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The connection between the types of architecture teaching in practical courses and the level of students' learning through virtual education

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Abstract

This study aimed to explore the connection between professors' teaching techniques and student learning in practical architecture courses in face-to-face and virtual classes. This study is a descriptive-analytical one. The respondents are the professors of Shiraz Azad University, and the researcher's questionnaires were distributed through virtual media. The findings are the result of testing the suggested hypotheses using inferential statistics and a correlated t-test. The findings show that in the practical courses in architecture and virtual classroom management, the ability to control students and fatigue in class, as well as the observance of justice and fairness, are the factors that the professors consider.

Furthermore, in the teaching approach section, the lack of teaching strategies and the low activity of students is the most significant problem.

Nevertheless, on the other hand, in the way of testing and assessing practical lessons, professors can do better. The fatigue level of the professors is the same in face-to-face and virtual classes. The primary components are more critical and superior because of the product of the said cases in virtual classes. Nevertheless, when all things are considered, the main distinctions and capabilities of each face-to-face and virtual class are recognized. Eventually, some suggestions have been made for the use of virtual education.

Keywords: architecture teaching, practical lessons, face-to-face training, virtual training, learning

INTRODUCTION

The temporal root of evolutions in education goes back to two influential historical occasions. One was the forewarning of the global crisis in France in 1968, stemming from a radical intellectual movement and questioning the existing educational system. The second was the meeting of the American National Commission for the Promotion of Education held in 1981 (Gaston Mialareh, 2011: 218). The education system went amiss until the middle of the 20th century and formed a plunging gap between education and life. Next, the second international conference on thinking about the future of education was held in Paris in December 1981, and it outlined and concluded the measures taken (UNESCO, 1984). In 1991, three influential books on global developments in education were printed. This year, Alexander King and Bertrand Schneider assembled and published the book "The First World Revolution" in two parts. They acknowledge that "the world is governed poorly, and the countries are governed more poorly."

Furthermore, based on their doctrines, educational systems should be entirely altered. They offered solutions, remarking that the educational system suffers from three issues: information overabundance, backwardness, and inadequacy (King and Schneider, 1990). The

second book, which contains 54 modern education articles published by the 21st Century Studies Institute, discussed issues, including collective work, financial support, attracting participation, etc. It also cites the solution-seeking ideas of countries, which indicates the need to pay attention to contemporary education (Garrett, 1991). In the third book regarding contemporary education, subjects such as the role of education in changing values and attitudes, education and modern educational technologies, the function of the teacher, etc., have been cited (Sink, 1991). In 1993, the 6th Conference of Ministers of Education of the Asia-Pacific region, comprising thirty-three governments, including Iran in Malaysia, yielded a recommendation that required attention to reforms in education (Rauf, 2019: 387). Science and education progress as time goes by. In this century, the topic of technology and teaching has expanded globally. Nevertheless, this issue was still not very important in Iran until the Covid-19 virus dominated the whole world, and Iran, like the rest of the world, was required to employ technology and virtual education. This study seeks to discover new methods to teach practical courses in the field of architecture in a virtual manner so that the problems of students and professors decline.

Definitions

Education is defined as the steady flow or process, the objective of which is to direct the development of various physical, cognitive, emotional, and social dimensions of the learners to formulate and understand human knowledge and help their aptitudes bloom (Khosrowshahi, 2010).

Types of teaching methods: face-to-face (lecture, theater, visit, laboratory) and non-face-to-face (books, radio, cinema, television, virtual simulation).

Types of education in different countries: 1- Compulsory education 2- Voluntary-active-passive education 3- Growing education 4- Advanced education 5- Active education in technical and professional fields 6- Active education in the field of literacy 7- Government Education 8- Non-government education 9- International education (Nagaraju, 2020).

Virtual education: For the first time in 2001, electronic education became ubiquitous. Yordan and Vegen state, "Electronic learning is the delivery of educational content through electronic media such as satellites, CDs, Internet, and extranet" (Asnafi, 2005).

Academy Definition: Derived from the word "academy", which literally means "culture", "university", "school", "school" or "school". Moreover, from the spatial dimension, it is a research higher education institution whose name is derived from Plato's school.

The definition of the academic architecture education system: "The interconnected elements that form the mental and personal form and follow a goal scientifically in the creative and practical construction of the *space" (*Hosseini, 2019*).*

The definition and characteristics of a teacher (trainer): the personality characteristics of a teacher and their association with teaching fall into four groups: 1- teachers who seek command and focus on lessons, 2- teachers who seek authority and focus on students, 3- teachers who seek rapport and focus on lessons, 4- Teachers who seek friendship with students and focus on them (Taghipour, 2017).

*Definition of a studen*t: A student is someone who constructs societal dynamics and alters the environment around him, speaks, and puts his words into practice. A student is someone alive, active, and effective, and his absence is felt. The meaning of hype is the power to make useful and long-term effects in the milieu, which makes a student a student (Taghipour, 2017).

Literature review

Many studies **have** been done in the field of education and training, and academics. However, the most significant of them is the research by Mehdi Momtohan and Masoud Nari Qomi under the title "Educational procedures in the types of architect education, a case study: examining the proposed educational options of the last decade (2005-2006) in Iranian architecture schools".

The axes of the research and the results are as follows

After categorizing the teaching methods from the educational perspective, we will discuss the connection between the student and the teacher from the old days until now, and the positive and negative opinions will be discussed. This study delivers a framework for the typology of architecture education methods based on educational purposes and types of educational systems. This framework includes four items: 1- Beaux-Arts, 2- New Apprentice Master, 3- Dattan Critical Education, and 4- Sanaf Collaborative Education. The outcomes indicate that in the last decade, the intense person-centered and student-centered defect prevails to a large extent, and the new techniques offered are less towards paying attention to the social values of architecture and the training of progressive social architects. After examining the background of the research, there has been no discussion about whether virtual education is more effective than face-to-face education in these stated techniques. This research seeks to be able to answer this question (Momtahan, 2018).

The world's first academic architecture education systems

The first schools of architecture are the Beaux-Arts, Architectural Association School of Architecture and the Bauhaus School. The first approach is that of the Beaux-Arts University of Paris, based on the shape and form of art and design. On the other hand, the method was based on the ideas of modernism and the academic roots of ancient Rome and Greece, which focused on the original idea and thought (Khoshnovis, 2019). The second method of education is prevalent in polytechnic universities, where architecture is taught along with engineering. In this educational fashion, art completes engineering principles. During the first two years of the faculty, courses such as physics, mechanics, statics, etc., are taught along with art education and architecture courses. This approach is common in polytechnic schools in Switzerland, Germany, and Italy (Kazemzadeh Raef, 2020). The third technique, architecture, is based on urban planning and human sciences, and its chief objective is to create a human atmosphere based on sociology, economy, and urban planning, and in it, a kind of urban planning architecture is taught. Architecture is inspired by nature, and green architecture and preservation of all resources are considered in the design (Khoshnavis, 2020). The fourth approach is architecture with a progressive and avant-garde direction; the concept is essential. Experiences of shapes influence this process, it uses natural morphology for the initial idea, and theoretical mathematical topics, equations, and spatial geometry are considered in the processing of leading patterns in this method. This method is against the construction of cube-shaped architecture. The above system is taught in the School of Architectural Association. The fifth method, architecture education, is based on social and popular realities. Architecture is done and taught according to construction facilities and incomes. This type of architecture runs especially in developing countries such as India, Indonesia, and Bangladesh. In the first and second years, students go among the people and see their lifestyles closely. Then they design based on their needs and facilities. We do not follow any of the techniques in architecture schools in a specific way. Until the early 1340s, the educational base was based on the method of the Beaux-Arts architecture school in Paris, and from around 1969 onward, it was followed with a different style, per the current education of countries such as Italy (Kazemzadeh Raef, 2020).

Comparison of architecture education in the past and today

The basis of traditional architecture education in Iran is practice and behavioral experience. In this approach, gathering information is dynamic and intended and happens in the core of the environment and reality. The association between teacher and student in this method is practical and experiential, and the architect student initiates his education from early to teenage years. In this technique, there was no theoretical teaching - everything was functional and experiential in the truest sense of the word, and the student learned from his teacher's behavior in the making environment. With the advent of the new era of industry and its impact on all aspects of life, construction also altered rapidly. In traditional architecture education, the construction workshop was the training site for the architect's students. Here, the academic place became a strong reference equalling today's libraries. However, in today's university scheme, architecture education is done in a virtual and

abstract form, far from the possibility of happening in studios. In the past, the primary part of experiences was gained by word of mouth, some by studying the remaining monuments, and some by practice (Noshadi, 2013). After the modification of this field after the Islamic revolution of Iran, more attention was paid to the courses related to Islamic architecture and the history of Islamic architecture in Iran; In the presentation related to Islamic architecture, major attention was paid to the appearance of architecture and its physical criticism while less attention was paid to the cultural, social and religious infrastructures existing in traditional societies, which were the basis for the production of valuable and lasting works (Gorji Mahlbani, 2019). In the following, a diagram of the evolution of architecture from the past to the present is presented.

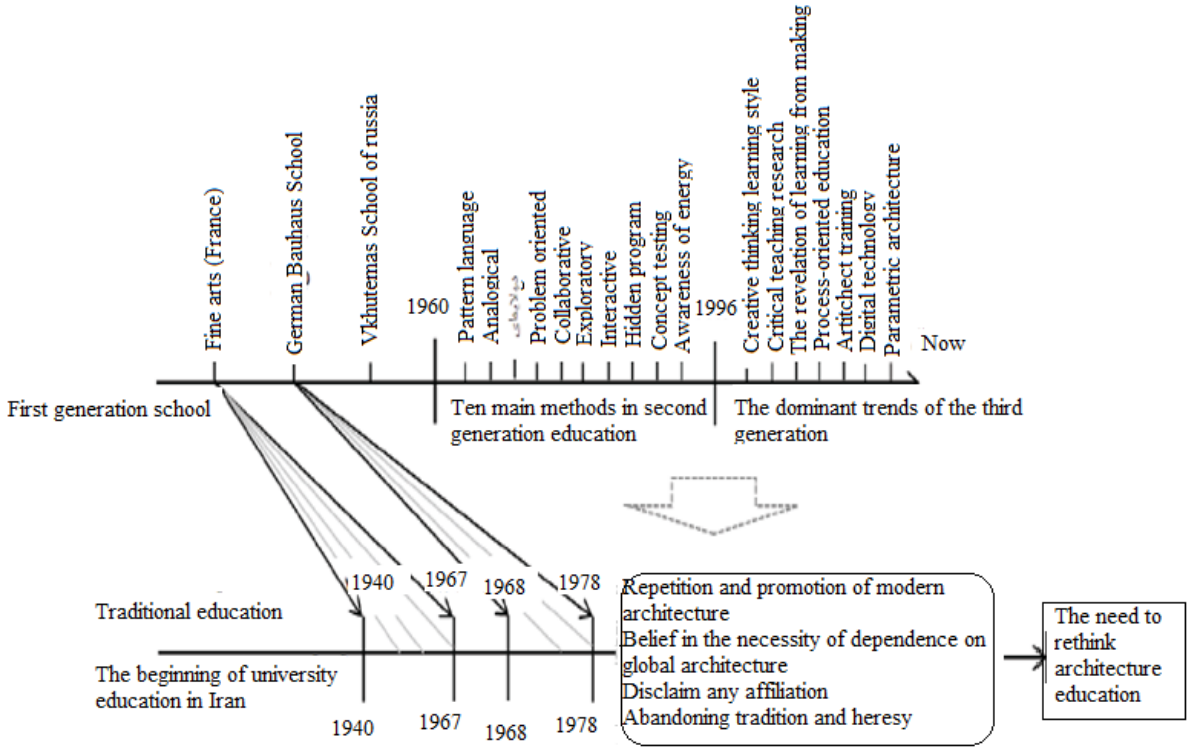

Diagram 1. Comparative comparison of three generations of education; Source: Kian Erthi, 2018

Table 1. The evolution of architecture from the past to the present. Source: Author

style	teaching method	Focus on	The main elements	result	the truth
Beaux-Arts	Teacher-student interaction	Individual and social values	Five main components: 1- teacher, 2-learner, 3-content, 4-space, 5-method	Self-centeredness - self-interest and self-exaltation	Only teacher-oriented
Architectural Association School of Architecture	Student-community interaction	Creativity and social modeling	1-Oral presentation, 2-Visual presentation	Individual abilities of an architect: creating ideas	Student-oriented with teacher supervision

and the Bauhaus School				and expressing them	
The new professor - student	Student-oriented and inclined to individualism	Individual creativity and institutional modeling	1- Being a mentor, 2- Guidance, 3- Support, 4- Expression, 5- Rethinking, 6- Self-discovery	Model work with a modern look and student individualism	Student-oriented to individuality
Sanaf partnership	Focusing on education	Individual work - collective work	Non-design planning disciplines - teaching the basics of participation	Fit with the environment	Student-centered
Critic Dutton	Both student-oriented and collectivist	Individual work - institutional collective work	Atelier method in which architecture is rejected as a neutral whole	Initial confusion and then filling the mind	Architecture is viewed as a commodity and at the disposal of politics

Definition of teaching and its theories

Teaching is that part of the educational exercises that happen with the teacher's presence in the classroom. It is a part of the education approach that contains a series of systematic and pre-planned actions, and its goal is to produce preferred learning conditions. Smith believes in five types of teaching: "descriptive", "successful", "voluntary", "normative", and "scientific". According to him, the "descriptive" definition of teaching is the direct expression of knowledge and skills from the teacher to the student. In the definition of "success," the two concepts of teaching and learning have a decisive and inseparable role. That is, the act of teaching will not happen unless learning does. Based on the definitions supplied, four characteristics of teaching are: 1- the existence of exchange between teacher and student; 2- Activities based on specific and predetermined objectives; 3- Standard planning according to the situation and possibilities; 4- Forming opportunities and promoting learning (Rafiei, 2014)

Types of teaching techniques

The teaching methods fall into two prominent types: 1- traditional, common, and historical (teacher-centered and passive student); 2- New (student-oriented and active student). Multiple distinct methods can be utilized for teaching. However, parallel using the four models offered in this model can reach very good results (Sha'bani, 2006).

Table 2. Teaching methods in Iran. Source: Author

methods	Definition	How to implement teaching	benefits	Disadvantages
Speech method	The teacher presents the information	Professor: the sender of the message, and	1- the existence of the class organization, 2- the possibility of	1- lack of student participation, 2- class time limit, 3-

	orally for a certain period. With specific content	student: the receiver of the message. A one-way way to transfer information	complete class management, 3- maximum use of time	causing fatigue, 4- paying attention to teaching versus learning
Conference method	Information is collected and presented by students.	The teacher's role: only guiding and managing the meeting and preventing deviation from the subject	1- Students' activity in teaching, 2- Finding new materials, 3- Practicing students' speeches	1- Reliance of the class on academics, 2- The possibility of deviating from the main topics, 3- Time difference
Student-teacher method	The oldest methods of teaching - the coexistence of teacher and student	The student plays the role of the teacher and reaches scientific results through discussion (discussion or circle).	1-Understanding the depth of the content, 2- Believing in what is learned, 3- Experience the discussion, 4- Creating new content.	1- Spending much time, 2- Low student-to-teacher ratio, 3- Static content
Problem-solving method	The problem question is asked, and the student solves it.	The teacher asks the question, the student provides the information, and they conclude together.	1- very active, 2- the possibility of discovering or solving the problem, in reality, 3- the possibility of creating the discovery or solving the problem	1- Class management is very difficult, 2- Going to a detour, 3- The teacher needs knowledge
Project method	The project is selected. This project can be a collection-research or laboratory.	According to their interest, a topic is chosen, and they actively participate in bringing that topic to a conclusion.	1- Management and planning power, student's sense of responsibility, 2- Creation of order and phasing, 3- Group work training, 4- Executive result	1- The need for a lot of management, 2- Lack of group training, 3- The professor's very high ability in project management.

Development of remote education theories

In 1985, Holmberg alluded to the need for delivering formal theories in distance education. Early theories describe the traditional views of distance education and stress the independence and autonomy of learners, the mechanization of education, and communication (Keegan, 1986). Modern theories about distance education consider it a part of conventional education and believe that distance education students will have the same educational experiences as traditional courses. They also argue that numerous strategies and techniques of education can be employed in the remote teaching-learning process (Taghipour, 2017). In the following, the influential theories regarding distance education will be discussed.

Table 3. Theories of virtual education. Source: Author

Theory	theorist	Year
Theory of distance education industrial model	Autopeters	1983,1971
Guided educational dialogue theory	Holmberg	1991,1989
The theory of educational independence	Charles is coming	1981,1977
Transactional exchange waste theory	Moore	The 1990's
Control theory	Grayson and Baynton	1987
Interaction theory	Grayson	1989
The theory of socio-cultural context	Evans and Ni Shen	1992
Theory of social presence	McIsam and Ganawardena	1996

Various ways of e-learning in terms of time and needed tools

One of the various types of education is the simultaneous one in which the teacher and the learner communicate at a specific time. Concurrent training is done in real-time with the help of a training tutor who is a live observer of all the training activities of the learners. This approach lets learners communicate with the teacher and other students by entering the virtual class. Essential tools of this method include electronic blackboard, telephone, instant media message, video conference, chat room, and virtual workshops (Azizifar, 2016). On the other hand, in asynchronous learning, the communication between the instructor and the learner is stored somewhere, and there is a time lag between the creation of the information and its receipt. The flexibility of time and the possibility of learner-centered self-learning are among the advantages of this type of schooling. The tools used in this method include disks, video CDs, e-mail, electronic discussion groups, audio and video files that can be uploaded to websites, simulation software, and educational websites (Basher Khah and Qureshi, 2015).

Types of e-learning in terms of using methods and required instruments

1- Education based on computer DVD, CD-ROM, 2- Education based on Internet or web (WBT), 3- Education based on intranet (IBT) (Azizi Far, 2016). Different forms of technology have delivered many ways to provide distance education, which are listed in the table below.

Table 4. Correspondence education (virtual). Source: (Azizi Far, 2016)

Correspondence education	Radio-television training		Satellite TV training		Computer and internet-based training		Education from telecommunication networks (mobile)
	Radio training	TV training	Unilateral training	Bilateral training	Computer training	Internet training	

Types of e-learning in terms of nature and required tools

1- Personal learning: in this category, the learner chooses his favorite field and searches for suitable information in his milieu, especially on the Internet, and conducts a study in that

domain. He then asks his questions to the relevant professors. 2- Collective learning: Conditions allow people to communicate with each other and their professors in this category. In this approach, the start and end times of the training span and exams are usually the same for all that groups (Razavi, 2013). 3- Virtual classes: In this type, the conditions are entirely the same as in physical classrooms, and the classroom is even held in physical classrooms in some cases. Here, a video projector is employed instead of a blackboard, joined by a video conference. This technique is valid, particularly for classes where the corresponding professor is not available in adequate numbers, and there is no possibility of moving professors (Joyce, 1997).

Distance learning teaching methods

The teacher must communicate with the learner in remote and online education by creatively operating the textbook and educational media. In distance schooling, teaching is done simultaneously and asynchronously. Typically, academic content is delivered through a web server and sent to the learner's computer when the request is administered. Concurrent teaching methods in distance education are based on two-way television, telephone conversations, and Internet conferences: audial, visual-audial, using chat rooms or using whiteboards. Asynchronous teaching techniques are based on printed materials, cassette tapes, answering phones, fax machines, videotapes, radio broadcasts, television broadcasts, electronic and e-mail software, web pages, and software programs that can be transmitted over the web (Razavi, 2013).). Types of non-attendance training include virtual training or distance training in four categories: 1- Messengers (internal such as Shad); 2- online education (online and offline, such as mocks); 3- educational packages (including CDs and DVDs, which are electronic tools); 4-Television School (live educational programs like production educational programs) (Dahnavi, 2020).

The major difference between face-to-face and virtual education

In face-to-face schooling, the principal part is played by the teacher, and he governs the entire process of teaching and learning, While in the virtual one, the learner should be shouldered all the activities and processes of educational programs. Virtual education is exhaustive. Considering the differences between the two methods, the questionnaire analysis decides which technique is more practical. The following table compares the distinctions between face-to-face and virtual education strategies.

Table 5. Disadvantages and advantages of virtual education and face-to-face education. Source: Author

face-to-face method	**Virtual method**	
Physical limitation	Education environment across the satellite network	Benefits
Teaching time of the academic year	Training time whenever you want	
Limited information sources	Unlimited and widely used	
Restrictions on attracting expert professors	Easy access to expert teachers	
Limited number of learners	Unlimited number of learners	
Restrictions on political boundaries	Removal of political boundaries	
Limited use of educational tools	Unlimited use of tools	
The possibility of establishing classes	The possibility of not establishing classes	Drawbacks

Presence and the possibility of asking and helping the teacher	Probability of problem and its solution in practical lessons	
The presence of professors in a specific place	Lack of available professors	
Creating a strong relationship between teacher and student	Absence of a strong relationship between teacher and student	
Ability to participate in other classes	Participate in the specified class	

Benefits of virtual education

Here are a few advantages of virtual education:

1- Availability, 2- Interactive and collaborative learning, 3- Up-to-date content, 4- Group learning and teaching, 5- Flexibility, 6- Student-centered, 7- Modular learning, 8- Maintainability and durability, 9- Increased learning speed, 10- Cost-effectiveness, 11- Creating motivation, 12- Possibility of simulation, 13- Quick information about the test result, 14- Possibility of learning more than one lesson, 15- Real-time access to the digital library (Fattahizadeh, 2015). Furthermore, social networks augment group critical thinking, team research-based learning, and group problem solving through internet means. Their advantage is not only the presentation and sharing of knowledge among the members but also the possibility of reflection and production of new knowledge; In these networks, opinions are generated, questioned, changed, critiqued, and assessed by a vast network. Traditional education methods no longer respond to the hefty demand for education. Among the factors that emphasize the necessity of using electronic education are: 1- The increase in the population of applicants for high-level education, 2- Increased demand for lifelong learning, 3- The matter of quality in education, 4- The explosion of knowledge, 5- The cost of education.

The major elements from the table about education and its kinds

1- Student-oriented: because this approach is not used in Iran, it is skipped; 2- Teacher-centered: the Beaux-Arts style 3- Student-centered with teacher supervision: the Bauhaus style. Types of teaching methods: 1- Lecture method, which is very common in Iran; 2- The conference method, which is common, but in the wrong way; 3- The student-teacher method is for high levels; 4- The problem-solving method that is not common; 5- The project approach used by professors in recent years. Eventually, teacher-centered and student-centered methods are measured with the teacher's supervision and with the lecture style and the correct conference style criteria. The teacher's face-to-face and virtual teaching methods are measured in separate questionnaires.

Methodology

This study is a descriptive-analytical one. The data of this research was obtained from the questionnaire by comparing the face-to-face and virtual teaching of practical courses in architecture. The questionnaire was developed, distributed, and collected by the researcher. The information from twenty-five questionnaires was entered into the statistical software SPSS version 22 after being coded as raw data by computer and was the basis of the research analysis. In the following, a descriptive analysis of demographic variables and factors analyzed in the study will be clarified. The test results of the suggested research hypotheses using inferential statistics according to the normality condition and the correlated t-test have been presented in detail. Before dealing with the descriptive and inferential results, the reliability of the test is assessed. Class management, teaching method, test method, evaluation, fatigue, and teacher's motivation, each of which has questions in the questionnaire, are the chief elements of the research. Cronbach's alpha in assessing the reliability of this researcher-made questionnaire is 0.96, and the number of items is 96.

Data description of demographic variables

In this part, the descriptive information received from the questionnaire is presented, which shows the demographic characteristics of the studied sample. The highest frequency in terms of gender belongs to women; Also, between the age group of 20 to over 61 years old, the highest frequency was related to the age group between 31 and 40 years old. The highest frequency in terms of educational grade belongs to doctorate professors, and the highest frequency in teaching grade is related to doctoral level.

Descriptive information of the chief research variables

In this unit, descriptive data is measured based on the main components of the study.

Table 6. Descriptive information of the chief research variables. Source: Author

Variable		Number	Average	standard deviation	Minimum score	Maximum score
Face-to-face teaching	How to manage the class	25	43	4.20	38	51
	Lesson teaching method	25	56.60	9.36	44	74
	How to test	25	11	1.31	10	12
	Assessment	25	7.60	0.76	7	9
	Teacher fatigue and motivation	25	19.12	3.65	14	26
Virtual teaching	How to manage the class	25	40	6.29	32	52
	Lesson teaching method	25	52.60	9.36	40	70
	How to test	25	8.44	1.08	7	10
	Assessment	25	9.25	1.87	7	13
	Teacher fatigue and motivation	25	19.04	3.74	14	26

Inspecting the normality of the variables

To analyze the data and choose the type of relevant tests, the normality of the variables should be studied in advance. Because if the variables are normal, it is allowed to employ parametric and non-parametric tests. In contrast, if the variables are not normal, only non-parametric tests are allowed. The Kolmogorov-Smirnov (K-S) test is used to check the normality of the variables. This test is used when we want to check whether the data of the desired variable is normal or not. If the significance level of this test is higher than 0.05, the null hypothesis that the data is normal is accepted. Thus, the statistical assumption is as follows:

Null hypothesis: the data distribution significantly differs from the normal distribution.

Counter hypothesis: The data distribution is not significantly different from the normal distribution.

The output of the normality test of the data of the variables in face-to-face and virtual teaching based on the Kolmogorov-Smirnov formula is

0.16, with a Sig value of 0.076. The sig value is higher than 0.05, rejecting the null hypothesis. In conclusion, the data of the studied variables are normal. Accordingly, the appropriate statistical test is the correlated t-test.

Table 7. Correlated t-test analysis; Source: Author

Pairs	Mean	Standard deviation	Standard error	t	df	P
How to manage face-to-face and virtual classes	3.64	2.25	0.45	8.08	24	0.000
How to take the face-to-face and virtual test	1.56	1.08	0.21	7.20	24	0.00
Face-to-face assessment - virtual assessment	-1.92	1.60	0.32	-5.98	24	0.000
Teacher's fatigue and motivation in face-to-face teaching and virtual teaching	0.080	0.40	0.08	1.00	24	0.32
Face-to-face teaching and virtual teaching methods	3.36	2.85	0.57	5.88	24	0.000

The results of the dependent t table to compare the face-to-face class management (M=43.64, SD=4.20) and the virtual one (M=40.00, SD=6.29) showed that there is a significant difference between the way of managing the face-to-face class and the virtual one (t=8.08, df=24, p<001). Because the average of face-to-face class management is higher than virtual class management, face-to-face class management is better than virtual class management. The results of the dependent t table for comparing the face-to-face teaching method (M=56.60, SD=9.36) and the virtual lesson teaching method (M=52.60, SD=9.36) showed that there is a significant difference between the face-to-face lesson teaching method and the virtual lesson teaching method (t=5.88, df=24, p<001). Because the average method of teaching face-to-face lessons is higher than the method of teaching virtual lessons, it can be said that face-to-face teaching is better than virtual teaching. The results of the dependent t table for comparing the face-to-face test (M=11, SD=1.31) and the virtual test (M=8.44, SD=1.08) showed that there is a significant difference between the face-to-face test and the virtual test (t=-5.98, df=24, p<001). Considering that the average of the face-to-face exam is higher than the virtual exam, it can be said that the face-to-face exam is better than the virtual one. The results of the dependent t table for the comparison of face-to-face assessment (M=7.60, SD=0.76) and virtual assessment (M=9.52, SD=1.87) showed that there is a significant difference between the face-to-face lesson teaching method and the virtual lesson teaching method (t=5.88, df=24, p<001). Considering that the average of virtual assessment is higher than that of face-to-face one, it can be said that virtual assessment is better.

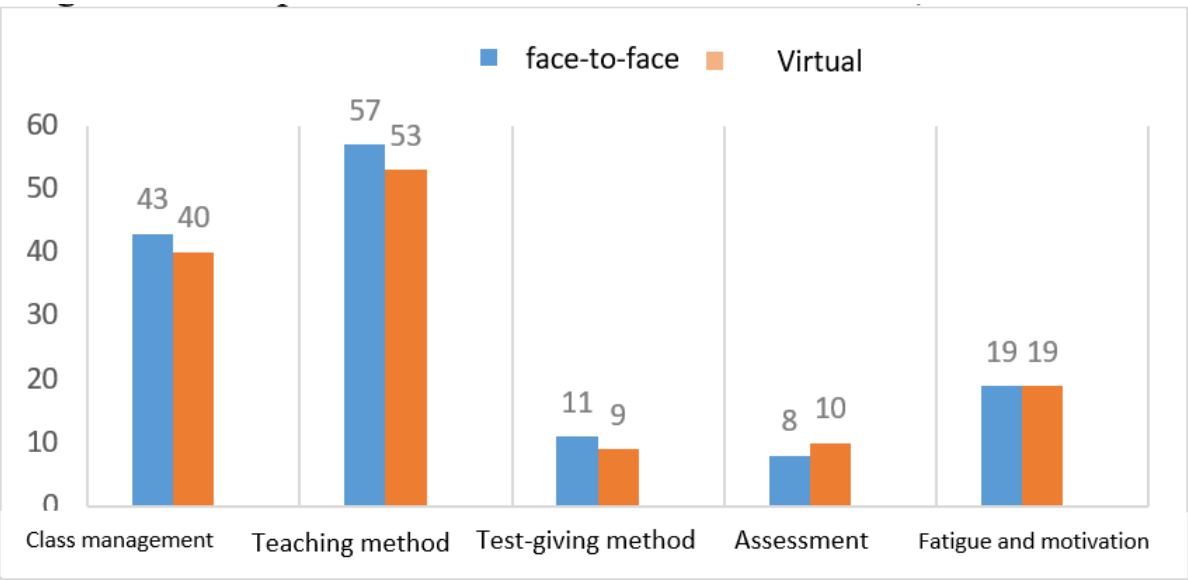

Diagram 2. Comparison of the chief research elements; Source: Author

Here, the details of each part will be examined based on the primary elements of each sub-set. The results and graphs indicate that each component has its sub-criteria; With a more thorough examination will determine which type of teaching is more appropriate in which sub-component.

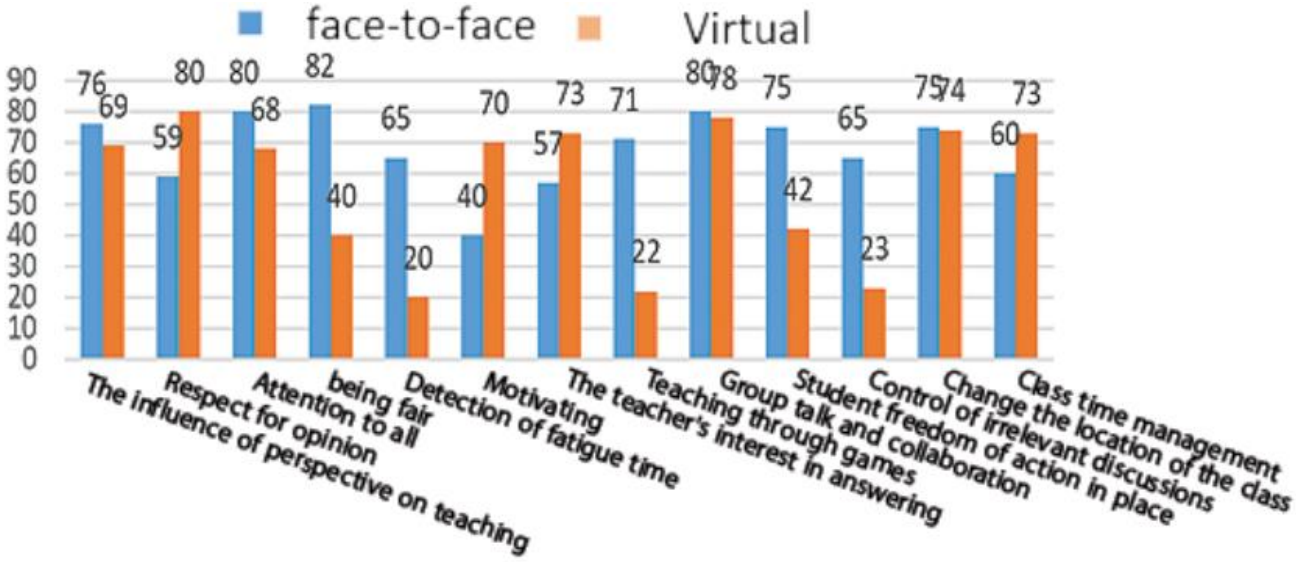

Diagram 3. Class management

Based on this chart and the opinions of the professors regarding the matter, the most effective and useful factors in face-to-face classes recognize the fatigue of students, paying attention to everyone, respecting fairness between students, teaching through games and entertainment, and controlling various discussions. On the other hand, the most important factors in virtual classes are respecting the student's opinion, creating motivation in the lesson and the teacher's

interest in responding, and class time management.

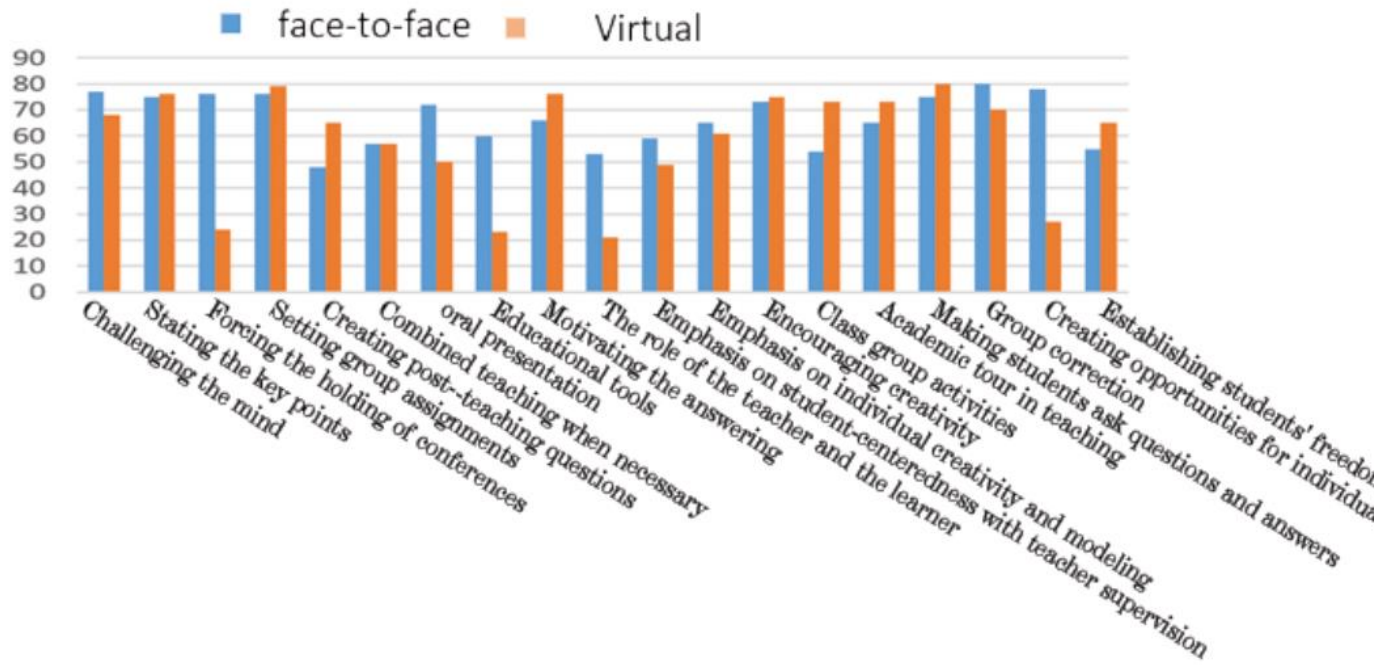

Diagram 4. Teaching method

In the diagram of the teaching method, the professors' opinion shows that the main difference in the part "forcing to hold a conference" is more common and works better in face-to-face classes than in virtual ones. Plus, "educational aids," "the role of teacher and student learner," "creating opportunities for activities in the class," and "oral presentation" are more possible in face-to-face classes. On the other hand, "Establishing student's freedom of action," and "group activities in class," and "determining motivation in class," and "creating questions after class" have better output in virtual classes.

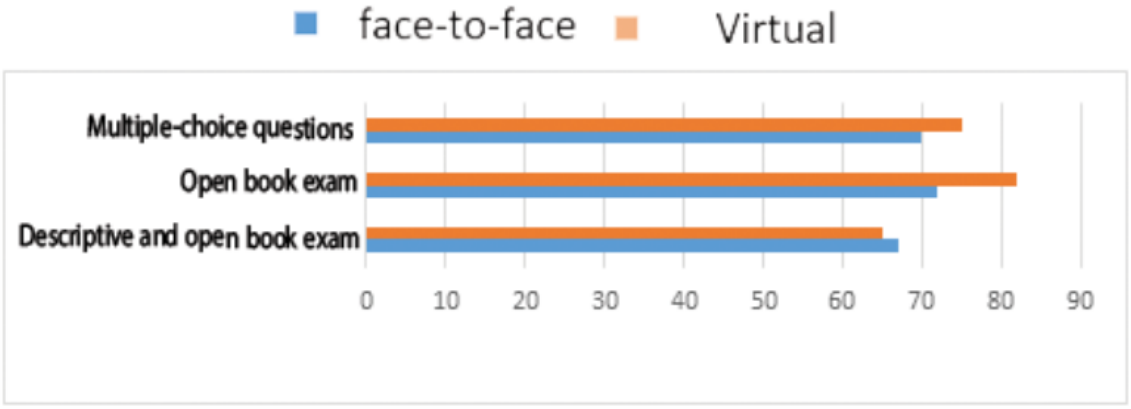

Diagram 4. Test-giving method

The professors believe that the usefulness of the materials and the evaluation of the objective are better checked in face-to-face classes. Nevertheless, in contrast, the effects of classroom activities and especially the evaluation of learning continuity are more

effective in virtual education due to the durability of materials in the form of videos, PowerPoint, etc.

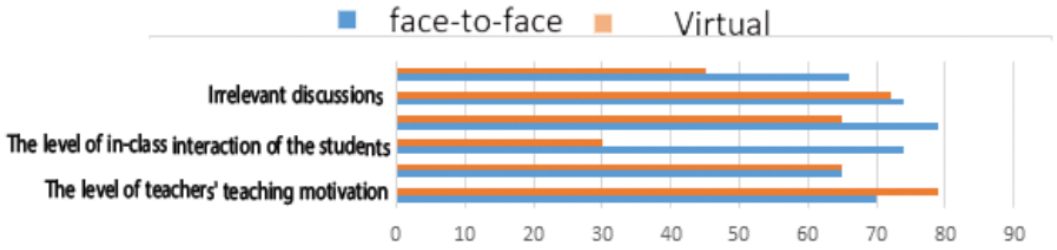

Diagram 7. Fatigue and motivation of teachers in both methods

Furthermore, eventually, the professors acknowledge that the student's attention to the lesson, the number of students' questions and the level of interaction with them, are more in face-to-face classes. On the contrary, the level of teaching motivation of professors in virtual classes is significantly different from face-to-face classes due to saving time and the lack of compulsion to attend class.

Conclusion

This study investigates the association between teaching architecture in practical courses and the level of students' learning through virtual education. As seen in the graphs, considering that some options do not include practical lessons, in the class management section, it seems that in virtual teaching, professors are less able to manage the class because they cannot attract everyone's attention. Also, they cannot fully master the items of "being fair" and "student fatigue" and cannot fully control irrelevant discussions. Furthermore, due to the inability to force conferences, use educational aids and games and entertainment, and create few classroom activities for students, the "teaching method" item also has less ability in virtual classes. On the other hand, in the "test-giving method" and "Evaluation" of practical courses, professors can perform better because the student is asked to send a video of the work process and photos to the professors. This sound solution can be used even in face-to-face classes. The item level of "teachers' fatigue" is equal for the two methods, which is not the reason that all cases are the same - even though in the virtual class, the professor uses more effort to teach and transfer concepts to the students, due to the lack of path fatigue and less class time. In virtual classes, the level of weariness is equal to the face-to-face teaching mode. In this example, the reason for the difference in the results of the two methods of investigation is determined. Virtual classes become more important and superior when the main components are reviewed due to the diversity and outcome of the mentioned cases. Nevertheless, when all the items are measured in detail, the correct process of the classes is determined. This is the main difference between face-to-face and virtual classes.

Recommendations

It is advised that other than the workshop method in teaching learning strategies and study skills, electronic education methods be used to enhance the education of students as much as possible. What should be considered in future research and studies is the quality and pathology of e-learning lessons from different aspects of education, technology, etc. In this way, by in-depth research, recognition of these courses, and overcoming the existing defects, the base is provided for improving electronic education as much as possible. Furthermore, the following strategies can be mentioned for more efficiency:

1- An opportunity to practice, 2- Using appropriate timings, 3- Using grading systems, 4- Authentic online education certificate, 5- Using videos and short teaching, 6- A field for students to communicate with each other. 7- Analysis using feedback and test results.

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