

## THE EFFECTIVENESS OF BLENDED LEARNING IN DEVELOPING CREATIVE THINKING FOR PROFESSIONAL MASTER'S STUDENTS

<sup>1</sup>Marwa Yasien Helmy Elbyaly and <sup>2</sup>Abdellah Ibrahim Mohammed Elfeky

<sup>1</sup>Centre for Sharia, Educational and Humanities Research, Najran University, Najran, Saudi Arabia

<sup>2</sup>Department of Curriculum and Instruction, College of Education, Najran University, Najran, Saudi Arabia

<sup>1</sup>Marwa.mohamed1@spe.kfs.edu.eg and <sup>2</sup>abdalah.elfeqi@spe.kfs.edu.eg

### ABSTRACT

*The current research aims to explore the effectiveness of blended learning in developing creative thinking for students of the Master of Vocational Education Technologies. The research sample consisted of two groups, an experimental group that studied the interactive multimedia course using the blended learning method, and a control group that studied the course using the traditional method. Each group consisted of 31 students. The creative thinking test was used as a tool to achieve the objective of the research. The research concluded that the students of the experimental group (blended learning) excelled over the students of the control group (learning in the traditional way) in creative thinking (total score), as well as in the axis of fluency, axis of flexibility, and axis of originality.*

*Keywords: blended learning; face-to-face learning; e-learning; interactive multimedia; creative thinking*

### INTRODUCTION

The issue of developing education has become a national demand to catch up with progress in an era marked by the explosion of knowledge and tremendous technical development. In addition, if we add to this tremendous development the inability of the university education system to meet the needs of the large numbers of students due to the rigidity of the prevailing educational practices related to the methods, means and strategies of education (Ahmed, Alharbi, & Elfeky, 2022). This prompted human sciences researchers to search for the best ways and means to confront this development and these obstacles. This led to the emergence of new educational methods such as E-Learning, which helped overcome the barrier of space and time in learning, and provide effective learning based on multimedia elements (texts, images, static and animation, sound and sound effects) (Zambrano & Luise, 2023). E-learning enables the provision of information to the learner through all electronic media, including the Internet and satellites, with the aim of providing the learner with knowledge and the ability to use it (A. I. M. Elfeky & Elbyaly, 2019; Nurninawati, Supriati, & Maulana, 2023).

Although the e-learning environment has addressed many of the disadvantages of traditional learning environments, including the limitations of space and time, there are advantages to learning in the traditional way that e-learning could not achieve (Buhl-Wiggers, Kjærgaard, & Munk,

2023). Where e-learning hinders the process of social interaction, weakens the attractiveness of traditional learning environments and the motivation that stems from communication and competition with others, the loss of the teacher's direct support and support, and the reduction of his role and creativity (Masada, 2017; Truss & Anderson, 2023). This is because the teacher and the learners do not know each other, not to mention that e-learning focuses more on the cognitive side than on the skill side (M. Y. H. Elbyaly & Elfeky, 2022b). The e-learning environment constitutes some of the damage that leads to restrictions in the communication process, while the traditional learning environment constitutes restrictions on space and time (Elbyaly & Elfeky, 2023a, 2023b; Yang & Kuo, 2023). These types of damages caused the search for a new educational environment that integrates the benefits of e-learning and classical (traditional) learning environments. This new environment introduced concepts such as Blended Learning.

Blended Learning can be defined as the method that combines the best characteristics of e-learning and face-to-face learning to design educational courses (Elfeky & Elbyaly, 2023; Janes, Ekpenyong, Mbeah-Bankas, & Serrant, 2023). It thus builds a more effective learning experience for learners. The term integration of learning should not only refer to the mixture of training in learning methods (as it is often known) but to the systematic application and integration of learning, tools, performance support, collaboration, practice, and assessment to create a unified learning and performance environment, to find the right mix of learning components (Elfeky & Elbyaly, 2021; Luka, 2023). Among the reasons for using blended learning is that it includes an improved pedagogical method, easy access to knowledge, more interaction between learners, personal presence, and ease of revising the learning content. There are many studies that have examined blended learning, including a study conducted by Buhl-Wiggers et al. (2023). In addition, AlManafi, Osman, Magableh, and Alghatani (2023) results showed that blended learning gave students a strong sense of group spirit more than the traditional method and fully e-learning. In addition, a study by Yudt, Sawyer, and Shera (2023) to survey students' opinion about the blended learning environment, and one of the most important results was to increase students' achievement, participation and enjoyment in the blended learning environment. In practice, blended learning is a fluid phrase that means different things to different people. It uses two or more distinct methods of training, which may include integrating classroom learning with online learning, integrating online learning with access to a trainer or faculty member, integrating simulations with structured lessons, and integrating management training with e-learning activities (Alanzi & Alhalafawy, 2022; Alshammary & Alhalafawy, 2023; A. I. M. Elfeky, Alharbi, & Ahmed, 2022; Luka, 2023).

Blended learning is an important strategy that provides students with both flexibility and convenience by combining traditional face-to-face learning with online learning (Alzahrani, Alshammary, & Alhalafawy, 2022; F. K. Alzahrani & Alhalafawy, 2023; Yudt et al., 2023). That is, education takes place both in the classroom and on the Internet, whereby the online component becomes a natural extension of traditional classroom learning (Almalki & Elfeky, 2022). Hence, blended learning is a flexible method for designing a course that supports the integration of the

different place and time of learning, and offers some of the amenities of the entire online course without the complete loss of face-to-face communication (BURSA, 2023). The result is a more powerful educational experience than traditional learning or fully online learning can offer. The study of Yudit et al. (2023) confirmed that students who studied blended learning indicated their general satisfaction with the course and their strong feeling that they will use it in their learning. They indicated their desire to study another course using this method. On the other hand, the students of the blended learning group felt that they gained a strong understanding of the course concepts. They also indicated that their analytical skills improved because of this course, compared to students in the traditional group.

Creative is a process that begins with sensing problems and deficiencies, gaps in knowledge, missing elements and inconsistent things, identifying difficulties and searching for solutions, making guesses and formulating hypotheses about difficulties, testing these hypotheses, modifying them, then re-testing them and reaching the final results (von Thienen, Kolodny, & Meinel, 2023). Creative Thinking is a special category of problem-solving behavior that requires novelty in production and unity of process, which is the highest form of creative thinking (Durnali, Orakci, & Khalili, 2023; M. Y. H. Elbyaly & Elfeky, 2022a). Many studies dealt with creative thinking, including the study of von Thienen et al. (2023). One of the most important results of the study was that students with (medium and low) levels of creative thinking benefited from the high-tech media environment more than students with high levels, and this was reflected in the increasing degrees of innovation. Researchers deal with the definition of innovation usually from four angles, the characteristics of the creative person, the characteristics of the creative process, the specifications of the creative product, and then a description of the educational environment that helps innovation (Alharbi, Elfeky, & Ahmed, 2022; Orakci & Durnali, 2023). As for the creative person, the authors are almost unanimous that he loves researching the mysterious and the unknown, even if he traces a glimmer of hope, challenges the difficult and complex without boredom or boredom, and loves adventure without fear of the obstacles he may encounter (Sargent, LePage, Kenett, & Matheson, 2023). All these characteristics make the creative person characterized by the ability to produce a very large number of ideas or solutions to a specific problem, and his view of the problem has multiple angles, which makes these ideas divergent and comprehensive for all aspects of the situation (Lansing-Stoeffler & Daley, 2023; Masadeh & Elfeky, 2016). Often the creative person comes up with unfamiliar and new solutions or ideas that distinguish him from his peers (Sargent et al., 2023). As for the creative process, a mental process involves a kind of meditation or in-depth thinking about a problem or situation. In addition, it is characterized by divergent thinking in which the person weaves threads of his thinking around the details of the situation and connects them with the largest number of new associations (Adawiyah, Irawan, Zubaidah, & Arsih, 2023). That often lead to unusual ideas or solutions, and the creative mind is open, independent, flexible, curious, and intelligent as well, and is not attached to traditional habits of thinking, but rather tends to break them, and directs him in that unconscious processes that are governed by the pressures of the situation. As for the creative product, it must be recent, rare, uncommon, valuable, beautiful and usable (Elfeky, 2017). As for the innovation

environment, it should be characterized by flexibility that allows students to choose and discover alternative ways to solve problems, provides a high degree of excitement and motivation to encourage students to try without fear of error, and provides them with opportunities to interact with each other and with the teacher. Creative thinking is a refined process represented in the ability of the individual to produce the largest possible number of alternatives, solutions or ideas that are characterized by originality, flexibility, sensitivity to problems, reorganization, a sense of difference, calibration, rebellion against the old, and embracing positive values (Shafa, Zulkardi, & Putri, 2023).

Likewise, creative thinking needs to reconsider the way information is presented to the student, as creative thinking cannot be formed in an educational environment based on memorization, memorization, and indoctrination (Elfeky & Elbyaly, 2017; Kusumawati, Winarno, Ariansyah, & Fitri, 2023). Therefore, the developed educational process in all its dimensions, including laboratories, libraries, teaching aids, information networks, and non-stereotypical learning environments, ultimately aims to create the appropriate conditions for the mind to grow in a way that seeks knowledge (Elfeky & Elbyaly, 2016; Shafa et al., 2023). Hence, it is essential to reconsider the method of providing educational material. The current research studies the effectiveness of blended learning in developing creative thinking for professional master's students.

### **Research Problem**

This research came in light of the emphasis on the importance of preparing professional master's students in the field of educational technology, through the continuous development of courses and programs for its preparation, in line with the functions and roles assigned to it in the light of the scientific and technological boom. Through the researchers teaching the interactive multimedia course for fifth-level students in the master's program in vocational education techniques, and by evaluating the students' production, and by surveying the opinions of students and experts, the researchers noticed the low level of students' creative thinking in the interactive multimedia course. Where they studied this course in the traditional way. In light of the results of previous studies that demonstrated the effectiveness of blended learning in developing different learning outcomes, the researchers saw the need to provide the current course with a blended learning system. This is to take advantage of the capabilities of blended learning in presenting the content of the course in order to develop creative thinking among students, allowing them to have a high ability to produce programs based on interactive multimedia.

### **Research Aims**

The main objective of this study is to explore the effectiveness of blended learning in developing creative thinking for professional master's students.

### **Research Importance**

- Qualifying graduates of the Master of Vocational Education Techniques to fulfill an important part of their job requirements.

- Directing attention towards the application of blended learning in the educational process by providing a practical model for blended learning that can be followed when preparing other similar programs with the aim of developing creative thinking.
- Directing the interests of specialists in the design of programs and courses to the importance of developing creative thinking for learners when designing these programs, in the light of the results that the research will reach.

### Research Limits

The current search experience is limited to:

- Students of the Master of Vocational Education Technologies, in the first semester of 2023.
- Developing creative thinking for master's students in vocational education techniques at the College of Education, Najran University.

### RESEARCH TERMS

#### Blended Learning

It is the combination of e-learning via the Internet and traditional face-to-face learning, in order to avoid the defects of each with the advantages of the other, to come up with a learning environment that combines the best characteristics of e-learning via the Internet and the best characteristics of learning in the traditional way (Elbyaly, 2016; Zambrano & Luise, 2023).

#### Creative Thinking

Creative thinking is the individual's ability to produce a production that is characterized by the greatest possible intellectual fluency, spontaneous flexibility, originality, and far-reaching repercussions, in response to a problem or an exciting situation (Adawiyah et al., 2023; Elbyaly & El-Fawakhry, 2016).

### METHODOLOGY

The current research was based on the researchers' use of the experimental approach with semi-experimental designs, which required the use of a pre-post design using two equal (control and experimental) groups.

**Table 1.** Research experimental design

	<b>Pre-test</b>	<b>Treatment</b>	<b>Post-test</b>
Control group	Creative thinking test	traditional learning	Creative thinking test
Experimental group		Blended learning	

#### Research Tool (Creative Thinking Test)

The content of the test was challenged after reviewing many female literature and researches that dealt with building creative thinking tests related to specific contents. He also briefed the

researchers on some general global tests for creative thinking, such as the Williams test for creative thinking, as well as the Torrance test for creative thinking, image (a) and image (b). The researchers considered these tests when building the creative thinking test in the content of the interactive multimedia course. The test consisted of eight items, in which it was taken into account when drafting it to be in a verbal form, and to be open-ended, and that each of the test items measures the three creative thinking skills (fluency, flexibility, and originality) to form together the individual's ability to think creatively. To verify the validity of the test, the researchers presented the test to a group of arbitrators, with the aim of obtaining their opinion on the clarity of the test items, and the suitability of the test for the purpose for which it was set. The results of the arbitration confirmed the relevance of the test questions to its objective, as the researchers made the amendments suggested by the arbitrators, which consisted in reformulating some of the test items. The reliability of the creative thinking test was also confirmed by measuring the correlation between the results of the application of the test prepared by the researchers and the results of the application of the "Williams" test for creative thinking through the exploratory experiment. The stability coefficient of the test was (0.91), which is a high stability coefficient, which confirmed the validity of the test for use in the current research. The time taken by each of the students in the survey sample to answer the test was also recorded, then the average time required to answer the test was calculated. Where the total time was (80) minutes distributed over the test items by (10) minutes for each of the items. After the completion of the previous stages, the test became in its final form consisting of (8) items aimed at measuring the creative thinking of the content of the interactive multimedia course.

### Research Sample

The sample of this current study consisted of 62 master's students in vocational education techniques at Najran University, the average age was 27.8 years, and the standard deviation was 4.19. The random method was followed by dividing them into two groups (experimental and control), each group consisted of 31 students. The experimental group studied the "interactive multimedia" course through the blended learning strategy, the control group studied the same course in the traditional way.

### Ensure the Homogeneity of the Two Groups in Creative Thinking

The homogeneity between the two groups (control and experimental) in the creative thinking test of the content of the interactive multimedia course was verified through the pre-test measurement, and the following table shows this:

**Table 2.** The significance of the differences between the two groups in the pre-measurement of the creative thinking test

	Sum of Squares	DF	Mean of Square	F. ratio	Sig.
Between Groups	29.752	1	29.752	0.326	0.305
Within Groups	13223.700	60	223.174		
Total	13253.452	61			

The results of the statistical treatment, as shown in the previous table, indicated that the percentile reached a value of (0.326), which is not significant at the level of (0.05). This means that there are no statistically significant differences between the two groups in the pre-measurement. This indicates the homogeneity of students' levels in relation to the creative thinking test before exposure to the experimental treatment.

### **Experimental Processing Material**

The experimental group studies the interactive multimedia course in Blended Learning through the following steps:

- The first meeting with the students to explain the nature of the course, its importance, objectives, evaluation, tests, how to specify the Username and Pass ward for each student to enter the website. As well as to determine the weekly study plan, the mechanism of communication, and the dates of face-to-face meetings with the teacher, the distribution of students in working groups of five students to complete the weekly activities.
- Students study individually the electronic aspect of the interactive multimedia course through the MOOLE system.
- The face-to-face component was presented through five sessions. A session at the beginning of the semester was mentioned above. In addition, three sessions, each session lasting two hours, in which the lecturer presented the traditional side of the interactive multimedia course units using many traditional methods and methods of teaching / learning. Including: lecture, discussion, problem-solving, practical presentations, and the last session at the end of the semester for the final exam) in the computer lab.
- Students meet electronically in a simultaneous dialogue meeting (during the chat room) for two hours every week. The time for the dialogue meeting is determined in coordination between the lecturer and students at the end of the weekly face-to-face meeting (which takes place in the computer lab).
- The lecturer answers all questions and inquiries raised by students through the forum within 24 hours.
- The students of each work team cooperate in completing the activity required of them on a weekly basis, and send it to the lecturer electronically through the MOODLE system.
- Students answer the formative assessment individually at the end of studying each unit of the course, where each student is given three attempts that are corrected electronically and the average grade is given, and the duration of each attempt is five minutes.
- The final evaluation at the end of the semester, which is presented to students face to face.

As for the control group, it studies the content of the interactive multimedia course traditionally inside the classroom and the computer lab according to the time plan specified for the application, and the meeting between the researcher and the students is once a week for four hours.

## Results

After presenting the study procedures, completing the basic experiment, and monitoring the scores of the students of the two groups (the control and the experimental) regarding the creative thinking test of the content of the interactive multimedia course (pre and post). The researchers used the T-test to determine the significance of the differences between the adjusted earning percentage for the scores of the two groups' students in creative thinking (fluency, originality, flexibility, and the total score) related to the content of the interactive multimedia course. The results shown in Table (3) have been reached:

**Table 3.** Significance of T for the difference between the adjusted earning percentage for the scores of students of the two groups in the creative thinking test (total score)

Group	M	SD	Mean Difference	T. Ratio	Sig.
Control group	28.5	6.794	15.9	4.15	0.046
Experimental group	44.4	7.794			

From the previous table, it is clear that the T value of the difference between the adjusted earning percentages for the scores of students of the two groups in the creative thinking test as a whole was (4.15). The average score of the experimental group students was (44.4). While the average score of the control group students was (28.5). Thus, we find that the value of T is statistically significant. Statistical significance is directed in favor of the group with the highest average, which is the experimental group. In addition to the statistical analysis of the total degree of creative thinking, the researchers carried out a statistical analysis for each of the creative thinking abilities separately as follows:

### Fluency Results

To verify the effect of blended learning on increasing fluency, the significance of the differences between the adjusted earning percentages for the scores of students of the two groups in the fluency axis was calculated. The results shown in Table (4) have been reached:

**Table 4.** Significance of "T" for the difference between the adjusted earning percentages for the scores of students of the two groups in the field of fluency

Group	M	SD	Mean Difference	T. Ratio	Sig.
Control group	16.3	5.281	6.2	3.18	0.039
Experimental group	22.5	4.281			

From the previous table, it is clear that the T value of the difference between the adjusted earning percentages for the grades of students of the two groups in the field of fluency was (3.18). The average score of the experimental group students was (22.5). While the average score of the control



group students was (16.3). Thus, we find that the value of T is statistically significant. Statistical significance is also directed in favor of the group with the highest average, the experimental group.

### Flexibility Results

To verify the effect of blended learning on increasing the ability of flexibility, the significance of the differences between the adjusted earning percentages of the scores of the two group's students in the flexibility axis was calculated. The results shown in Table (5) have been reached:

**Table 5.** Significance of "T" for the difference between the modified earning percentages for the scores of students of the two groups in the flexibility field

Group	M	SD	Mean Difference	T. Ratio	Sig.
Control group	9.7	2.868	5.1	2.79	0.032
Experimental group	14.8	3.587			

From the previous table, it is clear that the T value of the difference between the adjusted earning percentages for the grades of students of the two groups in the flexibility axis was (2.79). The average score of the experimental group students was (14.8). While the average score of the control group students was (9.7). Thus, we find that the value of T is statistically significant. The statistical significance is directed in favor of the higher group on average, which is also the experimental group.

### Originality Results

To verify the effect of blended learning on increasing the ability of originality, the significance of the differences between the adjusted earning percentages of the scores of students of the two groups in the originality axis was calculated. The results shown in Table (6) have been reached:

**Table 6.** Significance of "T" for the difference between the adjusted earning percentages for the scores of students of the two groups in the originality field

Group	M	SD	Mean Difference	T. Ratio	Sig.
Control group	3.6	3.108	3.5	1.925	0.028
Experimental group	7.1	2.617			

From the previous table, it is clear that the T value of the difference between the adjusted earning percentages for the grades of students of the two groups in the originality axis was (1.925). The average score of the experimental group students was (7.1). While the average score of the control group students was (3.6), and thus we find that the T value is statistically significant. The statistical significance is directed in favor of the group with the highest average, which is the experimental group as well.

## DISCUSSION

The results shown in Table (3) indicated that there was a statistically significant difference at the level of (0.05) between the adjusted earning percentage for the scores of the students of the experimental group taught by blended learning and the control group taught by the traditional method of creative thinking (total score) in favor of the experimental group. Which confirms the increase in creative thinking after exposure to blended learning versus the traditional method. This good indicator shows the importance of using Blended Learning. Which would lead to an increase in creative thinking among students of the Master of Professional Education Technologies. The researchers believe that this result can be explained in the light of the following:

- The content provided through the MOODLE system included still and animated pictures and drawings, which helped in visual thinking, which would pay attention to pictures, which have a tangible role in developing creative thinking among students.
- The diversity of interaction patterns within the blended learning environment, face-to-face interaction between the lecturer and students in the laboratory and between students with each other, direct interaction via the Internet through the chat room and another indirect one through the news forum, the recent activities block and the upcoming events block, all of which helped to develop creative thinking .
- Presenting content in a variety of media (text, images, still and animated graphics, sound and sound effects), undoubtedly helped develop creative thinking skills among students.
- Employing the tools of the chat room and the discussion forum in conducting an unlimited number of discussions that helped to employ brainstorming methods, which helped develop creative thinking among students.
- Providing the educational site with a system for short formative evaluation, which is self-used, undoubtedly helped to develop creative thinking among learners.
- The student's cooperation with his colleagues in completing the educational activities contained in the site after each unit of the course helped create a state of communication and exchange of ideas within the same learning group, which helped develop creative thinking among students.
- The content provided through the educational website, in addition to the educational activities that are carried out collaboratively, included activities within each unit that are carried out individually. This always put the student in a state of activity in order to acquire information in a cooperative or individual framework, which motivated him to practice many tasks that helped him develop his thinking through the realization of his mind.
- The stimuli and visual expressions included in the system of merging between e-learning via the Internet and traditional face-to-face learning had a major role in the development of creative thinking. Visual expressions are among the most important elements on which blended learning depends.

From the foregoing, the researchers found that the total degree of creative thinking expressed, in aggregate, the high creative thinking capabilities (fluency, flexibility, originality) combined. The researchers also analyzed the results of each creative thinking ability separately from the other abilities. As it was found from the analysis of the results that there is a statistical significance for each of the three abilities in favor of the experimental group that was taught by blended learning compared to the control group that was taught in the traditional way. The researchers analyzed the results for each ability as follows:

### **Fluency**

The results shown in Table (4) indicated that there was a statistically significant difference at the level of (0.05) between the modified earning percentage of the scores of students of the two groups in the field of fluency in favor of the experimental group. Which confirms the increase in fluency ability after exposure to blended learning versus the traditional method. This good indicator shows the importance of using Blended Learning. Which would lead to an increase in intellectual fluency among students of the Master of Vocational Education Technologies.

In addition, because fluency expresses the individual who produces a large number of ideas during a specific unit of time. Thus, he has the fluency in thinking and perceptions in record time for others. The researcher attributed the discrepancy between the experimental group (which was taught by blended learning) and the control group (which was taught by the traditional method) to the diversity of interaction patterns within the blended learning environment. This contributed to motivating the learners to participate in many learning situations in which they express their opinions and ideas freely (chat room, discussion forum). As well as the dependence of blended learning on the diversity of presentation styles (electronic and traditional), which helped in enriching educational attitudes and thus developing fluency among the students of the experimental group.

### **Flexibility**

The results shown in Table (5) indicated that there was a statistically significant difference at the level of (0.05) between the modified earning percentages for the grades of the two group's students in the flexibility axis in favor of the experimental group. This confirms the increase in flexibility ability after exposure to blended learning versus the traditional method.

In addition, because flexibility is the ability to direct or divert the course of thinking with the change of the stimulus or the requirements of the situation. Which is the opposite of mental stagnation, or the actual ability of the individual to change the thinking directions of more than one direction and not to freeze or insist on a specific direction, which leads to the production of responses that are characterized by diversity and atypical. The greater the number of new unique responses, the greater the flexibility. The researcher attributed the discrepancy between the experimental group (which was taught by blended learning) and the control group (which was taught by the traditional method) to the presentation of content in a variety of media, and the completion of educational activities presented collaboratively with colleagues in addition to individual activities. This led to help in creating various educational situations and multiple

sources of learning, each of which serves as an integrated source for the learning process. This contributed to distinguishing the blended learning environment with a great deal of flexibility. Which was reflected in the presence of a degree of flexibility among the students of the experimental group, as well as the diversity of interaction patterns within the blended learning environment, which required the student to have various responses in various situations, which led to the development of the ability of Flexibility among the students of the experimental group.

### **Originality**

The results shown in Table (6) indicated that there was a statistically significant difference at the level of (0.05) between the modified earning percentages of the scores of the two group's students in the originality axis in favor of the experimental group. This confirms the increase in the ability of originality after exposure to blended learning versus the traditional method.

In addition, because originality means the ability to produce responses that are not general, distant, unusual, and have unconventional associations, and originality is considered the most aspect that reflects creative thinking and the lower the degree of prevalence of the idea, the higher the degree of its originality. The researcher attributed the discrepancy between the experimental group (which was taught by blended learning) and the control group (which was taught by the traditional method) to the nature of the design of the blended learning environment, which allowed students a great deal of freedom to express their ideas and publish them through the educational website. That site, which in turn included many activities and blocks that deepened the motivation of students to present their ideas and present them within the site through the chat room and discussion forum. This led to distinguishing the ideas of each student from the ideas of his colleagues.

### **RECOMMENDATIONS**

- The colleges of education use blended learning programs in teaching students instead of traditional education.
- The need for lecturers to involve learners in building blended learning environments by knowing their desires in the educational environment, with the importance of their contribution to the educational content, in order to encourage learners to learn.
- All universities and educational institutions should pay attention to educating faculty members and students about the importance of blended learning and its role in improving the educational process.

### **SUGGESTED RESEARCH**

- The effect of an educational environment based on blended learning on the development of critical thinking skills among secondary school students, which were not included in the research.
- Carrying out similar studies on other courses in other university majors.

- The impact of an educational environment based on artificial intelligence technology on the development of innovative thinking among students of the Master of Vocational Education Techniques.

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