

The Impact of Blended Instruction based on Multiple Intelligences on Learning

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Abstract

In the last decade, the tendency to use Blended learning across the globe has grown steadily due to its benefits and attributes, and to address the weaknesses of e-learning and face-to-face Instruction. The purpose of this study was to investigate the effect of Blended Learning based on Gardner's multiple intelligences on students' learning and to compare it with the face-to-face approach. The study population included all students enrolled in Tehran Farhangian University of Primary Education. This quasi-experimental study was carried out with pretest-posttest with a control group in the academic year of 2016-2017. A total of 40 female college students participated in this study. They were selected by the available sampling method and randomly divided into two groups. Data collecting tools was a questionnaire of multiple intelligence profiles with 80 items, a questionnaire measuring the level of learning by comparing pre and post-test. Both experimental and control groups trained in eight 90-minute sessions. The control group was taught using face-to-face traditional Instruction and the experimental group along with Blended learning and network-based learning, went under Blended Instruction based on multiple intelligences using articulate engage software with educational media (text, audio, image, animation and video). To design learning activities, learners were grouped according to their predominant intelligence, which was measured through the multiple intelligence profile. In both groups, the pre-test and post-test were the same academic achievement. Data analysis was performed using SPSS 19 software. Findings of the research indicate that the level of students' learning in the experimental group has significantly increased in comparison with the control group after having participated in the Blended Learning based on multiple intelligences.

Keywords

Blended Instruction, Blended Learning, Learning Styles, Gardner's Multiple Intelligences.

Introduction

Blended learning is the third wave of learning environment development, which helps to improve the learning process by combining the capabilities, features, tools and practices of online and e-learning. Hence, the combination of learning is not a random combination of faculty and e-learning facilities and training methods, but its launch in the design and implementation phases requires decision making and various actions [1]. Since its awareness of ICT in the early 1990s, it showed its potential applications in a wide range of human interactions, and educational and learning processes [2]. Some researchers believe that the communication, multimedia, and information capabilities of these technologies can provide an opportunity to combine the capabilities of these two environments, and provide new learning environments while enhancing face training and shaping the environment Web-based and electronic learning [3; 4]. The concept of e-learning and combination training has become widespread, with the development of new communication technologies and its growth and expansion. E-learning involves all forms of learning and teaching in or outside the classroom, which have electronic support, including information and communication systems, network or non-network.

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Since electronic tutorials in providing practical and workshops are faced with limitations such as human and emotional interactions, and facial-to-face communication; it is necessary for learners to execute what they learn in an online environment, in practice, cannot be a good alternative to the face-to-face approach. Alqahtani & Higgins [2013] noted the factors of isolation and lack of direct and face-to-face social interaction, the lack of development of discursive skills among learners, the need for strong motivation, time management skills, the verbal and non-verbal absence of symptoms, the possibility of other people's participation in the learning environment and more evaluation and fraud tests, as weaknesses in e-learning [5]. Walker et al. [2009] define Blended learning as a combination of classroom-based learning and e-learning. Virtual learning space is used, as a medium for sharing ideas in each other, and building knowledge of learners. Blended learning can be displayed as a continuum, which is completely online education, on the one side of that continuum, and face-to-face education on the other side of the continuum, and Blended learning is located between the two continuum lines [6]. Heinze & Procter [2004] introduce Blended learning as learning that is facilitated by combining the effects of different patterns of transitions, diverse teaching patterns, and learning styles [7]. One of the strengths of Blended education is the ability to expand the learning environment outside the classroom, through the development of cognitive skills [8].

Blended learning, an approach that combines the traditional forms of learning in the classroom, such as the efficiency and synchronous opportunities of synchronous and asynchronous interaction, classroom participation and socialization, with different e-learning events and environments, and online learning environments, including simultaneous and asynchronous interactions [9; 10; 11]. Blended learning, which uses both e-learning and face-to-face learning, can be an appropriate alternative to improve the quality of teaching and learning. In this way, students in the Blended course, while observing the behavior of their counterparts, are trained, and develop their knowledge and skills, interacting with them, and also use the components of online learning. Given the operationally of the activities, and teamwork and problem-solving methods, Blended learning provides an active and dynamic environment for learning and practice transitions. Driscoll & Van Barneveld [2015] defined the term compilation learning, with four concepts: Integrate and combine a variety of web-based technologies to achieve educational goals; Combine a variety of education approaches to create the best outcomes of learning, with or without educational technology; Combine any educational technology with teacher guidance; Integrating or combining educational technology with real work activities to create synergistic learning and working [12]. Yang et al. [2016] introduced the Blended learning goals, as: Facilitating learning is better than learning face to face and electronic, and increasing the effectiveness of knowledge; Lifelong learning provider, self-learning based on exploration; Encourage intercultural and collaborative learning, between high school and university levels, in different parts of the world, and reduce the digital divide; Less cost effective learning [13].

The focus of learning in Blended learning is to improve the goals of learning with the help of appropriate learning technology, in accordance with the style of personal learning right, in real time and for the person who deserves it [14]. Among individual differences, intelligence is the most important factor in learning and development. *Gardner's Multiple Intelligence Theory* is the latest theory in this field. Gardner, in the research project "Zero," found that they did not find a type of ability, and specially a particular type of intelligence, while other parts of the brain are active, and other person's intelligences, by examining the function of those who were damaged by a particular part of their brain. They are working. In this way, he realized the existence of various types of intelligence in humans [15]. According to this theory, eight different learning methods, classified as multiple intelligences, are categorized as:

- Linguistic intelligence: the ability to understand and use spoken and written communication, and deftly apply the practical aspects of language.

- Logical Intelligence-Math: The ability to understand and use logic, symbols, and numerical operations, identify patterns and logical relationships, propositions, functions, and other abstract matters.
- Musical Intelligence: Ability to understand and use concepts such as rhythm, background, melody, and harmony.
- Space intelligence: The ability to understand, navigate and manipulate the three-dimensional space, visual perception of the world and visualization and representation of the graphic of the spatial-visual thoughts.
- Physical-motorized intelligence: The ability to coordinate physical movements, and the skillful use of hands and body, to express thoughts, feelings and hands for changing objects.
- Naturalistic intelligence: The ability to distinguish and classify objects or natural phenomena and clean non-living forms.
- Interpersonal intelligence: The ability to understand and interact with other people.
- Intelligent Intelligence: The ability to understand and use your thoughts, feelings, preferences and interests [16; 17].

Based on multiple intelligence theory, in the design process for designing a network learning environment, we must pay attention to the diversity of content provision, the design of individual e-learning resources, and the diversity in student learning assessment, the replacement of the implementation of a network curriculum, and the focus on capacity building [18]. As Gardner predicted, e-learning environments with potentially computer-based tools make it much easier to design instructional training for each person [19]. So *the Multiple Intelligence Theory* is the newest intelligence theory that matches each person's training with features and capabilities. E-learning and hybrid learning has facilitated the application of this theory, in order to achieve effective learning. An e-learning environment should consider how to apply the benefits of the virtual environment around the axis of multiple intelligences, in a different way. Also, he focused on designing an environment that reinforces these eight student intelligence issues. In this context, multimedia features and tools provide plenty of flexibility to design [20]. By emphasizing these eight types of intelligence, eight teaching methods are provided to teach any skill or content. In an e-learning environment, after identifying educational goals and materials, e-media tools should be considered for implementation of these eight teaching methods [16]. E-learning with its many benefits provides a good environment for the individualization of education, and its adaptation to the characteristics of learners [21]. So far, many studies have been done in Iran and other countries on the impact of teaching methods based on *Gardner's Multiple Intelligence Theory*, which confirms its broad application in education.

The results of Douglas et al. (2008), which investigated the effect of the method of teaching mathematics on the theory of multiple intelligences in male and female students of the eighth grade, show that the mean scores of the mathematical test of the case group were taught using an intelligence theory approach Multiple, is significantly higher than the case group being taught by direct teaching. In the research of Xie and Lin (2009) at Polytechnic University of Taiwan, in order to study the effect of teaching the theory of colors on a basis of each intelligence, in the Gardner multiple intelligence theory, the students of the experimental group who were trained in accordance with the theory of multiple intelligences, had a significantly higher educational achievement than that of the control group in the approach to each intelligence [22;23]. Grace (2011) also showed that students' memorization of the teaching style that matches the dominant intelligence is greater than other students who are weaker in their intelligence [24]. In the study of Smith (2011) entitled "The impact of educational styles (from multiple intelligence theory) on the amount of memorization and mastery of the subject," the results show that the memorization of students in the teaching style is in line with their prevailing intelligence, more than other

students who are weaker in that intelligence [25]. Also, Ganji's research in 2011 suggests that using multiple intelligence theory in teaching for elementary classes leads to more students' academic achievement [15].

Abdi and others (2011) also in their research entitled "Comparison of the Effectiveness of Multiple Intelligence-Based Teaching Strategies, and the Common Methodology, on Academic Achievement and Attitudes towards Learning the Science of Primary Vocational Students" stated that the use of multiple intelligences theory in teaching leads to more academic achievement at all levels of cognition [26]. Haji Hoseinnejad and others (2011) argue that the educational approach based on multiple intelligence theory has an impact on students' academic achievement with lower logical-mathematical intelligence, but there is no significant difference in other students [27]. Findings of the research by Poudanjani and Ghobari Bonab (2011) suggest that Gardner's theory of education increases the general self-efficacy in deaf-hearing students [28].

Given the novelty of the concept of hybrid learning, the impact of educational strategies based on multiple intelligences, in electronic and in combination of training has not been carried out. Wide researches on Blended learning shows that it is useful. According to Alqahtani and others (2010) in order to compare three traditional, electronic and Blended educational methods, in terms of academic achievement and attitudes of students at Ommolghara University in Saudi Arabia, they said that in Blended educational methods, compared to the traditional method, there was a significant improvement education has been higher, and the attitude has improved, but there is no significant difference in academic achievement, in both traditional and electronic methods [29]. Demirli and Axujan's (2012) research shows that the impact of using Blended learning on the sustainability of academic achievement is greater than the traditional education process [30].

The results of the research by Motamedi and others (2012) who compared the traditional method of teaching combined with the help of the computer, suggests that computer-assisted compilation training is more effective in reducing the problems of students with learning disabilities compared to traditional methods [31]. Farajollahi and Badiei (2013) have studied the impact of training with conventional hybrid learning and Blended learning, Gardner on linguistic and logical-mathematical intelligences, on the academic achievement of students in Honarestan. The results of this study indicate that in learning to combine, which has the benefits of traditional education and e-learning, with language-based strategies, it is possible to improve learning in computer learners. Also, they have studied the impact of electronic content based on Gardner interpersonal and interpersonal intelligences on the learning of third-year female computer students in Isfahan in Blended learning. The results of this study indicate that the use of electronic content designed based on in-person intelligence in Blended learning has led to increased learning in computer learners [32]. But with interpersonal intelligence-based teaching, the results indicate that the use of interpersonal intelligence based electronic content in Blended learning has failed to improve the results [33]. In another study, Badiei and Farajollahi studied the impact of Gardner-based education on linguistic, spatial, and motor-physical intelligence, on academic achievement, in the combination of third-year female computer students in Honarestan of Isfahan. The results of this study indicate that the use of electronic design based on spatial intelligence in Blended learning has led to increased learning. But the use of electronic content, designed in terms of motor-physical intelligence, and linguistic intelligence in Blended learning, has not led to increased learning. The study suggests that, in Blended learning, the use of electronically designed content based on Gardner's theory can make learning more [34]. So in this research seeks to answer the following research questions: Is there a meaningful difference between the amount of learning in the lesson "designing a learning unit", in the students who have been trained in the combination of multiple intelligence learning methods and the students who have been trained in person?

Method

This research is a quasi-experimental study with pre-test and post-test design with control group. The study population included all students enrolled in Tehran Farhangian University of Primary Education. This study was carried out on 40 female students, in the 2016-2017 academic years in Tehran. Participants were selected using available sampling method and divided into two groups of 20. At first, multiple intelligence profiles were evaluated in the experimental group by McKenzie questionnaire [35]. In both groups, the pre-test, academic achievement was taken in the lesson "Design of the Learning Unit". This is a specialized, single-unit, and practical, which students were trained at a computer workshop. "Designing a Learning Unit" for the sixth science education curriculum and a "very small to very large" course, according to a theoretical expert. Then, both experimental and control groups were trained in 8 sessions of 90 minutes, in combination and in person, respectively. In the experimental group, faculty-led learners used to display computer, computer facilities, and network resources that the teacher shared in the University's Intelligent System. Additionally, a researched electronic content, which was developed using Gardner's multiple intelligence-based strategies, was used with the articulate engage software, and taught how to work with the software. One week after the completion of training in two groups, a post-test of academic achievement was made.

Data collection tools in this research were:

1. The Gardner multiple intelligence questionnaire, designed by McKenzie, was used to measure the learning style of learners, which included 80 items, and based on a five-level Likert scale, a score of 1 to 5 data, this questionnaire was approved by a group of specialists in the Department of Educational Sciences. The questionnaire consisted of 8 sections; in each section one of Gardner's multiple intelligences (logical intelligence, mathematical intelligence, visual intelligence, spatial intelligence, musical intelligence, motion-movement intelligence, interpersonal intelligence, introspection Individual and naturalistic intelligence). The reliability of this tool was measured by the Cronbach's alpha method, equal to 0.75.
2. A four-way and descriptive academic achievement test, prepared in accordance with question-design standards, was used as a pre-test and post-test. The questions in this test were designed to teach the departments, depending on the different levels of learning from the lesson "designing a learning unit", and with expert subject cooperation, based on the target-content specifications table for the basic sixth elementary school science course. The content validity of the test is verified by a group of experts and designers. For the test reliability, the scores of 20 subjects were calculated based on the retest method, and the number was 0.71.
3. An electronic content was created by the researcher, with the help of the articulate engage software for training the experimental group, based on the training strategies consistent with each of Gardner's multiple intelligences, and approved by the content engineers. According to Lazear's proposed method by Yi-Dong and others (2011)[36], they were read in content to adapt to linguistic intelligence, text and text sources; to adapt to rational-mathematical intelligence, data models represent relationships and algorithms with appropriate steps; to adapt to intrinsic intelligence; provide different solutions to solve problems; search for resources from the network and achieve goals by providing guidance and feedback; adapt to interpersonal intelligence; communication through the forum. And e-mail; to match the motor-physical intelligence, to simulate the operation, to guide the interactive instruction set to learn and design of the mouse and keyboard operation in accordance with the learning content (The dominant intelligence of the students was the experimental group of a variety

of linguistic intelligence, logical-math, interpersonal, interpersonal and motor-physical) [20]. The collected data were analyzed by SPSS software.

Results

In this study, 40 female Farhangian female students, elementary education orientation science, were selected in Tehran in the 2016-2017 academic years. Participants were selected by convenience sampling and divided into two experimental groups (n=20), and control group (20 people), and both groups were trained by a professor. Pretest and posttest were scored in both experimental and control groups, and independent T-test was used, after calculating the mean scores, to compare the mean difference between the two groups of experiment and control.

Based on the data obtained from Table 1, it is seen that the mean score of the students in the experimental group was 9.65 and the control group 7 students, which according to the test, the independent mean t, 2.93 with a significant level of $P = 0.01$, mean difference Students' scores in the two groups were significant at 99% probability.

Table 1. Comparison of pre-test scores the design of the unit of learning in two groups of testing and control

Sig.	Degrees of freedom	T on the table	T value	difference in averages	The standard deviation	mean	No.	Group
0.01	19	2.54	2.93	2.65	3.21	9.65	20	examination
					2.29	7	20	Control

Table 2. Comparison of post-test scores, learning unit design lessons, in two experimental and control groups

Sig.	Degrees of freedom	T on the table	T value	difference in means	The standard deviation	mean	No.	Group
0.01	19	2.54	3.47	3.07	2.20	17.82	20	examination
					3.16	14.75	20	Control

Based on the data obtained from Table 2, it is noted that the average post-test score of the trained students is based on multiple intelligence-based combination (test group), 17.82, and in-person trained students (control group), 14.75, which according to the independent difference T test, 3.47, with a significant level of $P = 0.01$, the difference in mean scores of students in the two groups was significant at 99%.

Discussion and Conclusion

The aim of this study was to compare the impact of face-to-face and Blended learning based on multiple intelligences on female college students, Farhangian University of Educational Sciences. The results of pre-test and post-test in the experimental and control groups show significant changes. Therefore, multiple-intelligence-based blended learning increases the amount of student learning, in the design of the learning unit, in comparison to the face-to-face approach. These findings are consistent with the results of face-to-face research by Haji Hosein Nejad and others [27], Abdi and others [26], on the positive impact of multiple-intelligence-based teaching on academic achievement. It also confirms the results of Xie and Lin's research [23], which is based on linguistic intelligence and interpersonal intelligence in face-to-face

learning. As Stacey and Gerbick [8] and Ituma (2011) [37] state, when learning on line with different forms of content presentation traditionally and in person, learning and performance of students increases. In combination, both the teacher and the student, seek information with more interest and motivation. In fact, blended learning, in addition to increasing learning and internal motivation, makes learners make the most of their learning styles [38]. According to the results of this research and other researches in this field, it can be concluded that multiple-intelligence education, especially when adapted to the type of prevailing learner's intelligence, is effective in promoting learning.

According to research results, considering the advancement of science and technology, as well as the importance of electronic content production, and the need to pay attention to learners' characteristics and the style of learning and their types of intelligence, it is necessary to use the combination of learning capacities that have the benefits of face to face learning and e-learning. And thus provide educational justice, and optimal learning, with the least cost in the educational system. Learning in the "Designing a Learning Unit" course is not possible through e-learning environments alone, and should, in addition to providing e-learning environments, also take advantage of the face-to-face learning environment, and apply a blended learning environment.

At Farhangian University, in order to improve learning and increase the effectiveness of training courses, it is possible to design and implement all curriculum elements in person by designing a learning management system tailored to the courses required for multimedia content, various learning activities, digital learning materials and resources, and various evaluations on that system, to enhance classroom training. In addition, it is possible to use minimalistic combinations, moderate combinations, and a complete combination of technology with curriculum, moving towards the design of e-learning environments. According to Köse (2010), this learner-friendly learning environment allows them to move forward in line with their cognitive constructs and learning styles in the training; they provide learners with more learning resources and may provide greater educational coverage for learners [39]. In addition, this environment, through the use of multimedia systems, provides better opportunities for offsetting academic backwardness, providing personal resources and the possibility of ongoing study. So we suggest that in future research, a blended learning be used in other topics of engineering, science and natural sciences on learners with diverse personal characteristics in a variety of academic disciplines, with different computer skills and male students.

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