does student involvement affect student satisfaction?
5. How do student roles affect student satisfaction?
6. How do implementation challenges affect student satisfaction?
7. What are the advantages, challenges, and suggestions for improving technology-based learning?

This research contributes in two aspects. Theoretically, it enriches the literature on blended and student-centered learning in the context of taxation. Practically, the findings provide a foundation for developing technology-based teaching strategies pioneered by UNPAD Tax Center and similar institutions. In doing so, the study not only addresses the existing research gap but also delivers tangible benefits for lecturers and students in aligning vocational tax curriculum with industry needs, while offering insights for policymakers in designing education strategies that support digitalization and innovation in tax learning.

Theoretical Framework

The foundation of this research used The Theory of Constructivist Learning, which highlights that knowledge is not passively received but actively built through learners' experiences and interactions.Learning. This theory was first introduced by Hein (1991) states that all of knowledge

is actively construct by individuals through experience, continuous learning and reflection, such as with assimilation and accommodation. Learning is not merely a one-way transmission knowledge from teacher to students, but rather a dynamic process and two-way learning as action and reaction that emphasizes the importance of activity learning in the classroom, so essential to apply the active learning in the classroom. In this regard, Student-Centered Learning represent one of the most significant contribution of constructivism, as it directly informs the way education is applied between teacher and students. Empirical evidence supports the foundation of theoretical Student-Centered Learning, for instance Bada and Olusegun, (2015); Efgivia et al., (2021) emphasize that teachers need to adopt reflective practice grounded in constructive method to encourage students activity engagement to asses ability students and foster a deeper understanding of learning materials. These finding align with the present research, which examines how engagement and student roles within blended and SCL context can contribute to enhanced learning effectiveness. It highlights the transformation of teachers into facilitators and students as active agents in creating meaningful learning processes and outcomes.

Hypothesis Development

Effect of student involvement on learning effectiveness

Student involvement is widely considered a vital factor in academic achievement. Active participation encourages learners to invest more cognitive and emotional resources, leading to improved learning outcomes. Evidence from blended learning contexts shows that higher student engagement significantly enhances both performance and knowledge acquisition (Moubayed et al., 2021; De Bruijn-Smolders and Prinsen, 2024). Hence, this study proposes that: *H1: student involvement (X1) has a significant influence on learning effectiveness (Y1).*

Effect of Student roles on learning effectiveness

The definition of clear student roles in Student-Centered Learning is essential for creating effective educational environments. When students assume greater responsibility through collaboration, problem-solving, and self-directed learning, they gain autonomy that strengthens their learning outcomes. Prior research in blended settings indicates that well-structured student roles positively affect learning effectiveness (Tondeur et al., 2019; Mok et al., 2021). Therefore, this study hypothesizes that: *H2: Student roles (X2) significantly influence learning effectiveness (Y1).*

Effect of challenges in implementing SCL on learning effectiveness

Although blended and student-centered approaches offer many advantages, challenges such as unstable internet, lack of digital literacy, and reduced face-to-face interaction may weaken their

effectiveness. Studies report that these barriers reduce concentration and limit the learning process Li et al., (2021). Accordingly, it is hypothesized that:

H3: challenges in implementing SCL (X3) significantly influence learning effectiveness (Y1).

Effect of Student involvement on student satisfaction

Beyond learning effectiveness, engagement also shapes student satisfaction. Learners who are actively involved tend to perceive the learning process as more enjoyable, valuable, and motivating. Empirical studies confirm that student engagement in blended learning environments strongly correlates with higher levels of satisfaction (Kuo et al., 2023; Cubacub and Jimenez, 2025). Thus, this research hypothesizes that:

H4: Student involvement (X1) significantly affects student satisfaction (Y2).

Effect of Student roles on student satisfaction

Student roles also play a major role in determining satisfaction. When students are empowered to become active contributors in their learning journey, they are more likely to feel ownership and fulfillment. Previous findings show that students who adopt more active roles in blended learning contexts report greater satisfaction (Bada and Olusegun, 2015.; Efgivia et al., 2021). Hence, the study proposes that:

H5: student roles (X2) significantly influence student satisfaction (Y2).

Effect of Challenges in implementing SCL on student satisfaction

Finally, challenges faced in implementing blended and student-centered learning such as technical problems, unclear guidance, and heavy workloads may lower student satisfaction. Research highlights that such barriers can negatively impact learners' perceptions of online and blended education Alqahtani and Rajkhan, (2020). Therefore, it is hypothesized that:

H6: Challenges in implementing SCL (X3) significantly affect student satisfaction (Y2).

Method

This study employed a mixed-methods approach combining quantitative descriptive analysis and qualitative exploration to evaluate the effectiveness of Blended Learning and Student-Centered Learning (SCL) in Income Tax courses at the Tax Center UNPAD. The sample consisted of 52 students who had experienced this learning method. Quantitative data were collected through structured questionnaires using a 5-point Likert Scale, covering aspects of student involvement, student roles, challenges in implementation, learning effectiveness, and satisfaction. Reliability was tested using Cronbach's Alpha, which indicated high internal consistency, while descriptive statistics

summarized students' perceptions. Multiple regression analysis (MRA) with SPSS was conducted to examine the effect of each independent variable on learning effectiveness and student satisfaction.

Qualitative data were obtained through semi-structured interviews and document analysis to enrich the interpretation of the statistical findings. The interviews provided deeper insights into students' experiences, including advantages, challenges, and suggestions for improving technology-based learning. A thematic analysis approach was applied to identify recurring patterns and complement quantitative results. The research strictly followed ethical standards, ensuring informed consent from participants and maintaining data confidentiality. This approach allowed the study not only to measure the direct influence of student involvement, roles, and challenges on effectiveness and satisfaction but also to capture nuanced perspectives that reflect the real conditions of blended and student-centered learning in tax education.

To illustrate the framework of this study, Figure 1 presents the research model that links student involvement (X1), student roles (X2), and challenges in implementing blended and student-centered learning (X3) with two dependent variables, learning effectiveness (Y1) and student satisfaction (Y2). The arrows show the hypothesized relationships between the independent and dependent variables, forming the basis for the regression analysis conducted in this research, the Figure 1 as follows:

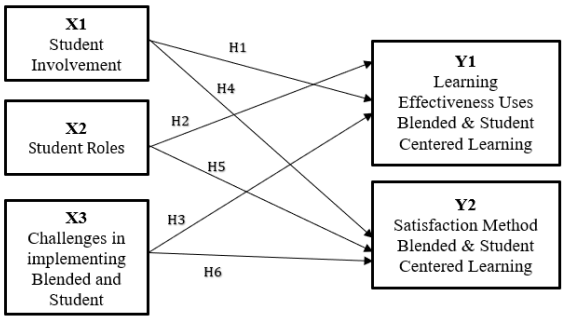

Fig 1: Research Method

Source: Author's Data Processing (2025)

There are three independent variables (free variables) that are assumed to influence two dependent variables (bound variables).

1. X1 - Student Engagement: This variable describes the extent to which students are actively involved in the learning process, for example through attendance, discussion, participation in assignments, or online activities. This engagement is assumed to influence effectiveness (Y1) and learning satisfaction (Y2) Graham, (2004).

2. X2 - Student Role: Refers to student initiative and responsibility in learning, such as independent learning decision making, collaboration, and content creation (e.g. videos or presentations). This active role is assumed to contribute to increasing effectiveness (Y1) and satisfaction (Y2) towards the learning method Higgins, (2014).
3. X3 – Challenges of Blended & SCL Implementation: This variable reflects the obstacles or difficulties experienced during the implementation of the Blended and Student-Centered Learning methods. For example, limited internet access, unclear instructions, or resistance to technology. These challenges are assumed to have a negative or positive effect depending on how students and lecturers respond to effectiveness (Y1) and satisfaction (Y2) Capone, (2022).
4. Y1 – Effectiveness of Learning using Blended & SCL: This is the first dependent variable that shows how effective this learning method is in improving students' understanding of tax material, both theoretically and practically Graham, (2004).
5. Y2 – Satisfaction with the Blended & SCL Method: The second dependent variable that reflects students' perceptions of their comfort, relevance, and general satisfaction in following this technology-based learning Capone, (2022).

The arrow lines connecting X1, X2, and X3 to Y1 and Y2 indicate that each independent variable is assumed to have a direct influence on both dependent variables, resulting in 6 partial hypotheses,

1. H1: Student involvement in learning (X1) has a significant influence on learning effectiveness (Y1).
2. H2: Student role in learning (X2) has a significant influence on learning effectiveness (Y1).
3. H3: Challenges in implementing the SCL method (X3) have a significant influence on learning effectiveness (Y1).
4. H4: Student involvement in learning (X1) has a significant effect on student satisfaction with the SCL method (Y2).
5. H5: Student role in learning (X2) has a significant effect on student satisfaction with the SCL method (Y2).
6. H6: Challenges in implementing the SCL method (X3) have a significant effect on student satisfaction with the SCL method (Y2).

Result and Discussion

Taxation E-Learning Center Program Design

Based on Figure 2, it shows the Taxation E-Learning Center developed by the UNPAD Tax Center as the first digital tax learning platform in Indonesia. This program is designed for students from various levels of education, such as Vocational, S1, and PPAK/S2, to deepen their understanding of tax regulations. Through online lectures, training, collaborative seminars, and student content production, the learning method becomes more interactive, flexible, and easily accessible. This program includes the Brevet Commission, Webinars & Seminars, Admissions, Tax Volunteers, and AKT-Tax UMK, which encourage active student involvement in the learning process. Figure 3 explains how the UNPAD Tax Center disseminates tax materials through various digital formats, such as videos and popular articles. This program includes the COMMISSION (AkadeMISI Online Class) which is broadcast live, ADMISI (AkadeMISI Advertorial) in the form of YouTube Shorts, IG Reels, and TikTok, as well as Popular Articles/Anthology Books published on the TC UNPAD website and electronic media. With this approach, students can gain modern, interesting, and easily accessible tax insights, while increasing tax awareness for the wider community.

Fig 2: Tax E-Learning Center Method – The First in Indonesia

Fig 3: Learning-Based Social Media Program

Figure 4 illustrates the collaboration between lecturers and students in publishing learning materials. Lecturers act as mentors, providing RPS and guiding students, while students are responsible for content production, such as flyers, YouTube thumbnails, and material distribution. The class team handles technical aspects, such as managing Zoom, live streaming, and posting on social media. Interaction with the audience is also encouraged through discussions, making short videos, and uploading materials on digital platforms, so that students can be more active in the learning process.

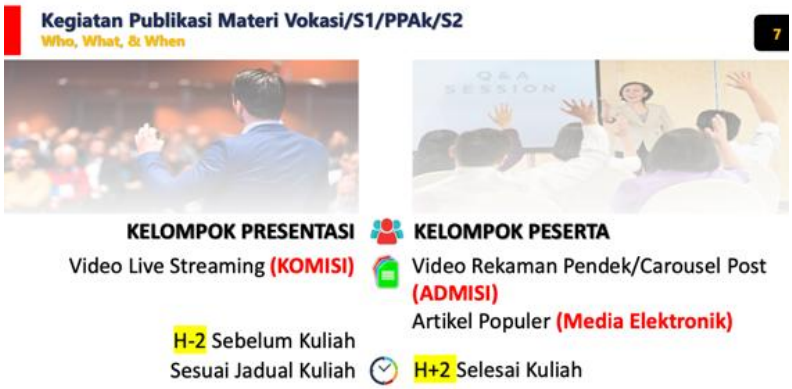

Fig 4: Learning Material Publication Activities

Figures 5 show the division of tasks and the implementation of COMMISSION as a Blended Learning and Student-Centered Learning (SCL) method. Lecturers prepare RPS, provide mentoring, and review student assignments, while the class team handles technical aspects, such as managing social media and documenting assignments. Students play an active role in creating learning content, such as teaser videos, presentation materials, Kahoot questions, and popular articles. In the COMMISSION session, students present the material, accompanied by reviews from lecturers and group or individual discussions. With this format, students gain a deeper combination of theory and practice, enhancing their understanding of contemporary tax issues more effectively.be consulted for details as needed.

Fig 5: Technical Process of Material Publication

Based on Table 1, The data shows that most of the respondents are women (73%) while men account for 27%. Based on student generation, the majority come from the 2023 cohort (73%),

followed by 2021 (19%) and 2022 (8%). In terms of age, most are 18 years old (73%), with smaller groups aged 19 (8%) and 20 (19%). Regarding learning styles, nearly half prefer kinesthetic learning (46%), while 35% prefer visual and 19% auditory methods. For academic performance, 58% of respondents have a GPA between 3.00–3.49, 35% fall within the 3.50–4.00 range, and only 8% have a GPA below 3.00. In terms of technology access, all respondents (100%) use both a handphone and a laptop, with none relying solely on a handphone.

Table 1. Sample Analytical Data

	N	%
Gender	38	73%
Women	14	27%
Man		
Generation		
2021	10	19%
2022	4	8%
2023	38	73%
Age		
18	38	73%
19	4	8%
20	10	19%
Learning Method		
Auditory	10	19%
Kinesthetic	24	46%
Visual	18	35%
GPA		
<3.00	4	8%
3.00-3.49	30	58%
3.50-4.00	18	35%
Technology Access		
Handphone Only	0	0%
Handphone and Laptop	52	100%
Total	52	100%

Descriptive statistical on Table 2 were obtained from a questionnaire completed by 52 students in the Income Tax class regarding their experiences with Student-Centered Learning (SCL). The instrument consisted of 20 items grouped into five variables: student involvement (X1), student role (X2), challenges in implementing SCL (X3), learning effectiveness (Y1), and satisfaction with the SCL method (Y2). The results show that most items scored above the mean value of 3.5 with standard deviations below 1, which indicates a generally positive perception and relatively consistent

responses. The highest mean score was found in item X2.3 (M = 4.42, SD = 0.70), reflecting strong agreement about the positive role of students in SCL. Conversely, the lowest mean score appeared in item Y1.2 (M = 2.92, SD = 1.06), with the largest variability in responses, suggesting differing views regarding the effectiveness aspect measured by this item. Overall, these findings highlight that SCL-based learning is well received by students, though certain dimensions particularly related to perceived effectiveness and challenges—require further attention and improvement.

Table 2. Descriptive Analysis

	Mean	Std. Deviation	N
X1.1	4.12	0.81	52
X1.2	4.00	0.89	52
X1.3	3.85	0.88	52
X1.4	3.81	0.74	52
X2.1	3.96	0.92	52
X2.2	3.80	0.80	52
X2.3	4.42	0.70	52
X2.4	4.11	0.86	52
X3.1	3.89	0.95	52
X3.2	3.85	0.83	52
X3.3	3.66	0.84	52
X3.4	4.15	0.92	52
Y1.1	4.03	0.77	52
Y1.2	2.92	1.06	52
Y1.3	4.15	0.88	52
Y1.4	3.68	0.82	52
Y2.1	4.03	0.72	52
Y2.2	4.03	0.77	52
Y2.3	4.03	0.77	52
Y2.4	4.27	0.87	52

Based on Table 3, The results of the reliability test show that all 52 respondents (100%) provided complete answers, so no data were excluded from the analysis. Cronbach's Alpha for the 20 items was 0.915, which exceeds the minimum threshold of 0.70 ($\alpha > 0.70$). This indicates that the instrument has very high internal consistency, meaning the questionnaire items are reliable and consistently measure the constructs of student involvement, student role, challenges of implementation, learning effectiveness, and satisfaction with the SCL method.

Table 3. Reliability Analysis

Total Valid Answer	52
Cronbach's Alpha	0.915
N of Items	20

Multiple Regression Analysis

The results of the multiple regression analysis tested the influence of student involvement in learning (X1), student role in learning (X2), and challenges in implementing the SCL method (X3) on learning effectiveness (Y1). The model provides an overview of how these three independent variables simultaneously affect students' perceptions of effectiveness in Student-Centered Learning. Based on the regression output, the coefficients indicate the strength and direction of the relationship for each predictor, while the significance values (p-values) determine whether the effects are statistically significant. In addition, the R^2 value shows the proportion of variance in learning effectiveness (Y1) that can be explained collectively by X1, X2, and X3. Overall, these results suggest that the regression model can be used to evaluate the contribution of each factor to the effectiveness of the SCL approach. The summary of the regression results is presented as follows on table 4, table 5, and table 6.

Table 4. Model Summary MRA I

Model	R	R Square	Adjusted R Square	Std Error of the Estimate
1	0.714[a]	0.510	0.479	1.00681

a. Predictors: (Constant), X3, X2, X1

Table 5. ANOVA[a] MRA I

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	50.575	3	16.858	16.631	0.000[b]
	Residual	48.656	48	1.014		
	Total	99.231	51			

a. Dependent Variable: Y1

b. Predictors: (Constant), X3, X2, X1

Table 6. COEFFICIENT[a] MRA I

Model		Unstandardized B	Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	0.742	0.608		1.221	0.228
	X1	0.622	0.102	0.618	6.082	0.000
	X2	0.325	0.099	0.334	3.288	0.002
	X3	0.015	0.112	0.014	0.137	0.891

a. Dependent Variable: Y1

Based on the results of the multiple regression analysis (Table 6), the regression equation can be formulated as follows :

$Y1=0.742+0.622X1+0.325X2+0.015X3+\varepsilon$

Explanation:

- Y1 = Learning Effectiveness
- X1 = Student Involvement in Learning
- X2 = Student Role in Learning
- X3 = Challenges in Implementing SCL
- 0.742= constant (intercept)
- ε = error term

The multiple regression analysis also examined the effect of student involvement (X1), student role (X2), and challenges in implementing SCL (X3) on student satisfaction (Y2). The results show how these three factors together influence students' satisfaction with the SCL method, with the coefficients showing the direction and strength of each variable and the R^2 value explaining how much of the variation in satisfaction can be accounted for by the model. The summary of the regression results is presented as follows as table 7, table 8 and table 9.

Table 7. Model Summary MRA II

Model	R	R Square	Adjusted R Square	Std Error of the Estimate
1	0.951[a]	0.905	0.899	0.3021

b. Predictors: (Constant), X3, X2, X1

Table 8. ANOVA[a] MRA II

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	41.674	3	13.891	152.099	0.000[b]
	Residual	4.384	48	0.091		
	Total	46.058	51			

c. Dependent Variable: Y2

d. Predictors: (Constant), X3, X2, X1

Table 9. COEFFICIENT[a] MRA II

Model		Unstandardized B	Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	-0.723	0.182		-3.961	0.000
	X1	0.428	0.031	0.625	13.947	0.000
	X2	0.159	0.030	0.240	5.371	0.000
	X3	0.571	0.034	0.761	16.918	0.000

b. Dependent Variable: Y2

Based on the results of the multiple regression analysis (Table 9), the regression equation can be formulated as : Y1=-0.723 +0.428X1+0.159X2+0.571X3+ε

Explanation:

- Y1 = Learning Effectiveness
- X1 = Student Involvement in Learning
- X2 = Student Role in Learning
- X3 = Challenges in Implementing SCL
- -0.723= constant (intercept)
- ε = error term

Effect of student involvement on learning effectiveness

Based on table 6, Student involvement (X1) is found to have a positive and significant effect on learning effectiveness (Y1), with a regression coefficient of 0.622 and a significance level of 0.000 (< 0.05). The standardized beta value of 0.618 also indicates that student involvement is the most influential factor in the model compared to other predictors. This result implies that the higher the level of student involvement, the greater the improvement in learning outcomes, confirming that active participation is essential in blended and student-centered learning environments.

These findings are in line with previous research, Moubayed et al., (2021); De Bruijn-Smolders & Prinsen, (2024) emphasize that increased student engagement enhances both performance and knowledge acquisition. The present study supports these conclusions by showing that involvement directly improves learning effectiveness, thus reinforcing the acceptance of H1: student involvement significantly influences learning effectiveness.

Effect of Student roles on learning effectiveness

Table 6 state that Student roles (X2) are found to have a positive and significant effect on learning effectiveness (Y1), with a regression coefficient of 0.325 and a significance level of 0.002 (< 0.05). The standardized beta value of 0.334 shows that student roles contribute meaningfully to the model, although the influence is smaller compared to student involvement (X1). This result implies that when students are given clearer and more structured roles such as collaboration, problem-solving, and self-directed learning, the effectiveness of the learning process improves, as role clarity helps students take greater responsibility for their own learning.

These findings are consistent with previous studies, Tondeur et al., (2019); Mok et al., (2021). emphasized that well-defined student roles enhance autonomy and collaboration in blended learning settings. The present study reinforces these perspectives by showing that student roles significantly increase learning effectiveness, thereby supporting the acceptance of H2: student roles significantly influence learning effectiveness.

Effect of challenges in implementing SCL on learning effectiveness

Based on Table 6, challenges in implementing SCL (X3) do not have a significant effect on learning effectiveness (Y1), with a regression coefficient of 0.015 and a significance level of 0.891 (> 0.05). The standardized beta value (0.014) shows that its contribution to the model is negligible. This finding is not in line with Li et al., (2021), who emphasized that barriers such as unstable internet, limited digital readiness, and reduced face-to-face interaction can hinder concentration and reduce learning outcomes. Similarly, Alqahtani and Rajkhan (2020); Baber (2021) highlighted that technicalproblems, lack of motivation, and platform-related issues are significant obstacles in blended and online learning. However, in this study, these challenges did not appear to significantly reduce learning effectiveness, suggesting that students may have adapted through peer collaboration, digital resources, or institutional support.

On the other hand, Martin et al., (2018); Baber, (2020) reported that technical problems, unclear guidance, and limited motivation negatively affect student performance and concentration. While the existing literature underscores that these challenges often reduce the effectiveness of learning, this study reveals otherwise, indicating that in the observed blended learning context, students may have adapted through peer collaboration, institutional support, and self-directed learning strategies. Accordingly, the hypothesis H3 is rejected.

Effect of Student involvement on student satisfaction

Based on Table 9, Student involvement (X1) is found to have a positive and significant effect on student satisfaction (Y2), with a regression coefficient of 0.428 and a significance level of 0.000 (< 0.05). The standardized beta value of 0.625 indicates that X1 is one of the most influential predictors in the model. This result implies that the more actively students engage in learning activities, the higher their satisfaction with the overall learning experience, as active involvement makes learning more enjoyable, valuable, and motivating.

These findings are in line with Kuo et al., (2023); Cubacub and Jimenez, (2025)., who emphasize that engagement in blended learning environments strongly correlates with greater satisfaction. The present study supports these conclusions by showing that involvement directly enhances satisfaction, thereby reinforcing the acceptance of H4: student involvement significantly affects student satisfaction.

Effect of Challenges in implementing SCL on student satisfaction

Based on Table 9, Challenges in implementing SCL (X3) are found to have the strongest significant effect on student satisfaction (Y2), with a regression coefficient of 0.571, a t-value of 16.918, and a significance level of 0.000 (< 0.05). The standardized beta value of 0.761 shows that

X3 is the most dominant predictor in the model. This result indicates that difficulties such as technical problems, heavy workloads, or unclear instructions can substantially reduce student satisfaction, even when involvement and roles are present.

These findings are consistent with Alqahtani and Rajkhan, (2020), who highlighted that barriers in blended and online learning negatively affect learners' perceptions and satisfaction. The present study supports this perspective by showing that challenges in implementing SCL directly shape student satisfaction, thereby reinforcing the acceptance of H6: challenges in implementing SCL significantly affect student satisfaction.

Advantages, Challenges and Suggestions in Improving Learning Effectiveness on Blended and Student-Centered Learning

Technology-based learning methods are considered effective in terms of time, allowing students to learn more flexibly and repeat the material through recordings available on YouTube or other platforms. Students also become more active in learning because this method is more interactive and interesting, thus increasing their understanding of tax concepts. In addition, easy accessibility allows students to learn anytime and anywhere, and share materials with other students, including those outside Unpad. One student explained,

"I really like that the material is uploaded to YouTube, so I can repeat it before exams and it makes me feel more confident" (Student A, Interview, 2024). Another emphasized how interactive elements helped them,

"When the class uses quizzes and polls, I feel more engaged compared to traditional lectures" (Student B, Interview, 2024).

These perceptions align with Rapanta et al., (2020); Li et al., (2021), who highlight that digital learning increases flexibility and fosters self-directed study.

Although this method offers various benefits, students face several challenges, especially internet network constraints that often hinder the learning process. Some students reported difficulties in focusing during long sessions,

"Sometimes I open the class but it's hard to concentrate for two hours straight in front of the laptop" (Student C, Interview, 2024).

Others found online learning lacked practical depth,

"Tax subjects need real cases, and it's hard to understand only from slides without direct practice" (Student D, Interview, 2024).

These challenges same are consistent with with research from Alqahtani and Rajkhan (2020);

Baber, (2020), who note that unstable connectivity, reduced interaction, and lack of motivation are major obstacles in online learning.

To improve the effectiveness of technology-based learning, students suggested more interactive classroom management and backup solutions. One student recommended,

"Maybe the lecturer should require cameras on, so we stay focused and don't get distracted" (Student B, Interview, 2024).

Another added, *"If the internet goes down, there should be a plan B, like recorded sessions, so we don't miss anything important"* (Student A, Interview, 2024).

These suggestions are consistent with Martin et al., (2018); Cubacub and Jimenez, (2025), who emphasize that clear facilitation and hybrid flexibility are essential for maximizing satisfaction and learning outcomes.

Based on explanation, technology-based learning offers clear advantages by providing time efficiency, flexible access, and interactive features that foster deeper understanding and engagement, as highlighted by both student reflections and supporting literature. However, several challenges remain, particularly unstable internet connections, lack of direct practice in complex subjects, reduced concentration during long sessions, and limited interaction with peers and lecturers. These barriers, if unaddressed, can diminish the potential benefits of digital learning. To overcome these issues, students proposed suggestions such as enforcing more interactive classroom management such as on-camera policies, providing backup strategies for technical disruptions, and integrating recordings of face-to-face sessions for flexible review. Taken together, these insights emphasize that while technology enhances learning effectiveness, its success depends on continuous refinement, stronger facilitation, and responsive solutions to student needs, thereby fostering a more balanced and impactful blended learning environment.

Conclusion

This study set out to examine the effect of student involvement, student roles, and challenges in implementing Student-Centered Learning (SCL) on both learning effectiveness and student satisfaction in the context of tax education at UNPAD. The results confirm that student involvement and student roles significantly enhance learning effectiveness, while challenges in implementation do not play a substantial role in this outcome. Conversely, when viewed from the perspective of student satisfaction, all three factors student involvement, student roles, and implementation challenges are shown to have a significant influence, with challenges emerging as the strongest

determinant. These findings directly address the research questions and provide evidence that both the active participation of students and the management of learning barriers are essential in shaping overall learning experiences.

The findings enrich the literature on blended and student-centered learning in vocational tax education, demonstrating how engagement and roles are consistently linked to improved outcomes, while challenges must be carefully managed to maintain satisfaction. Practically, the results highlight the importance of designing tax courses that empower students to take active roles, encourage autonomy, and create meaningful collaboration. At the same time, lecturers and institutions must anticipate and mitigate barriers such as technical disruptions, unclear guidance, or workload balance through stronger facilitation strategies, improved infrastructure, and contingency planning. By doing so, technology-based learning can be optimized to support both effectiveness and satisfaction.

This study is limited to a single institutional context with a relatively small number of respondents, which may restrict generalizability. The reliance on self-reported perceptions also leaves room for bias and does not fully capture actual performance improvements. Future research should therefore expand to larger and more diverse samples, include longitudinal designs to examine sustained impacts, and integrate objective performance indicators to complement student perceptions. In addition, further studies could explore the interaction between lecturer facilitation and student autonomy to better understand how blended and SCL methods can be refined for vocational education in taxation and beyond.

References

Alqahtani, A. Y., & Rajkhan, A. A. (2020). E-learning critical success factors during the COVID-19 pandemic: A comprehensive analysis of e-learning managerial perspectives. *Education Sciences, 10*(9), 216. https://doi.org/10.3390/educsci10090216

Baber, H. (2020). Determinants of students' perceived learning outcome and satisfaction in online learning during the pandemic of COVID-19. *Journal of Education and E-Learning Research, 7*(3), 285–292. https://doi.org/10.20448/journal.509.2020.73.285.292

Bada, D., & Olusegun, S. (n.d.). *Constructivism learning theory: A paradigm for teaching and learning.*

Badaruddin, M., Noni, N., Jabu, B., Basri, M., Ziska, I. Y., Agung, M., B., M., Malik, A., Hartoto, M., Larekeng, S. H., Nur, R., & Dangnga, M. S. (2019). Need analysis to design blended learning model:

An instructional design to create a dynamic, engaging and student-centered learning environment. In *Proceedings of the 1st International Conference on Advanced Multidisciplinary Research (ICAMR 2018)*. https://doi.org/10.2991/icamr-18.2019.19

Capone, R., & Lepore, M. (2022). From distance learning to integrated digital learning: A fuzzy cognitive analysis focused on engagement, motivation, and participation during COVID-19 pandemic. *Technology, Knowledge and Learning, 27*(4), 1259–1289. https://doi.org/10.1007/s10758-021-09571-w

Cubacub, P. D. C., & Jimenez, E. C. (2025). The role of blended learning in enhancing student engagement: Evidence from high schools in Micronesia. *International Journal of Didactical Studies, 3*. https://doi.org/10.33902/IJODS.202533074

De Bruijn-Smolders, M., & Prinsen, F. R. (2024). Effective student engagement with blended learning: A systematic review. *Heliyon, 10*(23), e39439. https://doi.org/10.1016/j.heliyon.2024.e39439

Distyasa, M. J. E., Winanti, E. T., Buditjahjanto, I. G. P. A., & Rijanto, T. (2021). The effect of project-based blended learning (PJB2L) learning model on students' learning outcomes. *International Journal for Educational and Vocational Studies, 3*(4), 268. https://doi.org/10.29103/ijevs.v3i4.3959

Efgivia, M. G., Adora Rinanda, R. Y., Suriyani, Hidayat, A., Maulana, I., & Budiarjo, A. (2021). Analysis of constructivism learning theory. In *1st UMGESHIC International Seminar on Health, Social Science and Humanities (UMGESHIC-ISHSSH 2020)*. https://doi.org/10.2991/assehr.k.211020.032

Hein, G. E. (1991). *Constructivist learning theory.* Institute for Inquiry.

Howard Miller, A. (2018). Using unsupervised machine learning to model tax practice learning theory. *International Journal of Engineering & Technology, 7*(2.4), 109. https://doi.org/10.14419/ijet.v7i2.4.13019

Kuo, T.-Y., Chen, S.-K., & Lin, S. (2023). Exploring student engagement and teacher-student interaction patterns in collaborative STEM PBL courses through epistemic network analysis. In *International Conference on Computers in Education*. https://doi.org/10.58459/icce.2023.1398

Li, W., Gillies, R., He, M., Wu, C., Liu, S., Gong, Z., & Sun, H. (2021). Barriers and facilitators to online medical and nursing education during the COVID-19 pandemic: Perspectives from international students from low- and middle-income countries and their teaching staff. *Human Resources for Health, 19*(1), 64. https://doi.org/10.1186/s12960-021-00609-9

Martin, F., Wang, C., & Sadaf, A. (2018). Student perception of helpfulness of facilitation strategies that enhance instructor presence, connectedness, engagement and learning in online courses. *The Internet and Higher Education, 37*, 52–65. https://doi.org/10.1016/j.iheduc.2018.01.003

Mok, K. H., Xiong, W., & Bin Aedy Rahman, H. N. (2021). COVID-19 pandemic's disruption on university teaching and learning and competence cultivation: Student evaluation of online learning experiences in Hong Kong. *International Journal of Chinese Education, 10*(1), 22125868211007011. https://doi.org/10.1177/22125868211007011

Moubayed, A., Injadat, M., Shami, A., & Lutfiyya, H. (2021). Student engagement level in e-learning environment: Clustering using K-means. *SocArXiv*. https://doi.org/10.31235/osf.io/ecg4x

Rapanta, C., Botturi, L., Goodyear, P., Guàrdia, L., & Koole, M. (2020). Online university teaching during and after the COVID-19 crisis: Refocusing teacher presence and learning activity. *Postdigital Science and Education, 2*(3), 923–945. https://doi.org/10.1007/s42438-020-00155-y

Setiyani, R., H., Lianingsih, S., & Susilowati, N. (2020). Using blended learning to enhance students' engagement and learning experience in taxation. *KnE Social Sciences*. https://doi.org/10.18502/kss.v4i6.6615

Tondeur, J., Scherer, R., Baran, E., Siddiq, F., Valtonen, T., & Sointu, E. (2019). Teacher educators as gatekeepers: Preparing the next generation of teachers for technology integration in education. *British Journal of Educational Technology, 50*(3), 1189–1209. https://doi.org/10.1111/bjet.12748

Van Laerhoven, H., Van der Zaag-Loonen, H., & Derkx, B. (2004). A comparison of Likert scale and visual analogue scales as response options in children's questionnaires. *Acta Paediatrica, 93*(6), 830–835. https://doi.org/10.1111/j.1651-2227.2004.tb03026.x

Weimer, M. (2013). *Learner-centered teaching: Five key changes to practice* (2nd ed.). Jossey-Bass.