The Impact of Blended Learning Assisted with Self-Assessment toward Learner Autonomy and Creative Thinking Skills

https://doi.org/10.3991/ijet.v17i06.29799

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Abstract—This study aims to analyze the effects of blended learning with self-assessment on learner autonomy and creative thinking skill. This study used a quasi-experimental design in the form of a pretest-posttest control group design. The total number of students in this study was 70, with 36 in the experimental group and 34 in the control group. Data collection was achieved by the use of tests and questionnaires. A test instrument in the form of a description of 10 questions was used to assess critical thinking skills, and a questionnaire instrument with 30 statements was utilized to assess learner autonomy. Quantitative descriptive analysis and inferential statistical analysis were employed as data analysis methods and techniques. The Manova analysis technique was applied in this study, and the outcomes were $0.00 < 0.05$. According to the findings of the study, blended learning with self-assessment had a partial or simultaneous effect on learner autonomy and creative thinking. However, the students' creative thinking skill in clothing design was the most influential variable. As a result, self-assessment-assisted blended learning became a learning recommendation for increasing learner autonomy and creative thinking skill.

Keywords—blended learning, creative thinking, learner autonomy, self-assessment

1 Introduction

One of the types of education that develops work skills is vocational education [1]. Vocational education is one of the educational paths that prepares students for work by teaching them skills that are relevant to the workplace [2]. Vocational education can help develop optimal, qualified, and competitive human resources [3]. The presence of vocational education is inextricably linked to the workforce's social development and the production of quality workers [4]. Students must be encouraged to be creative and imaginative, think critically to solve issues, and communicate and participate in vocational learning [5]. In other words, vocational education is an education that produces human resources who are ready to work; as a result, vocational education must be able to develop human resources who can compete in the era of the 4.0 industrial

revolution and possess 21st-century skills. The capacity to think creatively and innovatively is one of the qualities that must be acquired. It is critical for everyone to acquire 21st century skills in order to successfully navigate the difficulties and concerns of modern life [6]. According to this explanation, one of the necessary qualities is the capacity to think creatively.

Today, creativity and innovation are inextricably linked to education [7]. Creative thinking is a mental activity that can result in a variety of outcomes [8], [9]. Creative thinking may also be defined as a method for generating and developing new ideas [10], [11]. Many higher-order thinking skills (HOTS), such as analysis, testing, communication problem solving, and scientific process skills, are included in creative thinking[12]–[14]. Creative thinking includes flexibility, fluency [15], [16], novelty, and elaboration [17], [18]. Divergent and convergent thinking skills are two types of thinking skills [19], [20]. Many ideas and viewpoints may be developed through creative thinking skills, as well as the ability to ask questions, recognize the truth of others' opinions, and teach students to be open and kind [14], [21]. The ability of students to think creatively during the learning process can have an effect on the learning outcomes. Learning outcomes will be aided by the use of creative thinking skills. Well-developed creative thinking skills affect learning outcomes [22]–[24]. The value of creative thinking skills necessitates a shift in the educational process. Learning that encourages students to participate more actively in the learning process is learning that can increase creative thinking skills. By developing integrated attitudes, skills, and knowledge, teachers are needed in the present learning process to be creative, productive, innovative, proactive, and emotional[25], [26]. Students may strengthen their creativity, particularly their creative thinking skills, through engaging in varied activities. Learner autonomy is required in addition to the capacity to think creatively.

Learner autonomy is the ability to take charge of one's own learning in a highly effective manner[27], [28]. Learner autonomy, in general, is a belief in the ability to achieve learning goals that involve students independently[29], [30], to make a decision, choose the methods and techniques used to monitor the acquisition procedure, and evaluate what has been obtained [31]. Learner autonomy of learners can be developed by starting with managing planning, organizing, and evaluating learning[31]. An active and successful learning experience in the learning process leads to learner autonomy[32], [33]. The increased learner autonomy will also increase the cognitive flexibility of students [34]. Learner autonomy is the answer to the 21st century challenges to meet the labor market[35] and a lifelong learning approach. Learner autonomy necessitates teachers' ability to generate active learning, as Learner autonomy may be achieved through controlling the planning, implementation, and evaluation of learning that is more focused on the development of students' 21st century skills [31]. As a result, learner autonomy is a crucial aspect of the learning process for students. Because of the importance of creative thinking skills and learner autonomy in the learning process, teachers must use new teaching techniques to create an innovative learning.

Currently, the learning process is not optimum since national education goals have not been met yet. The capacity of students to think creatively is one of the skills that cannot be stated to be ideal. According to the findings of the initial analysis, many students continue to struggle with developing creative goods. The educators also

claimed that the students' lack of interest in learning this topic resulted in less-than-optimal product outputs, assignments that were not completed on time, and certain products that were the identical for some students. This situation demonstrates that students' creative thinking skills are still not growing to their full potential. This condition is confirmed by the present statement that students' creative thinking capacity is still low, as seen by the fact that 97.4% of students lack the ability to think creatively [36]. Students' creative thinking skills have not developed optimally [37]. Several factors contribute to this condition, including teachers who rarely or never encourage students to think creatively [38]. Students are less encouraged to acquire critical thinking skills during the learning process [39]. If this problem is not addressed, it will undoubtedly affect students' learning outcomes. Various and innovative ways can be used to improve students' creative thinking skills [40]. The existence of Covid-19, in which the learning process is carried out online, aggravates this problem. Many youngsters do not engage in online learning and instead engage in other activities such as playing video games, using social media, and viewing more YouTube videos, among other actions that demonstrate phones addiction [41]–[43]. Another issue is that offering students problems that are extremely difficult can annoy them and make them unwilling to study. Another issue is that teachers are unable to conduct sophisticated or complete evaluations; instead, they can only analyze the results of assigned activities as well as middle and final examinations results without understanding how the process is carried out. To address these issues, new learning that is relevant to contemporary circumstances is required. Blended learning is one of the options available.

Blended learning is a type of learning that blends traditional face-to-face instruction with distant learning via the internet [44], [45]. It allows students to explore topics and share their experiences both in person and online [46], [47]. Blended learning allows students to visualize, listen, feel, and interact with teachers and learning materials [48], [49].Blended learning enables students to have more options when it comes to learning methods, such as using diverse media and having more flexible schedules. Blended learning has been shown to boost learning motivation and improve learning outcomes [50], [51].Blended learning has become an important approach in the learning process [52], it is supported by several previous studies. Research states that blended learning results in better achievement and motivation to learn [53], [54]. Blended learning is beneficial in helping students grasp concepts [55]. Combining blended learning with the use of WhatsApp application can boost student motivation during the learning process [56]. Blended learning affects creativity [57]. Blended learning can increase the efficiency and speed of individual learning [58]. As a result, blended learning has a beneficial effect on the learning process. Blended learning will be paired with self-assessment to improve its effectiveness. Self-assessment, also known as self-evaluation, is a technique for measuring students' attitudes, knowledge, and skills. Separate self-assessment has the benefit of being more ordered for students in the learning process, allowing them to identify learning shortcomings [59]. Self-assessment is used to compare conceptual knowledge to action-based conceptual understanding [60], [61]. Self-assessment will have a favorable influence on the learning process, as students will gain confidence and be better able to encourage themselves. Students can use self-assessment to have an overview of their learning strengths and weaknesses

[62]. Students do not need to have direct interaction with teachers while using the self-assessment method [63]–[65]. Therefore, self-assessment will improve students' learning outcomes. Both blended learning and self-assessment have a positive impact on the learning process, as seen by these descriptions. As a result, the goal of this study is to look at the effect of blended learning with self-assessment on learner autonomy and creative thinking skills. The existence of this study will make the learning process more active and students more engaged in it, which will have an effect on autonomous learning attitudes and creative thinking skills, as well as students' learning outcomes.

2 Methods

This study used a quasi-experimental research design. The design of this re-search is a quasi-experimental design in the form of a pretest-posttest control group design (Rogers & Revesz, 2019). The research implementation process was grouped into the experimental group and the control group. The experimental group was treated with blended learning assisted with self-assessment, where blended learning was carried out with e-learning (asynchronous) and Zoom meet-ings (synchronous). For the control group, anblended learning process was car-ried out without any self-assessment, the learning process was carried out in the experimental and control groups. Both groups, both the experimental group and the control group, were given a pretest to determine the initial conditions before treatment, then a post-test to determine the differences in learner autonomy and creative thinking skills between the experimental group that was given treatment. The research design is presented in Table 1. The data obtained in this study were (1) Learner autonomy (Y1) before treatment in the Experiment group; (2) Learner autonomy (Y1) before the treatment was carried out in the Control group; (3) The ability to think creatively (Y2) before being applied in the Experiment group; (4) The ability to think creatively (Y2) before being applied in the control group; (5) Learner autonomy (Y1) Students who were taught using blended learning assisted by self-assessment; (6) Learner autonomy (Y1) Students who were taught online without any self-assessment; (7) Creative thinking ability (Y2) Students who were taught using blended learning assisted by self-assessment; and (8) Creative thinking skills (Y2) Students who were taught online with Zoom meetings without any self-assessment.

Table 1. Stages of learning activities

Learning	Treatment	
	Experiment	***Control***
1	Synchronous with Zoom. (Giving a course contract and explanation related to Design and Fashion Performance course)	Synchronous with Zoom. (Giving a course contract and explanation related to Design and Fashion Performance course)
2	Asynchronous using e-learning. (Students accessed materials, discussions and assignments)	Asynchronous using e-learning. (Students accessed materials, discussions and assignments)
3	Synchronous with Zoom and Self-Assessment. Students were given the opportunity to present the tasks that had been made, and students made an assessment of what had been made and presented.	Synchronous with Zoom. Students were given the opportunity to present the tasks that had been made.
4	Asynchronous using e-learning. (Students accessed materials, discussions and assignments)	Asynchronous using e-learning. (Students accessed materials, discussions and assignments)
5	Synchronous with Zoom and Self-Assessment. Students were given the opportunity to present the tasks that had been made, and students made an assessment of what had been made and presented.	Synchronous with Zoom. Students were given the opportunity to present the tasks that had been made.
6	Asynchronous using E-learning. (Students accessed materials, discussions and assignments)	Asynchronous using E-learning. (Students accessed materials, discussions and assignments)
7	Synchronous with Zoom and Self-Assessment. Students were given the opportunity to present the tasks that had been made, and students made an assessment of what had been made and presented.	Synchronous with Zoom. Students were given the opportunity to present the tasks that had been made.
8	Asynchronous using E-learning. (Students accessed materials, discussions and assignments)	Asynchronous using E-learning. (Students accessed materials, discussions and assignments)

The participants in this study were all fifth-semester Design and Fashion Show students. A total of 135 students participated in this study. The equivalence test was then performed using the SPSS 25.0 for Windows program and One Way-ANOVA (Anava-A) analysis. The study included 70 students, with 36 VA students in the experimental group and 34 VB students in the control group. The research sample was chosen using a random sampling technique. The data collection approach employed in this study was a test and questionnaire method. The test method is one of the methods for indirectly determining an individual's level of ability, and it involves individuals responding to a variety of stimuli or questions. The test method was employed to obtain data on how self-assessment-assisted blended learning affected creative thinking skills. The test was a description test, with the following steps: 1) designing a test instrument grid; 2) producing questions in the form of descriptions; and 3) consulting the grids and questions developed by experts. Although the test instruments were supposed to have ten items, the tests given to students only had ten questions. Table 2 describes the question grid. It is necessary to test the validity of the instrument items, the validity of the instrument

content, the reliability of the test, the level of difficulty of the test items, and the level of difficulty of the test equipment when determining the validity of the test instrument for the ability to think creatively. The CVR formula was used to assess the validity of the items on the creative thinking skills test instrument. The total CVR of all the items of the creative thinking ability test instrument was 10 and could be deemed valid based on the validation provisions of each instrument item in the CVR formula. The CVI formula was used to assess the content validity of the creative thinking test instrument, with the result that the CVI value was 1 and the creative thinking skill test instrument was certified very good based on the CVI formula's content validation criteria. The reliability test of the creative thinking skill test whose data was in the form of polytomies using the Alpha Coefficient formula with the results obtained was 0.75 and was in the range of $0.60 < r11 \leq 0.75$. Therefore, the reliability of the creative thinking skill test was at a high criterion. The level of difficulty of the test items for the ability to think creatively obtained the results that of the 10 questions made, 5 questions were on the medium criteria and 5 questions were on the high criteria, while the level of difficulty of a test device was in the medium criteria.

Table 2. Indicators of creative thinking skill in fashion design and performance course

No.	Basic Competencies	Indicators	Cognitive Level	Number of Questions
1	Identifying the types of clothing	1. Comparing the types of clothing with the season	C4	2
2	Analyzing the basic shape and development of fashion	1. Analyzing the basic shape of fashion	C4	2
		2. Choosing the form of fashion development in accordance with its development	C5	2
3	Creating images of basic shapes of fashion and analysis of models and their development	1. Creating a picture of the basic shape of fashion	C6	2
		2. Creating a fashion shape image with the model and its development	C6	2

Learner autonomy was measured via a questionnaire collecting method. The questionnaire had five options: strongly agree, agree, somewhat disagree, disagree, and strongly disagree. The total number of instruments created was 30, with three dimensions divided into 11 indicators. 1) Behavioral autonomy; 2) emotional autonomy; and 3) value autonomy were the three aspects. Table 3 has a more comprehensive grid. The validity of the instrument items, the validity of the instrument's contents, and the reliability had to be tested when determining the validity of the questionnaire instrument. The CVR formula was used to test the validity of the contents of the questionnaire instrument. The total CVR of all learner autonomy instrument items was 30, and the CVR result from each instrument item's calculation was 1, so it could be deemed valid based on the validation provisions of each instrument item in the CVR formula. SPPS was used to test the validity of the questionnaire's contents, and the findings were 0.87, which is considered very strong. Using SPSS to test the questionnaire's reliability, the results of the research yielded a Cronbach's Alpha score of 0.93, indicating that the produced questionnaire was highly reliable.

Table 3. Indicators of learner autonomy in design and fashion show course

No.	Dimension	Indicators	No Statement
1	Emotional autonomy	1. Emotional contact of learners with teachers	2
		2. Emotional contact of learners with parents	2
		3. Emotional contact of learners with other learners	2
2	Behavioral autonomy	1. Having confidence in doing tasks	4
		2. Spending time in the learning process.	2
		3. Mastering the skills that are in accordance with work	4
		4. Being able to work independently to complete the tasks given	4
		5. Being responsible for has been done	3
3	Value autonomy	1. Being able to take decisions and initiatives to overcome the problems faced	3
		2. Being able to choose the right and wrong about a problem faced	2
		3. Being able to determine tasks that are important and not	2

The descriptive and inferential statistical analysis methods used in this study were used to analyze the data. The data analyzed in this study were pre-test and post-test data, and the descriptive analysis was performed using SPSS 25.0 for Windows. The mean, standard deviation, maximum and minimum values were among the values sought in the statistical test. Meanwhile, pre-test data was analyzed using the t-test, and post-test data was analyzed using inferential statistical analysis using the MANOVA test. The normality and homogeneity criteria were checked before the t-test. The Kolmogrof-Smirnov normality test was employed, whereas the Levene Statistic homogeneity test was utilized. Likewise, with the Manova test, before the Manova test was carried out, the prerequi-site test was carried out, the prerequisite test was the normality test with Kolmo-gorov-Smirnov, homogeneity test with Levene Statistic and Box's Test of Equality of Covariance Matrices and linearity test aimed to determine whether there was a linear relationship in each the dependent variable analyzed. MANOVA test and prerequisite test were carried out with the help of SPSS 25.0 for Windows.

3 Results and discussion

3.1 Results

The goal of this study was to investigate the effect of blended learning in online learning with self-assessment on learner autonomy and creative thinking skills. The results revealed an improvement in learner autonomy and creative thinking skills before and after treatment after being taught according to the learning design, and the effect of blended learning was further assisted by self-assessment of learner autonomy and creative thinking skills. Table 4 summarizes the findings of the descriptive analysis in detail. The results of the descriptive study show that there were differences in learner autonomy and creative thinking skills before and after treatment, it was indicated by an increase in learner autonomy by 19.22 for the experimental group while for the control

group, the learner autonomy showed a difference of 19.79. Similarly, there was a difference of 16.86 for the experimental group and 13.53 for the control group when it came to the value of creative thinking skill. The results of the descriptive analysis also revealed that blended learning with self-assessment had an effect on learner autonomy and creative thinking skills, as evidenced by the difference between the experimental and control groups. Learner autonomy had a difference of 1.99, with the experimental group having a higher mean score, and creative thinking skills had a difference of 3.73, with the experimental group having a higher mean value. Based on the findings, it can be concluded that blended learning with self-assessment had an effect on learner autonomy and creative thinking skills, with the findings indicating that blended learning with self-assessment had a larger effect on creative thinking abilities. In this situation, students had diverse views about how to create the clothes, as seen by their capacity to plan activities for fashion shows, despite the fact that the classes were held online. A hypothesis test was performed to support these findings. However, before the hypothesis was tested, a pre-test was performed.

Table 4. The results of descriptive analysis of Learner Autonomy (LA) and creative thinking skill

Treatment		Dependent Variable	Mean	Std. Deviation	N
A1 Blended learning assisted with self-assessment.	Pre-test	Learner autonomy	68.11	9.14	36
		Creative Thinking Skills	45.05	8.85	34
	Post-test	Learner autonomy	88.33	9. 18	36
		Creative Thinking Skills	61.91	8.16	34
A2 Blended learning without self-assessment	Pre-test	Learner autonomy	66.56	8.86	36
		Creative Thinking Skills	44.65	8.09	34
	Post-test	Learner autonomy	86.34	8.07	36
		Creative Thinking Skills	58.18	7.13	34

Prerequisite analysis tests carried out included tests for normality of data distribution, homogeneity of variance test, multivariate homogeneity test, and linearity test for the dependent variable. The first prerequisite test was the normality test with the Kolmogorov-Smirnov. The results of the analysis showed that all data came from groups of data that were normally distributed, it could be indicated by the value of Sig. > 0.05, which is presented in Table 5. After the normality conditions were met, the next prerequisite test was the homogeneity test. In this study, the homogeneity test was carried out with two analyzes, namely the homogeneity of variance test with Levene's Test of Equality and the multivariate homogeneity test with Box's Test of Equality of Covariance Matrices. The results of the homogeneity analysis showed the same meaning, namely the research data came from homogeneous data groups, it could be seen from the sig. value, where each test showed a value of more than 0.05. Sig. value of Levene's Test of Equality was 0.53 for Learner autonomy, while the sig. value of creative thinking skill was 0.23. Meanwhile, the homogeneity test with Box's Test of Equality of Covariance Matrices obtained a sig. value of 0.82 with an F value of 0.94.

Table 5. Normality analysis results

	Learning Approach	Kolmogorov-Smirnov[a]		
		Statistics	***Df***	***Sig.***
Autonomy learner	Blended learning with self-assessment	0.15	36	0.39
	Blended learning without self-assessment	0.15	34	0.44
Creative Thinking Skills	Blended learning with self-assessment	1.51	36	0.37
	Blended learning without self-assessment	0.13	34	0.95

The next prerequisite test was the linearity test, which aimed to determine whether there was a linear relationship in each of the analyzed dependent variables. The results of the analysis showed that the sig. value on Deviation from Linearity of 0.56 (> 0.05). It means that there was no linear relationship between the data on Learner autonomy and creative thinking skills. The test conditions for MANOVA analysis had been met, where the research data obtained were normally distributed, homogeneous and there was no linear relationship between variables so that hypothesis testing with Manova could be carried out. The results of the complete analysis are described in Table 6 and Table 7.

Table 6. Results of the Manova test analysis

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Intercept	Pillai's Trace	0.8	2020.20b	2.00	67.00	0.00	0.98
	Wilks' Lambda	0.02	2020.20b	2.00	67.00	0.00	0.98
	Hotelling's Trace	60.30	2020.20b	2.00	67.00	0.00	0.98
	Roy's Largest Root	60.30	2020.20b	2.00	67.00	0.00	0.98
Group	Pillai's Trace	0.78	116.36b	2.00	67.00	0.00	0.78
	Wilks' Lambda	0.22	116.36b	2.00	67.00	0.00	0.78
	Hotelling's Trace	3.47	116.36b	2.00	67.00	0.00	0.78
	Roy's Largest Root	3.47	116.36b	2.00	67.00	0.00	0.78

Several conclusions were drawn based on the results from the analyses in Tables 6 and 7. First, the MANOVA findings revealed that the F coefficient was 2020,197[b] with a sig. value of 0.00, as shown by Pillae Trace, Wilks' Lambda Hotelling's Trace, and Roy's Largest Root. It suggests that there were simultaneous differences in learner autonomy and creative thinking skills across groups of students taught using blended learning with self-assessment and students taught online using Zoom sessions. Second, the F value of 162,733 with Sig. 0.00, which was less than 0.05, was found in the Tests of Between-Subjects Effects analysis. It demonstrates that blended learning with self-assessment had an impact on Learner Autonomy. Third, the results of the Tests of Between-Subjects Effects analysis showed an F value of 236.156 with sig. value of 0.000 which was less than 0.05. It means that there was an effect of blended learning with self-assessment on the ability to think creatively.

Table 7. Analysis results of tests of between-subjects effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	Learning autonomy	12206.765a	1	12206.765	162.733	0,000	0,705
	Creative Thinking Skills	13917.589b	1	13917.589	236.156	0,000	0,776
Intercept	Learning autonomy	296623.908	1	296623.908	3954.415	0,000	0,983
	Creative Thinking Skills	125045.589	1	125045.589	2121.798	0,000	0,969
Group	Learning autonomy	12206.765	1	12206.765	162.733	0,000	0,705
	Creative Thinking Skills	13917.589	1	13917.589	236.156	0,000	0,776
Error	Learning autonomy	5100.735	68	75.011			
	Creative Thinking Skills	4007.497	68	58.934			
Total	Learning autonomy	317625.000	70				
	Creative Thinking Skills	145470.000	70				
Corrected Total	Learning autonomy	17307.500	69				
	Creative Thinking Skills	17925.086	69				

3.2 Discussion

According to the findings, blended learning with assessment materials had an impact on learner autonomy and creative thinking skills. It was inextricably linked to the manner in which the learning process was carried out. Blended learning with self-assessment taught students how to study effectively. In addition, the self-assessment-assisted blended learning process had the following advantages: 1) Student-centered. Students' learning experiences would be enhanced through learning that gave many opportunities for them to participate actively in their learning. Students who engaged in active learning make learning more meaningful, and meaningful learning had an impact on the development of knowledge, experience, and the formation of social emotions in students, all of which could be used in their everyday lives [66], [67]; 2) Blended learning with self-assessment would allow students to obtain information from a variety of sources during the learning process. Learning would be more flexible if there was a learning environment where students were allowed to explore information. Flexible learning would provide a more pleasant learning environment, which would, in turn, have a favorable impact on the learning process. Students will be more engaged and driven in the learning process if they are more at ease [68]; 3) Students would acquire values or an honest, responsible, and confident attitude as a result of the blended learning process, which was assisted by self-assessment. These attitudes were established by providing opportunity for students to analyze themselves, and teachers' trust would encourage good values. 4) Blended learning gave students the chance to hone their Higher Order Thinking Skills (HOTS). Students were given the chance to learn more generally connected to the material provided, and were given the widest possible opportunity to discover answers to the challenges presented, allowing them to think more flexibly and interdisciplinary. Students would, of course, learn higher-order thinking skills as a result of this advantage. With the advantages of the blended learning process assisted with self-assessment, it would give an impact on the expected results.

First, there were differences in learner autonomy and the capacity to think creatively at the same time, according to the findings of this study. Self-assessment-based blended learning allowed students to actively participate in learning by collecting and digging information that was relevant to the activities or materials that they had to accomplish. Because the teacher's role in the learning process was minimized in the blended learning process, students had a more independent learning environment. Following the distribution of tasks to students via e-learning and Google Zoom, students were allowed to utilize technology to gather information and knowledge that might be used to accomplish the work. The description provides an illustration that blended learning was more flexible, students could choose and determine the place of learning that suited their needs [69], [70], students were the center of learning and learning was interactive and of course could be accessed anytime, anywhere and by anyone [71]. Blended learning provides an opportunity to discuss concepts and exchange experiences face-to-face and online [46]. Students can visualize, listen to, feel, and interact with teachers and learning materials through blended learning [48]. As a result, students who participated in blended learning actively learned on their own. In addition to blended learning, the presence of self-assessment would increasingly enable students to develop an independent attitude in the learning process. It is because self-assessment would allow students to directly know how much ability they possess and can enable students to design the most appropriate learning process. Students would learn to be more responsible for what they had and did as a result of self-assessment. Self-assessment would have a favorable influence on the learning process, as students would gain confidence and be better able to encourage themselves. Students could use self-assessment to get an overview of their learning strengths and limitations [62]. The self-assessment method does not require students to have direct contact with teachers [63]. As a result, self-assessment will have a good effect on students' autonomy in the learning process. It is evident in students who have learning freedom if they have a strong desire to study, overcome issues, and fulfill their academic commitments. The more motivation to learn and be accountable for their actions, the better the students would be able to solve the problems/tasks assigned to them. Students would have more creative ideas when it comes to finishing the work. Students would be able to make drawing designs that were distinct from the previous ones as a result of the self-assessment assisted blended learning approach, which would undoubtedly promote creative thinking skills. The higher the learner autonomy, the students would have a positive impact on the thinking abilities of students.

The second result is that blended learning based on self-assessment had an influence on Learner Autonomy. Blended learning based on self-assessment will promote students' ability to study independently. Learner autonomy is defined as the capacity to effectively manage one's own learning [27], [28]. Learner autonomy in general is a belief in the ability to achieve learning goals that involve students independently [29], [30], to make a decision, choose the methods and techniques used to monitor the acquisition procedure, and evaluate what has been obtained [31]. Learner autonomy of students can be developed by starting with managing planning, organizing, and evaluating learning [31]. Learner autonomy is obtained from active and effective learning experiences in the learning process [32], [33]. The increased learner autonomy will increase

the cognitive flexibility of students [34]. Learner autonomy necessitates teachers' ability to generate active learning, as Learner autonomy may be achieved through controlling the planning, implementation, and evaluation of learning that is more focused on the development of students' 21st century skills [31]. Therefore, learner autonomy necessitates learner-centered learning and gives students with opportunities. Blended learning with self-assessment is one method that may be implemented; this learning allows students to study more autonomously and with greater flexibility. Blended learning with self-assessment will make students accountable for their actions; also, blended learning will increase students' confidence. It is due to the fact that in this type of learning, students are given the opportunity to have teachers evaluate their work. It will undoubtedly have a significant effect on kids. Students will feel valued in the learning process, which will affect their emotional growth as they form relationships with teachers and learning resources. This situation is unquestionably beneficial.

The third finding is that blended learning with self-assessment had an effect on creative thinking skills. The capacity to create clothes was found to be a creative thinking ability of students who progressed well in this research. Because students were given the chance to discover and explore their own information, student's creative thinking capacity was flourishing. Students were reading or viewing content online in order to explore and uncover ideas that suited them. It is in line with the concept blended learning, which allows students to access as much content as they want without any restrictions on learning materials. Students may visualize, listen to, feel, and engage with teachers and learning resources through blended learning [48]. Blended learning also allows students to have additional options for learning techniques, such as using diverse media and having more flexible schedules. Furthermore, the presence of self-assessment will have a greater beneficial impact. Furthermore, self-assessment allows students to identify learning steps that are appropriate for their circumstances. Self-assessment will have a positive effect on the learning process, as students will gain confidence and be better able to encourage themselves. Students can use self-assessment to obtain an overview of their learning strengths and limitations [62]. The self-assessment method does not require students to have direct contact with teachers [63]. Students could learn more effectively and have stronger problem-solving skills when the teacher employed a combination of blended learning and self-assessment to create a clothing.

Blended learning with self-assessment will also have an effect on students' capacity to think critically. The capacity to think creatively is one skill that may be improved. Learning that encourages students to participate more actively in the learning process is learning that can increase creative thinking skills. Students can develop their creativity, particularly their creative thinking skills, through engaging and varied activities. Creative thinking is a mental activity that can result in a variety of outcomes [8], [9]. Creative thinking can also be seen as the process that a person uses to create and generate new ideas [10], [11]. Creative thinking includes many higher-order thinking skills such as analysis, testing, communication problem solving, and scientific process skills [12]–[14]. Creative thinking includes flexibility, fluency [15], [16], novelty, and [17], [18]. Thinking skills consist of divergent and convergent thinking skills [19], [20]. Many ideas and viewpoints may be developed through creative thinking skills, as well as the ability to ask questions, recognize the reality of others' opinions, and teach stu-

dents to be open and kind [14], [21]. These descriptions show that blended learning based on self-assessment had a positive effect on the learning process, namely learner autonomy and the capacity to think creatively. Learning will become more flexible and enjoyable as a result of the availability of this learning, allowing students to enjoy the learning process. Learning objectives will also become a reality with the growth of learner autonomy and the ability to think creatively in students. In this scenario, vocational education is one of the educational paths that students can take to prepare for careers by mastering skills that are relevant to the workplace [2]. Vocational education can help develop optimal, quality, and competitive human resources so that [3] the existence of vocational education is closely related to the social development of the workforce and producing quality workers [4]. Vocational learning must be able to encourage students to be creative and innovative, think critically to solve problems, and have the ability to communicate and collaborate [5]. Thus, because vocational education is one of the educations that produces human resources who are ready to work, it must be able to develop human resources who are able to compete in the period of the industrial revolution 4.0 and possess 21st century skills.

4 Conclusion

Blended learning based on self-assessment had an effect on learner autonomy and creative thinking skills in design and fashion shows courses. This condition was indicated by an increase in the mean value of each variable before and after treatment. The results also show that blended learning with self-assessment had more effect on the ability to think creatively, in this case the ability of students to design clothes. Blended learning with self-assessment taught students to learn well independently, was student-centered, provided the widest opportunity to seek information in the learning process, made students develop values or attitudes of being honest, responsible and confident, and blended learning provided opportunities for students to develop HOTS. Therefore, it can be recommended as one of the learning innovations used to improve learner autonomy and creative thinking skills to students.

5 References

[1] P. Sudira and R. E. Juwanto, "Design training kits CPI for vocational learning in industry 4.0," Int. J. Recent Technol. Eng., vol. 8, no. 3, pp. 6293–6302, 2019. https://doi.org/10.35940/ijrte.C5917.098319

[2] M. N. Fitriyanto and P. Pardjono, "Factors affecting the employability skills of vocational students majoring mechanical engineering," J. Pendidik. Vokasi, vol. 9, no. 2, pp. 132–140, 2019. https://doi.org/10.21831/jpv.v9i2.24420

[3] A. I. Gunawan, Rafiati Kania, and Widi Senalasari, "Analisis Peluang Bisnis Start-Up Konsultan UMKM dari Akademisi dan Institusi Pendidikan Vokasi," Bhakti Persada, vol. 7, no. 1, pp. 11–16, 2021. https://doi.org/10.31940/bp.v7i1.2328

[4] M. A. Hamid, D. Aribowo, and D. Desmira, "Development of learning modules of basic electronics-based problem solving in Vocational Secondary School," J. Pendidik. Vokasi, vol. 7, no. 2, p. 149, 2017. https://doi.org/10.21831/jpv.v7i2.12986

[5] R. M. Hidayati and W. Wagiran, "Implementation of problem-based learning to improve problem-solving skills in vocational high school," J. Pendidik. Vokasi, vol. 10, no. 2, pp. 177–187, 2020. https://doi.org/10.21831/jpv.v10i2.31210
[6] I. W. Redhana, "Mengembangkan Keterampilan Abad Ke-21 Dalam Pembelajaran Kimia," J. Inov. Pendidik. Kim., vol. 13, no. 1, 2019.
[7] R. Sharif, "The Relations Between Acculturation and Creativity and Innovation in Higher Education: A Systematic Literature Review," Educ. Res. Rev., vol. 28, p. 100287, 2019. https://doi.org/10.1016/j.edurev.2019.100287
[8] Y. Febrianti, Y. Djahir, and S. Fatimah, "Analisis Kemampuan Berpikir Kreatif Peserta Didik dengan Memanfaatkan Lingkungan pada Mata Pelajaran Ekonomi di SMA Negeri 6 Palembang," J. Profit, vol. 3, no. 1, pp. 121–127, 2016.
[9] D. K. S. Sekar, K. Pudjawan, and I. G. Margunayasa, "PEMBELAJARAN IPA PADA SISWA KELAS IV Universitas Pendidikan Ganesha," e-Journal PGSD Univ. Pendidik. Ganesha Jur. PGSD, vol. 3, no. 1, pp. 1–11, 2015.
[10] N. I. Cintia, F. Kristin, and I. Anugraheni, "Penerapan Model Pembelajaran Discovery Learning Untuk Meningkatkan Kemampuan Berpikir Kreatif Dan Hasil Belajar Siswa," Perspekt. Ilmu Pendidik., vol. 32, no. 1, pp. 67–75, 2018. https://doi.org/10.21009/PIP.321.8
[11] M. Tendrita, S. Mahanal, and S. Zubaidah, "Pemberdayaan Keterampilan Berpikir Kreatif melalui Model Remap Think Pair Share," Proceeding Biol. Educ. Conf. (ISSN 2528-5742), vol. 13, no. 1, pp. 285–291, 2016.
[12] C. Yildiz and T. Guler Yildiz, "Exploring the Relationship between Creative Thinking and Scientific Process Skills of Preschool Children," Think. Ski. Creat., vol. 39, no. January, p. 100795, 2021. https://doi.org/10.1016/j.tsc.2021.100795
[13] M. Zhang, M. Guo, and B. Xiao, "Creative thinking and musical collaboration: Promoting online learning groups for aspiring musicians," Think. Ski. Creat., vol. 42, p. 100947, 2021. https://doi.org/10.1016/j.tsc.2021.100947
[14] J. L. Redifer, C. L. Bae, and Q. Zhao, "Self-efficacy and performance feedback : Impacts on cognitive load during creative thinking," Learn. Instr., vol. 71, no. february 2021, p. 101395, 2021. https://doi.org/10.1016/j.learninstruc.2020.101395
[15] H. Kassim, H. Nicholas, and W. Ng, "Using a multimedia learning tool to improve creative performance," Think. Ski. Creat., vol. 13, pp. 9–19, 2014. https://doi.org/10.1016/j.tsc.2014.02.004
[16] N. Huang, Y. Chang, and C. Chou, "Effects of creative thinking , psychomotor skills , and creative self- e ffi cacy on engineering design creativity," Think. Ski. Creat., vol. 37, no. July, p. 100695, 2020. https://doi.org/10.1016/j.tsc.2020.100695
[17] J. H. Hardy, A. M. Ness, and J. Mecca, "Outside the box: Epistemic curiosity as a predictor of creative problem solving and creative performance," Pers. Individ. Dif., vol. 104, pp. 230–237, 2017. https://doi.org/10.1016/j.paid.2016.08.004
[18] T. Montag-Smit and C. P. Maertz, "Searching outside the box in creative problem solving: The role of creative thinking skills and domain knowledge," J. Bus. Res., vol. 81, no. July, pp. 1–10, 2017. https://doi.org/10.1016/j.jbusres.2017.07.021
[19] X. Gu, A. Dijksterhuis, and S. M. Ritter, "Fostering children's creative thinking skills with the 5-I training program," Think. Ski. Creat., vol. 32, no. March, pp. 92–101, 2019. https://doi.org/10.1016/j.tsc.2019.05.002
[20] K. Zhuang et al., "Connectome-based Evidence for Creative Thinking as an Emergent Property of Ordinary Cognitive Operations," Neuroimage, vol. 227, no. December, pp. 1–15, 2021. https://doi.org/10.1016/j.neuroimage.2020.117632

[21] U. Akpur, "Critical , Re fl ective , Creative Thinking and Their Reflections on Academic Achievement," Think. Ski. Creat., vol. 37, no. August, 2020. https://doi.org/10.1016/j.tsc.2020.100683
[22] A. Fatmawati, S. Zubaidah, S. Mahanal, and Sutopo, "Critical Thinking, Creative Thinking, and Learning Achievement: How They are Related," J. Phys. Conf. Ser., vol. 1417, no. 1, 2019. https://doi.org/10.1088/1742-6596/1417/1/012070
[23] M. K. Y. Hidayatulloh, S. Muslim, E. Rahmadyanti, E. Ismayati, and N. Kusumawati, "Level of Creative Thinking Effect through Multiple Solution Task Type Problem-Solving On Learning Outcomes," J. Educ. Teaching, Learn. Vol., vol. 5, no. 1, pp. 177–184, 2020. https://doi.org/10.26737/jetl.v5i1.1821
[24] R. Resien, H. Sitompul, and J. Situmorang, "The Effect of Blended Learning Strategy and Creative Thinking of Students on the Results of Learning Information and Communication Technology by Controlling Initial Knowledge," Budapest Int. Res. Critics Linguist. Educ. J., vol. 3, no. 2, pp. 879–893, 2020. https://doi.org/10.33258/birle.v3i2.997
[25] N. Setyorini and S. Rizqiana, "KEEFEKTIFAN MEDIA ARTIKEL DALAM PEMBELAJARAN MENULIS NASKAH PIDATO," vol. 2, no. 2, pp. 137–144, 2017.
[26] A. Murjani and A. Hamid, "Meningkatkan Kemampuan Berpikir Kreatif Dan Hasil Belajar Siswa Melalui Model Pembelajaran Generatif Pada Materi Larutan Penyangga," J. Inov. Pendidik. Sains, vol. 7, no. 2, pp. 103–108, 2016.
[27] A. Lazăr, "Learner Autonomy and its Implementation for Language Teacher Training," Procedia - Soc. Behav. Sci., vol. 76, pp. 460–464, 2013. https://doi.org/10.1016/j.sbspro.2013.04.146
[28] R. H. Haddad, "Developing Learner Autonomy in Vocabulary Learning in Classroom: How and Why can it be Fostered?," Procedia - Soc. Behav. Sci., vol. 232, no. April, pp. 784–791, 2016. https://doi.org/10.1016/j.sbspro.2016.10.106
[29] D. C. Henri, L. J. Morrell, and G. W. Scott, "Student Perceptions of Their Autonomy at University," High. Educ., vol. 75, no. 3, pp. 507–516, 2018. https://doi.org/10.1007/s10734-017-0152-y
[30] S. Van Nguyen and A. Habók, "Designing and validating the learner autonomy perception questionnaire," Heliyon, vol. 7, no. 4, 2021. https://doi.org/10.1016/j.heliyon.2021.e06831
[31] W. T. Tseng, H. J. Liou, and H. C. Chu, "Vocabulary learning in virtual environments: Learner autonomy and collaboration," System, vol. 88, p. 102190, 2020. https://doi.org/10.1016/j.system.2019.102190
[32] Ş. Orakci and Y. Gelisli, "Learner Autonomy Scale: A Scale Development Study," Malaysian Online J. Educ. Sci., vol. 5, no. 1, pp. 25–36, 2017.
[33] S. Orakci and Y. Gelisli, "The Effect of the Application of Learning Activities Based on Learner Autonomy on the 6th Grade Students' English Achievements, Attitudes, and Learner Autonomy.," Int. J. Curric. Instr., vol. 11, no. 1, pp. 269–292, 2019.
[34] Ş. Orakcı, "Exploring the relationships between cognitive flexibility, learner autonomy, and reflective thinking," Think. Ski. Creat., vol. 41, no. April, 2021. https://doi.org/10.1016/j.tsc.2021.100838
[35] S. Blidi, Collaborative Learner Autonomy. Singapore: Springer, 2017. https://doi.org/10.1007/978-981-10-2048-3
[36] S. Malisa, I. Bakti, and R. Iriani, "Model Pembelajaran Creative Problem Solving (Cps) Untuk Meningkatkan Hasil Belajar Dan Kemampuan Berpikir Kreatif SiswaBakti, Iriani Iriani, Rilia," Vidya Karya, vol. 33, no. 1, p. 1, 2018. https://doi.org/10.20527/jvk.v33i1.5388
[37] G. Atikasari and A. W. Kurniasih, "Keefektifan Model Pembelajaran Kooperatif Dengan Strategi Ttw Berbantuan Geogebra Terhadap Kemampuan Berpikir Kreatif Matematis

Siswa Kelas Vii Materi Segitiga," Unnes J. Math. Educ., vol. 4, no. 1, 2015. https://doi.org/10.15294/ujme.v4i1.7447

[38] A. Wahyuni and P. Kurniawan, "Hubungan Kemampuan Berpikir Kreatif Terhadap Hasil Belajar Mahasiswa," Matematika, vol. 17, no. 2, pp. 1–8, 2018. https://doi.org/10.29313/jmtm.v17i2.4114

[39] G. Amirullah, A. Marlina, A. Yuliyani Pramita, R. Suciati, and Y. Astuti, "Pengaruh Strategi Pembelajaran Active Knowledge Sharing terhadap Kemampuan Berpikir Kreatif Siswa Kelas X," BIOEDUSCIENCE J. Pendidik. Biol. dan Sains, vol. 3, no. 2, pp. 66–73, 2019. https://doi.org/10.29405/j.bes/3266-733636

[40] Y. Budiarti, "Pengaruh Metode Pembelajaran Creative Problem Solving (CPS) Terhadap Kemampuan Berpikir Kreatif Mahasiswa (Studi Eksperimen Pada Mahasiswa Pendidikan Ekonomi FKIP UM Metro)," PROMOSI (Jurnal Pendidik. Ekon., vol. 4, no. 2, pp. 50–60, 2016. https://doi.org/10.24127/ja.v4i2.638

[41] M. Samaha and N. S. Hawi, "Computers in Human Behavior Relationships among smartphone addiction , stress , academic performance , and satisfaction with life," Comput. Human Behav., vol. 57, pp. 321–325, 2016. https://doi.org/10.1016/j.chb.2015.12.045

[42] Q. Liu, J. Huang, and Z. Zhou, "Self-expansion via smartphone and smartphone addiction tendency among adolescents: A moderated mediation model," Child. Youth Serv. Rev., vol. 119, no. June, p. 105590, 2020. https://doi.org/10.1016/j.childyouth.2020.105590

[43] M. Rahmawati and M. Latifah, "Penggunaan Gawai, Interaksi Ibu-Anak, Dan Perkembangan Sosial-Emosional Anak Prasekolah," Jur. Ilm. Kel. Kons., vol. 13, no. 1, pp. 75–86, 2020. https://doi.org/10.24156/jikk.2020.13.1.75

[44] B. Garcia-Ortega and J. Galan-Cubillo, "Comparing Student'S Perspectives of Blending Learning in the Context of a Postgraduate Master Vs Face-To-Face Learning. Strategies for Enhancing the Experience," INTED2021 Proc., vol. 12, no. 2, pp. 1–15, 2021. https://doi.org/10.21125/inted.2021.2218

[45] A. L. P. de C. Cordeiro, F. T. M. M. Braga, L. R. F. da Mata, K. D. S. Mendes, R. C. Fófano, and M. C. B. Dalri, "Blended learning program for the development of skills in the aspiration of artificial airways," Rev. Lat. Am. Enfermagem, vol. 29, p. e3462, 2021. https://doi.org/10.1590/1518-8345.4539.3462

[46] F. G. Boni, L. D. B. Da Silva, J. I. Grigolo, S. K. Boaz, A. L. P. Cogo, and I. C. Echer, "Blended learning in permanent education of nursing professionals on smoking cessation," Rev. Gauch. Enferm., vol. 42, no. spe, p. e20200183, 2021. https://doi.org/10.1590/1983-1447.2021.20200183

[47] R. H. Rafiola, P. Setyosari, C. L. Radjah, and M. Ramli, "The effect of learning motivation, self-efficacy, and blended learning on students' achievement in the industrial revolution 4.0," Int. J. Emerg. Technol. Learn., vol. 15, no. 8, pp. 71–82, 2020. https://doi.org/10.3991/ijet.v15i08.12525

[48] S. Hayati, Y. Armansah, and S. F. A. B. Ismail, "Teachers Experiences on Blended Learning: a Case Study of a Group of Secondary School Teachers in Malaysia and Indonesia," vol. 7, no. 3, pp. 511–519, 2021. https://doi.org/10.33394/jk.v7i4.4102

[49] W. Banyen, C. Viriyavejakul, and T. Ratanaolarn, "A blended learning model for learning achievement enhancement of thai undergraduate students," Int. J. Emerg. Technol. Learn., vol. 11, no. 4, pp. 48–55, 2016. https://doi.org/10.3991/ijet.v11i04.5325

[50] M. M. Hamad, "Blended Learning Outcome vs. Traditional Learning Outcome," Researchgate.Net, vol. 3, no. 4, pp. 75–78, 2015.

[51] Y. Liu, "Blended Learning of Management Courses Based on Learning Behaviour Analysis," Int. J. Emerg. Technol. Learn., vol. 16, no. 9, pp. 150–165, 2021. https://doi.org/10.3991/ijet.v16i09.22741

[52] G. Lam Wai Ling, "Blended Learning Strategies for Advertising Design Studies," Cubic J., no. 4, pp. 44–53, 2021. https://doi.org/10.31182/cubic.2021.4.037
[53] P. Ranjan, "Is blended learning better than online learning for b.Ed students?," J. Learn. Dev., vol. 7, no. 3, pp. 349–366, 2020.
[54] N. Kuzmina, D. Kochkina, and M. Kuzmin, "Blended Learning as a Means of Foreign Students' Integration into a University Educational Process," Int. J. Emerg. Technol. Learn., vol. 16, no. 6, pp. 259–274, 2021. https://doi.org/10.31182/cubic.2021.4.037
[55] E. D. Pitaloka and S. Suyanto, "The Effectiveness of Blended Learning Implementation in Ecological Chapters Judging from the Understanding of Students' Concepts," J. Biol. Educ., vol. 8, no. 2, pp. 156–162, 2019. https://doi.org/10.15294/jbe.v8i2.31584
[56] M. A. Bakhtiyar, "Promoting Blended Learning in Vocabulary Teaching Through," Nidhomul Haq, vol. 2, no. 2, pp. 106–112, 2017. https://doi.org/10.31538/ndh.v2i2.146
[57] N. Siregar and S. L. Manurung, "Pengaruh Blended Learning terhadap Kreativitas Mahasiswa Calon Guru di Universitas Negeri Medan," Edumatika J. Ris. Pendidik. Mat., vol. 3, no. 1, p. 44, 2020. https://doi.org/10.32939/ejrpm.v3i1.485
[58] K. Nijakowski, A. Lehmann, J. Zdrojewski, M. Nowak, and A. Surdacka, "The effectiveness of the blended learning in conservative dentistry with endodontics on the basis of the survey among 4th-year students during the covid-19 pandemic," Int. J. Environ. Res. Public Health, vol. 18, no. 9, 2021. https://doi.org/10.3390/ijerph18094555
[59] R. Arifin, I. H. Kusumah, and I. Mubarak, "Hasil Penilaian Diri Dan Penilaian Teman Sebaya Dibandingkan Dengan Assessment Dosen Untuk Hasil Produk Mata Kuliah Body Otomotif," J. Mech. Eng. Educ., vol. 5, no. 1, p. 78, 2018. https://doi.org/10.17509/jmee.v5i1.12623
[60] M. Schmid, E. Brianza, and D. Petko, "Developing a short assessment instrument for Technological Pedagogical Content Knowledge (TPACK.xs) and comparing the factor structure of an integrative and a transformative model," Comput. Educ., vol. 157, p. 103967, 2020. https://doi.org/10.1016/j.compedu.2020.103967
[61] T. Valtonen, E. Sointu, J. Kukkonen, S. Kontkanen, M. C. Lambert, and K. Mäkitalo-Siegl, "TPACK updated to measure pre-service teachers' twenty-first century skills," Australas. J. Educ. Technol., vol. 33, no. 3, pp. 15–31, 2017. https://doi.org/10.14742/ajet.3518
[62] S. B. Rahimah, M. Kusmiati, and E. Widyastuti, "Hubungan Self Assessment-Peer Assessmentdengan Nilai Kelulusan OSCE Mahasiswa Fakultas Kedokteran Unisba," Glob. Med. Heal. Commun., vol. 5, no. 1, p. 19, 2017. https://doi.org/10.29313/gmhc.v5i1.1856
[63] L. A. Worobey et al., "Concurrent Validity and Reliability of the Transfer Assessment Instrument Questionnaire as a Self-Assessment Measure," Arch. Rehabil. Res. Clin. Transl., no. 90, p. 100088, 2020. https://doi.org/10.1016/j.arrct.2020.100088
[64] I. G. W. S. Antara, I. K. Sudarma, and I. K. Dibia, "The Assessment Instrument of Mathematics Learning Outcomes Based on HOTS Toward Two-Dimensional Geometry Topic," Indones. J. Educ. Res. Rev., vol. 3, no. 2, pp. 19–24, 2020. https://doi.org/10.23887/ijerr.v3i2.25869
[65] I. W. Widiana, "Pengembangan Asesmen Proyek dalam Pembelajaran IPA di Sekolah Dasar," JPI (Jurnal Pendidik. Indones., vol. 5, no. 2, pp. 147–157, 2016. https://doi.org/10.23887/jpi-undiksha.v5i2.8154
[66] E. Kostiainen, T. Ukskoski, M. Ruohotie-Lyhty, M. Kauppinen, J. Kainulainen, and T. Mäkinen, "Meaningful learning in teacher education," Teach. Teach. Educ., vol. 71, pp. 66–77, 2018. https://doi.org/10.1016/j.tate.2017.12.009
[67] D. T. Bressington, W. kit Wong, K. K. C. Lam, and W. T. Chien, "Concept mapping to promote meaningful learning, help relate theory to practice and improve learning self-efficacy in Asian mental health nursing students: A mixed-methods pilot study," Nurse Educ.

Today, vol. 60, no. February 2017, pp. 47–55, 2018. https://doi.org/10.1016/j.nedt.2017.09.019

[68] N. W. Rati and N. N. Rediani, "E-learning Assissted by Finger Printing on Students' Critical Thinking and Creativity," J. Educ. Technol., vol. 4, no. 4, p. 433, 2020. https://doi.org/10.23887/jet.v4i4.30214

[69] I. M. Satyawan, W. Wahjoedi, and I. K. I. Swadesi, "The Effectiveness of Online Learning Through Undiksha E-Learning During the Covid-19 Pandemic," J. Educ. Technol., vol. 5, no. 2, p. 191, 2021. https://doi.org/10.23887/jet.v5i2.32364

[70] A. Tryanto, M. Sukardjo, and E. Siregar, "Blended Learning in Integrated Science Learning by a WISE Approach in Homeschooling," J. Educ. Technol., vol. 5, no. 4, p. 619, 2021. https://doi.org/10.23887/jet.v5i4.38365

[71] E. P. Sari, Sukardi, E. Tasrif, and Ambiyar, "Optimalisasi Penggunaan E-learning dengan Model Delone dan McClean," J. Educ. Technol., vol. 4, no. 2, p. 141, 2020. https://doi.org/10.23887/jet.v4i2.24819

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Article submitted 2022-01-27. Resubmitted 2022-03-01. Final acceptance 2022-03-01. Final version published as submitted by the authors.