International Journal of Evaluation and Research in Education (IJERE)
Vol. 13, No. 6, December 2024, pp. 3752~3762
ISSN: 2252-8822, DOI: 10.11591/ijere.v13i6.29757

Assessment methods and learning styles for learning satisfaction: the role of self-efficacy

Amir Mahmud[1], Nurdian Susilowati[1], Puji Novita Sari[2]
[1]Faculty of Economics and Business, Universitas Negeri Semarang, Semarang, Indonesia
[2]Faculty of Teacher Training and Education, Universitas Sebelas Maret, Surakarta, Indonesia

Article Info

Article history:

Received Dec 24, 2023
Revised Apr 3, 2024
Accepted May 7, 2024

Keywords:

Assessment methods
Higher education
Learning styles
Online learning satisfaction
Self-efficacy

ABSTRACT

This study aimed to determine the effect of assessment methods and learning styles on online learning satisfaction with self-efficacy as a moderating variable. The study surveyed 228 students from the accounting education major program at a public university in Indonesia. The collected data was analyzed using descriptive statistics and moderation regression analysis (MRA). The results showed that the assessment method and learning styles affected student learning satisfaction. In addition, this study also found that self-efficacy moderated the effect of the assessment method and learning styles on student learning satisfaction. This finding suggests that lecturers can use online assessment methods that are based on student interest so that students can enjoy learning in class and increase the level of satisfaction students can increase. Not only that, but the assessment process will also be a success if the faculty supports every technical source to make online learning run smoothly. Furthermore, when students have self-efficacy when choosing their specific learning style during the assessment process, their satisfaction with online learning will increase. The current study contributes to the existing body of knowledge by stressing that assessment and learning methods are significantly helpful in students' satisfaction-related self-efficacy.

Corresponding Author:

Amir Mahmud
Faculty of Economics and Business, Universitas Negeri Semarang
Sekaran, Gunungpati Subdistrict, Semarang City, Central Java 50229, Indonesia
Email: amirmahmud@mail.unnes.ac.id

1. INTRODUCTION

All schools and universities have carried out online learning from 2020 to 2022. Online learning is crucial to ensure the learning process continues optimally, even during the COVID-19 pandemic. The application of online learning changes mindsets and adaptation patterns for using technology. All elements of education are massively making changes and preparing learning facilities to achieve learning goals. The Indonesian Ministry of Education and Culture Number 15 of 2020 issued Guidelines for organizing learning during emergency periods at home during the spread of the Corona Virus Disease (COVID-19). This guideline becomes the legal basis for implementing the online learning policy.

Rapid technological development has made it a must for people to adapt. The education world is no exception to this. Technology-based learning applications can facilitate students' learning [1]. Meanwhile, information and communication technology can develop globally by improving operational processes in academic units. The popularity of the Internet is increasing with rapid progress in web-based technology, which is very close to the learning process [2], [3].

Currently, learning in higher education is almost entirely based on technology. The use of website-based learning applications has made it easier for students to learn. All lecture materials and information are

presented clearly and fully on the website so students can learn independently. Apart from website-based learning, the university is also developing a Moodle-based learning management system (LMS) as a learning facility. Students can interact with lecturers via chat rooms and discussion forums, submit assignments, and provide feedback on all assignments in the LMS. Students can also find their grades at each meeting so that lecturers and students get information on learning progress. The facilities provided by the university make it easier for students to learn boldly and create learning satisfaction.

Online learning is technology-based and can support achieving learning objectives [4]. Students can take a more active role in learning, while the lecturer becomes a tutor who oversees the whole process [5]. From a philosophical perspective, online learning is a constructive and participatory approach. It empowers students to change from passive to active learners, able to explore and be creative [6]. Satisfaction with online learning is a person's feelings of pleasure or disappointment (less/unpleasant) due to a comparison between perceptions and experiences of perceived services and expectation [7]. Learning satisfaction is a feeling over the fulfillment of expectations from a learning activity experienced by students when learning online. In light of that, the service in question is a learning service that students feel.

Student learning satisfaction can be measured based on their enjoyment while learning in class. If students feel happy in the learning process, it concludes that they are satisfied with learning. At the tertiary level, a student is a customer of an educational product with the right to invest in a major at the preferred educational institution. Thus, student learning satisfaction is essential to address to see what factors influence it.

There are several components to online learning satisfaction, including learning outcomes or objectives, student assessment and measurement, learning resources and materials, student interactions (instructors, students, content), and course technology [7]. These components can show the level of online learning satisfaction students feel. Every student has high expectations for the learning outcomes given by the lecturer. Therefore, if the learning outcomes align with the student's expectations, the level of their learning satisfaction will be high. Students' high or low learning satisfaction is essential to understand and measure because it can impact their study efforts. Then students with high levels of satisfaction tend not to ignore the learning process or stop learning because they tend to be more motivated to follow it in class [8].

Satisfaction is a fundamental concept for knowing students' enjoyment of learning [7]. Students can provide good perceptions of the environment and their learning experiences, which can determine learning outcomes [9]. The results of previous research indicate that many determinant factors influence online learning satisfaction, including determining the assessment method [10], [11], learning styles [12], [13], and self-efficacy [14], [15].

Determining the assessment method set by the lecturer is a crucial element that influences online learning satisfaction [10]. Assessment methods include project and process assessment, which are the most popular and have become a favorite among students. Cognitive elements are assessed as in a written exam and are affective and psychomotor [4]. Assessment methods can help lecturers monitor student productivity, their attitudes, and the quality of their work. With them, lecturers can promptly identify gaps at each learning level [1].

Student online learning satisfaction can be evaluated depending on the assessment method used by the lecturer to see student performance. In the learning process, assessment in any form represents a crucial and essential element. Thus, it must be an integral part of the learning process [16]. Indicators in the assessment method are the clarity of information about the evaluation method, the consistency of the assessment activities, and the weight of the assessment. The assessment method is a determinant in adding to the effectiveness and quality that affect user satisfaction with online learning. Specific analysis of the relationship between assessment methods and student satisfaction is essential because students perceive online and face-to-face learning differently [10]. Apart from assessment methods, learning style can also influence online learning satisfaction.

Furthermore, learning styles represent how individuals interpret, process, understand, and integrate information [12]. Incorporating technology-based materials into various programs can maximize student learning opportunities whenever and wherever they are [13]. Hence, there are no limitations on space and time. Besides, lecturers and students can adjust their learning styles. Some students prefer to learn through online activities, while others prefer to study using traditional methods [2].

The changes lead to curriculum revisions and allow lecturers to adjust instructional strategies to suit better student learning styles [17]. Identifying student learning styles can make it easier to achieve learning objectives. An in-depth understanding is needed to determine the type of student learning style to fit each individual's needs [18]. However, the research by Cheng *et al.* [19] found that students with different learning styles did not significantly affect online learning satisfaction. Furthermore, [20] revealed that learning styles do not affect student satisfaction with teaching approaches because students who apply learning styles well do not guarantee student learning satisfaction [21].

Self-efficacy can also moderate online learning satisfaction [14], [22]. Self-efficacy helps individuals decide how much effort to put into a task, how long they will continue when faced with problems, and how flexible they will appear when faced with a dangerous situation [23]. Self-efficacy reflects a person's

confidence in his ability to carry out tasks [24]. Meanwhile, Hushman and Marley [25] defines self-efficacy as assessing individuals' ability to perform specific tasks. It is necessary to have a student's level of confidence in learning activities, how confident a student is when asking questions to lecturers, in doing assignments, and so on because student attitudes are an essential factor affecting his performance [15].

Self-efficacy is a critical component in Cognitive Social Theory or Social Learning Theory. The theory is the belief that a person can perform a task and motivate himself to achieve the desired result. Thus, the higher the self-efficacy in a person, the higher his confidence in his ability to succeed in a task. Bandura [26] added that self-efficacy refers to an individual's belief about his ability to mobilize the motivation, cognitive resources, and actions needed to successfully carry out tasks in a particular context, master the situation, and obtain positive results.

The individual self-efficacy could strengthen online learning satisfaction [27]. Self-efficacy moderates assessment methods and learning styles, which can determine learning satisfaction [28] and become parameters in determining the appropriate learning style in each implementation of learning activities [29]. Social learning theory asserts that because of personal experience and observation, individual development depends on their ability to carry out tasks successfully in various types of behavior, including how a student with different learning styles can achieve the same goal and the possibility to acquire better, desirable, and valuable behaviors. The originality/value of this research is that student satisfaction is indicates of the quality of effective teaching and learning in online learning. Although many previous studies have analyzed the factors that influence satisfaction with online learning, few have examined the relationship between self-efficacy, which moderates assessment methods and learning style. The existence of self-efficacy can strengthen the quality of online learning so that it can run well.

Self-efficacy can strengthen the quality of online learning and ensure its smooth operation. This research aims to determine student satisfaction with online learning by considering the assessment system and appropriate learning styles. The objectives of this research are: i) to explain the effect of learning methods on online learning satisfaction; ii) to explain the influence of learning styles on online learning satisfaction; iii) to explain the role of moderating self-efficacy on learning methods and learning styles on online learning satisfaction. Therefore, this study will explain the literature review and how the hypotheses are developed.

The learning satisfaction theory was developed from the customer satisfaction theory. Therefore, in line with the latter theory, the former views students as consumers who can respond to an activity (teaching and learning) based on comparing the expectations and the reality they receive. Therefore, the level of student satisfaction with the learning process and the results obtained from the process. The level of student satisfaction according to Almusharraf and Khahro [30], suggests that students' learning satisfaction will increase if they get support from an instructor or lecturer (one-on-one feedback, inclusive learning, and understanding special situations), how to send material online (such as through audio, video, text, PowerPoint slides, games, and quizzes), instructor guidance and follow-up (email, phone calls, and online meetings), level of course involvement (active classes or lecture-based classes), online teaching approaches (providing active learning opportunities, demonstrations, games, groups, and individual discussions), lecturer efforts in making online learning and using a student-centered approach. This finding is in line with the principles of transformative learning theory [31]–[33].

Quality learning will have a high level of satisfaction for its users. Satisfaction with the proposed learning system is closely linked between user satisfaction, successful teaching, and course quality. Thus, it is essential to be aware of student satisfaction with online learning, as this is another aspect of educators' assessment of their courses and the overall quality of the educational program [10]. One of the methods used to measure the effectiveness of learning is end-user computing satisfaction (EUCS). In the EUCS method, several factors affect user satisfaction with a media. The indicators used in this method, according to Cheok and Wong [24], include ease of use, perceived benefits, accuracy, and interaction.

The assessment model used by the lecturer significantly influences student learning satisfaction. Chen *et al.* [34] stated that student learning satisfaction is influenced by elements of the online learning strategy, which strengthens the assessment design. In addition, Almusharraf and Khahro [30] stated that students would have a sense of satisfaction in online learning if college and faculty staff also supported the implementation of online learning. They can use unique platforms, grading systems, choice of assessment methods, training, online technical support, and others. Furthermore, regarding classroom management and assessment methods, students prefer Google Hangouts and learning management systems (NGOs) as media that can be used for conducting assessments. The assessment approach can include e-open book exams, case studies, and project presentations [30]. Not only that, the selection of the proper assessment model can increase student learning satisfaction; for example, using online assessments has been shown to have positive impacts, such as being able to get students' attention, focus, and expand student attention during long lectures [35]. In online learning, assessment materials and methods must be adapted to achieve better learning objectives and support fair assessment [36]. This study is in line with previous study [37], which states that the online

assessment method determines student online learning satisfaction. Thus, the proposed hypothesis 1 (H_1) is: assessment method affects student learning satisfaction in online learning.

Learning style is one of the topics that can lead to optimal e-learning effectiveness. The style lies in students' selective learning, a cognitive, emotional, and physiological set related to how students collect, organize, and think about the information they get. The learning style focuses on how students understand, discern, and conceptualize the information obtained [2]. Awareness of learning styles can help students improve their learning [6]. Learning style theory states that everyone learns in a very different and characteristic way. Each learning style is a unique way of obtaining information, formulated by personal background, and changed by the knowledge and expectations acquired in certain situations [17].

Learning styles consist of three types: visual learning styles that focus on vision, for example, when learning something new. Usually, this type needs to see something visually to make it easier to understand and discern. The second learning style is the auditory learning style. This style relies on to receive information and knowledge. Next is the kinaesthetic learning style. This learning style involves movement. Usually, this type finds it more accessible to learn by reading a book and practicing it or by doing or touching the studied object. Students' preferred learning style is one factor that influences student learning satisfaction in terms of personal factors [38], [39]. Certain learning styles, such as understanding the information dimension, significantly influence the level of satisfaction with online education [27]. Thus, the hypothesis 2 (H_2) proposed is: learning style has a significant positive influence on student learning satisfaction in online learning.

Self-efficacy is different in each dimension each student possessed to achieve satisfactory performance. Bandura [26] states that there are three dimensions to self-efficacy, namely the magnitude, which indicates the level of difficulty that the individual believes to complete. Individuals will try behaviors that they feel capable of doing. Instead, he will avoid situations and behaviors that go beyond his limits. Next is strength. Self-confidence exists in a person and can manifest in achieving individual performances. It is the determination of the individual's belief that he will succeed in dealing with a problem. The third is generality, which shows whether self-confidence will occur in a particular domain or be applied in various activities and situations. It relates to how an individual behavior believes in achieving success.

The assessment method is a determining factor in increasing efficiency and quality and influencing user satisfaction with e-learning. The effect of the assessment method on student learning satisfaction in online learning is moderated by self-efficacy variables. Self-efficacy is an individual's belief about his ability to perform tasks or actions to achieve specific results. It is one of the most influential aspects of self-knowledge in everyday life. Students have beliefs and know the differences between online and face-to-face learning. Hence, it is essential to analyze the relationship between assessment methods and student satisfaction [10].

Student satisfaction with learning can be assessed using the assessment method given by the teacher to measure student learning outcomes. The assessment must be integral to the learning process because assessment forms are essential and vital [16]. The researchers argue that with the independent nature of online learning, self-efficacy could be the key to determining the level of motivation reflected in the amount of effort put into the time endured under challenging situations. Thus, the study found that online learning self-efficacy predicts students' online learning satisfaction [40]. Therefore, the proposed hypothesis 3 (H_3) is: self-efficacy strengthens the effect of assessment methods on student satisfaction in online learning.

Encouragement or motivation must be encouraged during the learning process to create self-efficacy. It can be in the form of awareness of students' learning styles. The group learning style of discussion can encourage or praise each other for their ideas. In short, if fellow members provide ideas, they will be praised and commented on by others. Hence, one's confidence in conveying ideas will increase one's self-confidence, then self-efficacy [22].

In Bandura's theory, there are sources regarding the level of self-efficacy. First, there is a successful experience where it indicates the level of competence possessed. Past behavior or results indicate individual abilities and reinforce self-efficacy ratings. Second, looking at other people's experiences, especially on success, reinforces feelings of self-efficacy. Thus, it is necessary to determine the right person with the ability and competence to be an example. Third, verbal persuasion. Saying what abilities, one has and what achievements one wants to achieve can increase one's self-efficacy. Parents, teachers, friends, and therapists often do oral persuasion. Fourth, psychological awakening includes feeling calm or being in a stressful situation. That way, it can be used to see an individual's problem-solving ability. Therefore, the hypothesis 4 (H_4) proposed is: self-efficacy strengthens the effect of learning styles on student satisfaction in online learning. Based on the results of literature review and the hypotheses developed, the research design is shown in Figure 1.

2. RESEARCH METHOD

The research design of this study is quantitative research, which is the type of research that is systematic, well-planned, and structured from the beginning to the making of the research design. The research design in this study is causality, and the data collection used in this study is a questionnaire. It collects

information from several people about a particular topic or issue. The population of this research was the 228 prospective accounting teachers at one of the universities in Indonesia who have participated in online learning for two semesters, which was chosen with simple random sampling.

The dependent variable in this study is online learning satisfaction. it is measured using a learning effectiveness measurement using end-user computing satisfaction (EUCS). The indicators used are ease of use, perceived usefulness, accuracy, and interaction. The instruments used are adapted from previous study [24]. Next, the independent variables in this study are assessment methods and learning styles. The assessment method as a determinant in increasing the effectiveness and quality of learning has three indicators: i) clarity of information about evaluation methods; ii) consistency of assessment activities; and iii) assessment weights. Furthermore, learning style is a type of student study habit that has characteristics such as visual, auditory, and kinesthetic [37], [41]. Furthermore, the moderating variable, self-efficacy, is the perceived belief in a person's ability to solve problems, complete tasks, or achieve a goal. The indicators are: i) confidence that you can complete each task; ii) confidence that you can motivate yourself; iii) belief that you can fight hard, persistently, and diligently; and iv) belief that you can withstand obstacles and difficulties. The self-efficacy instruments are used to refer to previous research [26].

The data collection method was a questionnaire. It is a method of collecting data by giving questions to respondents with a questionnaire guide. The questionnaire in this study used closed-ended questions with a Likert Scale score for each statement, which was 5 for strongly agree, 4 for agree, 3 for neutral, 2 for disagree, and 1 for strongly disagree. Thus, the respondents chose one of the alternative answers provided by choosing the statement based on their circumstances.

Before analyzing the data, the research instrument is tested for validity and reliability. Based on the validity test in this study, all questions used in the variable are one-star at the 1% level (r table=0.1911) and two-star at the 5% level (r table=0.1357). The validity test results on the variable show that all items in the variable are valid because the corrected total correlation value of each item r-count > r-table. Therefore, the questions used are valid.

Furthermore, based on the reliability test in Table 1, the instrument reliability test was conducted with the condition that if the Cronbach alpha (α) value was more than 0.700, it met the reliable criteria. The reliability test results on the assessment method variable have a Cronbach alpha of 0.788, a learning style of 0.846, self-efficacy of 0.821, and online learning satisfaction of 0.872, all above 0.700 means reliable. The data obtained from the questionnaire was then analyzed using descriptive statistical data analysis techniques and moderation regression analysis (MRA). The p-value<.05 was considered statistically significant.

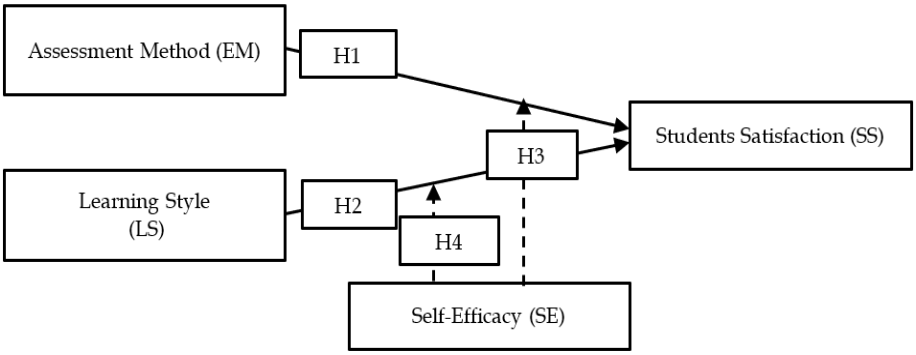

Figure 1. Research design

3. RESULTS AND DISCUSSION

3.1. Results

The output results of Table 2 present the descriptive statistical test results. The results showed that out of 228 respondents, the minimum score of the valuation method variable was 27, and the maximum score was 49. The average value of the valuation method variable was 40.74, with a standard deviation of 4.579. Based on the descriptive category, the average value obtained shows that the assessment method is in the excellent category. Meanwhile, the minimum score of the learning style variable was 42, and the maximum score was 89. The average value of the assessment method variable was 71.49, with a standard deviation of 9.048. Based on the descriptive category, the average value obtained shows that the assessment method is in the high category.

Furthermore, the minimum score of the self-efficacy variable was 29, and the maximum score was 49. The average value of the assessment method variable was 65.18, with a standard deviation of 7.214. Meanwhile, the minimum score of the online learning satisfaction variable was 39, and the maximum was 41. The average value of the assessment method variable was 65.20, with a standard deviation of 8.030. Based on the descriptive category, the average value obtained shows that the assessment method is in the high category.

Table 1. Validity test results

Variables	Item	Corrected total correlation	Cronbach alpha (α)
Assessment method (EM)	EM1	0.563**	0.788
	EM2	0.538**	
	EM3	0.623**	
	EM 4	0.425**	
	EM 5	0.475**	
	EM 6	0.537**	
	EM 7	0.427**	
	EM 8	0.489**	
	EM 9	0.515**	
	EM 10	0.626**	
Learning style (LS)	LS 1	0.348**	0.846
	LS 2	0.537**	
	LS 3	0.597**	
	LS 4	0.341**	
	LS 5	0.580**	
	LS 6	0.552**	
	LS 7	0.473**	
	LS 8	0.181*	
	LS 9	0.574**	
	LS 10	0.556**	
	LS 11	0.569**	
	LS 12	0.541**	
	LS 13	0.598**	
	LS 14	0.648**	
	LS 15	0.626**	
	LS 16	0.547**	
	LS 17	0.653**	
	LS 18	0.560**	
Self-efficacy (SE)	SE 1	0.396**	0.821
	SE 2	0.405**	
	SE 3	0.549**	
	SE 4	0.578**	
	SE 5	0.654**	
	SE 6	0.656**	
	SE 7	0.567**	
	SE 8	0.508**	
	SE 9	0.332**	
	SE 10	0.558**	
	SE 11	0.579**	
	SE 12	0.596**	
	SE 13	0.586**	
	SE 14	0.495**	
	SE 15	0.502**	
	SE 16	0.502**	
Student's satisfaction (SS)	SS 1	0.491**	0.872
	SS 2	0.372**	
	SS 3	0.371**	
	SS 4	0.554**	
	SS 5	0.663**	
	SS 6	0.632**	
	SS 7	0.693**	
	SS 8	0.709**	
	SS 9	0.547**	
	SS 10	0.716**	
	SS 11	0.555**	
	SS 12	0.627**	
	SS 13	0.604**	
	SS 14	0.618**	
	SS 15	0.655**	
	SS 16	0.555**	

Table 2 Descriptive statistical test results

	N Statistic	Range Statistic	Minimum Statistic	Maximum Statistic	Mean Statistic	Std. Deviation Statistic	Variance Statistic
EM	228	22	27	49	40.74	4.579	20.971
LS	228	47	42	89	71.49	9.048	81.871
SE	228	29	49	78	65.18	7.214	52.041
SS	228	39	41	80	65.20	8.030	64.485

3.1.1. Test result for moderated regression analysis (MRA)

The moderated regression analysis test used SPSS 23 by utilizing the (1).

$$SS = \alpha + \beta_1 EM + \beta_2 LS + \beta_3 EMSE + \beta_4 LSSE + e \quad (1)$$

Moderated regression analysis was performed through the following steps.

a) Regressing variable EM and LS on SS

$$Y = \alpha + \beta_1 EM + \beta_2 LS$$

b) Regressing variable EM and LS on SS

$$Y = \alpha + \beta_1 EM + \beta_3 SE + e$$

c) Regressing variable EM, SE, and EMSE interaction on SS

$$Y = \alpha + \beta_1 EM + \beta_3 SE + \beta_4 EMSE$$

d) Regressing variable X_2 and Z on Y

$$Y = \alpha + \beta_2 LS + \beta_3 SE + e$$

e) Regressing variable LS, SE, and LSSE interaction on SS

$$Y = \alpha + \beta_2 LS + \beta_3 SE + \beta_4 EMSE$$

Table 3 presents the hypotheses testing results. The first hypothesis suggests an effect of the assessment method on online learning satisfaction, as indicated by the significance value of 0.000 <0.05. So, H1 is accepted, implying that the assessment method influences online learning satisfaction. The simple linear regression test results for the second hypothesis, which proposes that learning style influences online learning satisfaction, show a significance value of 0.000 <0.05. Thus, H2 is accepted, confirming that learning styles affect online learning satisfaction.

Testing the third hypothesis, which posits an influence of the assessment method on online learning satisfaction with self-efficacy as moderation, the test results reveal a significance value of 0.000 <0.05. So, H3 is accepted. The difference in absolute value, where the coefficient of positive β value is 0.495, indicates that the presence of the self-efficacy variable can enhance the influence of assessment methods on student online learning satisfaction.

Furthermore, the results for the fourth hypothesis, stating that learning style affects online learning satisfaction with self-efficacy as moderation, show a significance value of 0.000 <0.05. So, H4 is accepted. The difference in absolute, with the coefficient of positive b value of 0.401, allows us to conclude that the existence of the self-efficacy variable can increase the influence of learning style variables on student online learning satisfaction.

Table 3. Hypotheses testing results

Hypothesis	Relationship between variables Explanatory variable ---> Response variable		Path coeff.	P-value	Description
H_1	EM	SE	0.186	0.000 < 0.05	Significant
H_2	LS	SE	0.502	0.000 < 0.05	Significant
H_3	Interaction (EM*SE)	SE	0.495	0.000< 0.05	Moderate (strengthen)
H_4	Interaction (LS*SE)	SE	0.401	0.000< 0.05	Moderate (strengthen)

3.2. Discussion

3.2.1. The effects of assessment methods on online learning satisfaction

The study results show that the assessment method is based on the appropriate methodology and measurement tools adapted to the characteristics of students and course material so that they can be used to make decisions on learning outcomes [4]. The assessment method affects online learning satisfaction, which can be used as material for evaluating learning and monitoring student productivity [1]. The findings of this study align with previous research [42], where they emphasized the significance of consensus regarding the suitability of modified assessment methods in influencing satisfaction scores. Basuony *et al.* [37] also stated that assessment methods like the use of online exams as an evaluative measure can be viewed as a crucial element influencing students' contentment with online education. Moreover, it can also be used to measure the quality of work so that lecturers can find out the progress of each individual in the class. An assessment method must pay attention to several aspects, such as cognitive, affective, and psychomotor, from the time it is designed to implement. In short, the assessment method is an additional determinant of the effectiveness and quality of online learning and, therefore, a factor influencing satisfaction [10], [43].

Online assessments such as e-open book exams, oral exams, case studies, and project presentations have proven to be able to play an essential role in increasing student satisfaction in online learning [30]. Online assessment can reduce student anxiety and improve learning outcomes [30]. Student learning satisfaction will be guaranteed when lecturers can choose the right communication tool or media for conducting assessments because tools that allow communication between lecturers and students (and vice versa) can increase student satisfaction higher than media that only allow students to interact with other students [44]. Furthermore, online assessment of online learning will run well if there is support from the campus to provide internet and ICT tools and ensure no power supply interruptions [45], [46]. The availability of the need for online learning in the research area shows that appropriate assessment methods, such as online assessment, can increase student learning satisfaction. In addition, Sintema [47] explained that if technology does not support an area, online learning will not run smoothly, thus impacting student learning satisfaction.

3.2.2. The influence of learning styles on online learning satisfaction

Learning style influences online learning satisfaction [12]. Learning styles are closely related to a person's personality, which is determined by education and history of development, so everyone has different learning styles. Often, individuals have to take different ways to understand the same information or lesson. However, suppose an individual captures information or material according to his learning style. In that case, there will be no problematic lessons, and the achievement of learning objectives will be high.

A lecturer ideally conveys material effectively to achieve learning objectives during the learning process. Knowing each individual's learning style in the class will make it easier to deliver material and create learning satisfaction. Learning styles are determined by the variants of the visual, auditory, read/write, and kinesthetic frameworks. Each learning style is a unique way of obtaining information, formulated by personal background and changed by the knowledge and expectations it acquires in certain situations [48].

Some research showed that learning style can improve student satisfaction. Research by Baherimoghadam *et al.* [27] revealed that learning styles in understanding the dimensions of information significantly influence the satisfaction level of online learning. Students curious about information tend to seek and understand knowledge well, so student satisfaction is achieved when they can understand information (in this case, the lecturer's material) well. In addition, Alvandi *et al.* [49] revealed that students using verbal cognitive learning styles were more satisfied with text-based searches than content-based searches, and users with visual cognitive styles were more satisfied with content-based searches than text-based searches. So, each student has a different way or style of learning that can increase the learning satisfaction of each individual.

3.2.3. Moderating the role of self-efficacy in assessment methods and learning styles on online learning satisfaction

Satisfaction theory states that it can be interpreted as a person's feeling of pleasure or disappointment (less/unpleasant) due to a comparison between perceptions and experiences of the perceived service and what is expected [50]. With this theory, in this study, it was found that students had experienced learning services through Elena, which they felt facilitated access to learning. Elena, which stands for Electronic Learning Aid, as an online learning platform. Through Elena, students can increase their satisfaction with online learning.

It is essential to note that student learning satisfaction starts from the factors that influence it and moves on to factors that can be influenced by it. Aligns with this theory, this study found that factors influence student learning satisfaction—assessment methods and learning styles. These factors can significantly influence student satisfaction with online learning. According to Bandura [26], there are sources regarding the first level of self-efficacy, the success experiences that indicate the level of competence. Second, looking at other people's experiences, especially on success, will strengthen self-efficacy. With this theory, this study

found that students can increase self-efficacy through the experience of one's success. Hence, a high level of self-efficacy can strengthen the influence on student learning satisfaction.

This study found that the assessment method can affect student satisfaction in online learning. The finding aligns with the research results [10], which say that the assessment method affects student satisfaction in online learning. Also, the results of this study indicate that student satisfaction in the Department of Economics Education is influenced by learning styles, in contrast to the results of previous research [17], which shows student satisfaction in the pediatrics department is not influenced by learning styles. The other study's results [14] showed that this self-efficacy variable is believed to be a key component in successful online learning. The results of this study indicate that the existence of an assessment method and learning style accompanied by self-efficacy can increase student learning satisfaction in online learning.

4. CONCLUSION

The results revealed that the assessment method directly influenced student satisfaction with online learning. Additionally, this study identified that self-efficacy moderated the relationship between the assessment method and student satisfaction in online learning. Further findings indicated that learning style variables also directly affect student satisfaction in online learning, and self-efficacy moderated the effect of learning styles on student learning satisfaction. This research contributes to understanding student learning satisfaction in the context of online learning. This finding suggests that lecturers can enhance student satisfaction by employing online assessment methods aligned with student interest, fostering an enjoyable learning experience and increasing overall satisfaction. Moreover, the success of the assessment process relies on the faculty's support for technical resources to ensure the smooth execution of online learning, such as providing internet access and ICT tools and preventing power supply interruptions.

Furthermore, students experiencing self-efficacy during the assessment process and being able to choose their specific learning style are likely to have increased satisfaction with online learning. However, it is vital to acknowledge the limitations of this study, including the use of questionnaires in data collection, which may introduce bias and inconsistency. This research also focused on two independent variables: assessment methods, learning styles, and a limited sample size. Future research should consider employing diverse data collection methods, addressing a more comprehensive range of indicators, incorporating additional independent variables related to environmental conditions, and increasing the sample size for a more comprehensive understanding.

REFERENCES

[1] L. Benkirane, M. Hamza, W. Sbihi, and E. Arabi, "Perception of learning assessment methods by students at the end of their initial training at the faculty of Dentistry of Casablanca," *Education Research International*, vol. 2019, pp. 1–5, Sep. 2019, doi: 10.1155/2019/8463169.

[2] G. Cheng and J. Chau, "Exploring the relationships between learning styles, online participation, learning achievement and course satisfaction: An empirical study of a blended learning course," *British Journal of Educational Technology*, vol. 47, no. 2, pp. 257–278, Mar. 2016, doi: 10.1111/bjet.12243.

[3] S. Farid, R. Ahmad, M. Alam, A. Akbar, and V. Chang, "A sustainable quality assessment model for the information delivery in E-learning systems," *Information Discovery and Delivery*, vol. 46, no. 1, pp. 1–25, Feb. 2018, doi: 10.1108/IDD-11-2016-0047.

[4] T. Mahmood and K. Hafeez, "Performance assessment of an e-learning software system for sustainability," *International Journal of Quality and Service Sciences*, vol. 5, no. 2, pp. 208–229, Jun. 2013, doi: 10.1108/IJQSS-04-2013-0022.

[5] Ó. Martín-Rodríguez, J. C. Fernández-Molina, M. Á. Montero-Alonso, and F. González-Gómez, "The main components of satisfaction with e-learning," *Technology, Pedagogy and Education*, vol. 24, no. 2, pp. 267–277, Mar. 2015, doi: 10.1080/1475939X.2014.888370.

[6] D. Gholipour, M. Dashtaki, A. Mohammadi, M. Zolfaghari, S. Imani, and S. Tahmasebian, "The relationship of satisfaction and usage of virtual learning facilities with learning style in medical, health, and operating room students," *Strides in Development of Medical Education*, vol. 17, no. 1, pp. 1–6, 2020.

[7] A. Basith, R. Rosmaiyadi, S. N. Triani, and F. Fitri, "Investigation of online learning satisfaction during COVID 19: In relation to academic achievement," *Journal of Educational Science and Technology (EST)*, vol. 6, no. 3, pp. 265–275, Nov. 2020, doi: 10.26858/est.v1i1.14803.

[8] R. Maini, S. Sehgal, and G. Agrawal, "Todays' digital natives: An exploratory study on students' engagement and satisfaction towards virtual classes amid COVID-19 pandemic," *The International Journal of Information and Learning Technology*, vol. 38, no. 5, pp. 454–472, Oct. 2021, doi: 10.1108/IJILT-03-2021-0055.

[9] L. C. Duque and J. R. Weeks, "Towards a model and methodology for assessing student learning outcomes and satisfaction," *Quality Assurance in Education*, vol. 18, no. 2, pp. 84–105, Apr. 2010, doi: 10.1108/09684881011035321.

[10] Ó. Martín Rodríguez, F. González-Gómez, and J. Guardiola, "Do course evaluation systems have an influence on e-learning student satisfaction?" *Higher Education Evaluation and Development*, vol. 13, no. 1, pp. 18–32, Jun. 2019, doi: 10.1108/HEED-09-2018-0022.

[11] S. Al Natour and C. Woo, "The determinants of learner satisfaction with the online video presentation method," *Internet Research*, vol. 31, no. 1, pp. 234–261, Aug. 2020, doi: 10.1108/INTR-04-2019-0155.

[12] D. C. Wu, "Learning styles and satisfaction in distance education," *Turkish Online Journal of Distance Education*, vol. 15, no. 4, Dec. 2014, doi: 10.17718/tojde.31724.

[13] A. M. Aliweh, "Exploring Egyptian EFL students' learning styles and satisfaction with web-based materials," *CALICO Journal*, vol. 29, no. 1, pp. 81–99, Sep. 2011, doi: 10.11139/cj.29.1.81-99.
[14] D. Shen, M.-H. Cho, C.-L. Tsai, and R. Marra, "Unpacking online learning experiences: Online learning self-efficacy and learning satisfaction," *The Internet and Higher Education*, vol. 19, pp. 10–17, Oct. 2013, doi: 10.1016/j.iheduc.2013.04.001.
[15] A. Nardi and M. Ranieri, "Comparing paper-based and electronic multiple-choice examinations with personal devices: Impact on students' performance, self-efficacy and satisfaction," *British Journal of Educational Technology*, vol. 50, no. 3, pp. 1495–1506, May 2019, doi: 10.1111/bjet.12644.
[16] A. Aouine, L. Mahdaoui, and L. Moccozet, "A workflow-based solution to support the assessment of collaborative activities in e-learning," *The International Journal of Information and Learning Technology*, vol. 36, no. 2, pp. 124–156, Mar. 2019, doi: 10.1108/IJILT-01-2018-0004.
[17] A. Al Shaikh *et al*., "Learning styles and satisfaction with educational activities of Saudi Health Science University Students," *Journal of Taibah University Medical Sciences*, vol. 14, no. 5, pp. 418–424, Oct. 2019, doi: 10.1016/j.jtumed.2019.07.002.
[18] H. M. Truong, "Integrating learning styles and adaptive e-learning system: Current developments, problems and opportunities," *Computers in Human Behavior*, vol. 55, pp. 1185–1193, Feb. 2016, doi: 10.1016/j.chb.2015.02.014.
[19] F.-F. Cheng, C.-C. Chiu, C.-S. Wu, and D.-C. Tsaih, "The influence of learning style on satisfaction and learning effectiveness in the asynchronous web-based learning system," *Library Hi Tech*, vol. 35, no. 4, pp. 473–489, Nov. 2017, doi: 10.1108/LHT-12-2016-0151.
[20] N.-K. Hong, H.-M. Koh, and S.-G. Hong, "Linking innovative design to the education for structural engineers," Presented at *IABSE Conference: Bridges and Structures Sustainability - Seeking Intelligent Solutions*, Guangzhou, China 2016, pp. 327–334. doi: 10.2749/222137816819258681.
[21] O. Usman and F. Chairani, "The effect of learning style, online participation, and learning outcomes on learning satisfaction," *SSRN*, 2020.
[22] Y.-C. Yang and E. Park, "Applying strategies of self-regulation and self-efficacy to the design and evaluation of online learning programs," *Journal of Educational Technology Systems*, vol. 40, no. 3, pp. 323–335, Mar. 2012, doi: 10.2190/ET.40.3.g.
[23] M. Komarraju and D. Nadler, "Self-efficacy and academic achievement: Why do implicit beliefs, goals, and effort regulation matter?" *Learning and Individual Differences*, vol. 25, pp. 67–72, Jun. 2013, doi: 10.1016/j.lindif.2013.01.005.
[24] M. L. Cheok and S. L. Wong, "Predictors of E-learning satisfaction in teaching and learning for school teachers: A literature review," *International Journal of Instruction*, vol. 8, no. 1, pp. 75–90, Jan. 2015, doi: 10.12973/iji.2015.816a.
[25] C. J. Hushman and S. C. Marley, "Guided instruction improves elementary student learning and self-efficacy in science," *The Journal of Educational Research*, vol. 108, no. 5, pp. 371–381, Sep. 2015, doi: 10.1080/00220671.2014.899958.
[26] A. Bandura, "Self-efficacy: Toward a unifying theory of behavioral change," *Advances in Behaviour Research and Therapy*, vol. 1, no. 4, pp. 139–161, Jan. 1978, doi: 10.1016/0146-6402(78)90002-4.
[27] T. Baherimoghadam, S. Hamedani, M. Mehrabi, N. Naseri, and N. Marzban, "The effect of learning style and general self-efficacy on satisfaction of e-Learning in dental students," *BMC Medical Education*, vol. 21, no. 1, Dec. 2021, doi: 10.1186/s12909-021-02903-5.
[28] M. van Dinther, F. Dochy, and M. Segers, "Factors affecting students' self-efficacy in higher education," *Educational Research Review*, vol. 6, no. 2, pp. 95–108, Jan. 2011, doi: 10.1016/j.edurev.2010.10.003.
[29] J. S. Camara, "Correlates of self-efficacy, learning style and aptitude across strand of senior high school students in San Jacinto National High School," *Asian Journal of Multidisciplinary Studies*, vol. 1, no. 2, pp. 15–24, 2018.
[30] N. Almusharraf and S. Khahro, "Students satisfaction with online learning experiences during the COVID-19 pandemic," *International Journal of Emerging Technologies in Learning (iJET)*, vol. 15, no. 21, p. 246, Nov. 2020, doi: 10.3991/ijet.v15i21.15647.
[31] M. B. Ramos, "Pedagogy of the oppressed," in *Toward a sociology of education*, Routledge, 2020, pp. 374–386.
[32] T. M. Duffy and D. H. Jonassen, "Constructivism: New implications for instructional technology?" *Educational Technology*, vol. 31, no. 5, pp. 7–12, 1991.
[33] J. Mezirow, *Learning as transformation: Critical perspectives on a theory in progress. The Jossey-Bass higher and adult education series*. Jossey-Bass Inc Pub, 2000.
[34] B. Chen, K. Bastedo, and W. Howard, "Exploring best practices for online STEM courses: Active learning, interaction & assessment design," *Online Learning*, vol. 22, no. 2, Jun. 2018, doi: 10.24059/olj.v22i2.1369.
[35] W. Fellin and G. Medicus, "Multiple choice tests: More than a time saver for teachers," *International Journal of Engineering Pedagogy (iJEP)*, vol. 5, no. 3, pp. 15–24, Aug. 2015, doi: 10.3991/ijep.v5i3.4376.
[36] G. Giray, "An assessment of student satisfaction with e-learning: An empirical study with computer and software engineering undergraduate students in Turkey under pandemic conditions," *Education and Information Technologies*, vol. 26, no. 6, pp. 6651–6673, Nov. 2021, doi: 10.1007/s10639-021-10454-x.
[37] M. A. K. Basuony, R. EmadEldeen, M. Farghaly, N. El-Bassiouny, and E. K. A. Mohamed, "The factors affecting student satisfaction with online education during the COVID-19 pandemic: An empirical study of an emerging Muslim country," *Journal of Islamic Marketing*, vol. 12, no. 3, pp. 631–648, May 2021, doi: 10.1108/JIMA-09-2020-0301.
[38] S. L. Appleton-Knapp and K. A. Krentler, "Measuring student expectations and their effects on satisfaction: The importance of managing student expectations," *Journal of Marketing Education*, vol. 28, no. 3, pp. 254–264, Dec. 2006, doi: 10.1177/0273475306293359.
[39] S. P. Stokes, "Temperament, learning styles, and demographic predictors of college student satisfaction in a digital learning environment," Paper presented at *the Annual Meeting of the Mid-South Educational Research Association*, 2003.
[40] R. Prifti, "Self–efficacy and student satisfaction in the context of blended learning courses," *Open Learning: The Journal of Open, Distance and e-Learning*, vol. 37, no. 2, pp. 111–125, Apr. 2022, doi: 10.1080/02680513.2020.1755642.
[41] B. De Porter and S. Meutia, *Quantum learning: Amiliarizing learning comfortable and enjoyable (Translated by Alwiyah Adurrahman)*. Bandung: PT Mizan Publika (in Indonesian), 2007.
[42] I. M. K. Ho, K. Y. Cheong, and A. Weldon, "Predicting student satisfaction of emergency remote learning in higher education during COVID-19 using machine learning techniques," *PLOS ONE*, vol. 16, no. 4, Apr. 2021, doi: 10.1371/journal.pone.0249423.
[43] H. F. Kelly, M. K. Ponton, and A. P. Rovai, "A comparison of student evaluations of teaching between online and face-to-face courses," *The Internet and Higher Education*, vol. 10, no. 2, pp. 89–101, Jan. 2007, doi: 10.1016/j.iheduc.2007.02.001.
[44] F. Small, D. Dowell, and P. Simmons, "Teacher communication preferred over peer interaction," *Journal of International Education in Business*, vol. 5, no. 2, pp. 114–128, Nov. 2012, doi: 10.1108/18363261211281735.
[45] J. Kranzow, "Faculty leadership in online education: Structuring courses to impact student satisfaction and persistence," *Journal of Online Learning & Teaching*, vol. 9, no. 1, pp. 131–139, 2013.

[46] F. A. Faize and M. Nawaz, "Evaluation and Improvement of students' satisfaction in Online learning during COVID-19," *Open Praxis*, vol. 12, no. 4, Dec. 2020, doi: 10.5944/openpraxis.12.4.1153.
[47] E. J. Sintema, "Effect of COVID-19 on the Performance of Grade 12 Students: Implications for STEM Education," *Eurasia Journal of Mathematics, Science and Technology Education*, vol. 16, no. 7, Apr. 2020, doi: 10.29333/ejmste/7893.
[48] A. Al Shaikh, "Learning styles and satisfaction with educational activities among paediatric physicians at King Abdulaziz Medical City Jeddah," *Journal of Taibah University Medical Sciences*, vol. 10, no. 1, pp. 102–108, Mar. 2015, doi: 10.1016/j.jtumed.2015.02.002.
[49] Z. Alvandi Poor, M. Mirzabeigi, and M. Nabavi, "The impact of cognitive style on the level of satisfaction and image search behavior in the textual and content search system of Google Images," *Aslib Journal of Information Management*, vol. 74, no. 1, pp. 19–36, Jan. 2022, doi: 10.1108/AJIM-04-2021-0116.
[50] P. Kotler and K. L. Keller, *Marketing management*. London: Pearson Education, 2016.

BIOGRAPHIES OF AUTHORS

Amir Mahmud is a lecturer in the Department of Economics Education, Universitas Negeri Semarang. He graduated from the doctoral program in education management at Universitas Negeri Semarang. His research interests are public sector accounting, accounting education, higher education policy, and management accounting. He has published many articles in reputable national and international journals. He can be contacted at email: amirmahmud@mail.unnes.ac.id.

Nurdian Susilowati is a lecturer in the Department of Economics Education, Universitas Negeri Semarang. She graduated master program of economic education in Universitas Negeri Malang. Her research interests are accounting teaching and learning, ethic education, behavioral accounting, and public sector accounting. She has published many articles in reputable national and international journals. She can be contacted at email: nurdiansusilowati@mail.unnes.ac.id.

Puji Novita Sari is a master's student at Universitas Sebelas Maret, Indonesia. She received a bachelor's degree from the Department of Economics Education, Universitas Negeri Semarang, Indonesia in 2020. Her research interest including student's digital creativity, accounting public sector, and accounting education. She can be contacted at email: pujinovitasari@student.uns.ac.id and pujinovitasari22@gmail.com.