

The Effect of Integrated Teaching of Architectural Foundation Courses on the Creativity and Educational Motivation of novice Learners

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Abstract

As a first lesson of architectural design, among the basic courses, the Architectural Basic Design is very important. Strengthening the power of visualization, imagination and thinking ability of students, understanding the structural elements of the building, dealing with the physical areas, is the purpose of the Architectural Basic Design. The purpose of the study is trying to depict the effect of studio teaching methods (Integrated and disintegrated teaching of required courses), on the architecture students motivation and creativity. The following methods were quantitative. For this purpose, the exercises of the Architectural Basic Design, for students in their second semester by two methods of combination (simultaneous teaching of basic courses under a single program) and disintegration (Independent teaching of basic courses) has been considered. The test has been carried out by two groups of students in each of the above studio education systems. The Valrand motivation questionnaire and Abedi creativity questionnaire are used for the measurement of motivation and creativity. As a result, teaching Architectural Basic Design alongside other required parallel courses, increases intrinsic and extrinsic motivation and reduces their lack of motivation. With increasing motivation, novice learners will have the ability to create new ideas and will be able to expand it due to their abilities and this means that the creativity has increased. As a result, integrated education of basic courses is more dynamic education due to the increased motivation and creativity of the students.

Keywords: Architecture education, Basic courses, Architectural Basic Design, Educational motivation, Creativity.

1. Introduction

The most important goal of architectural education is to train successful graduates who are capable of applying what they learn to solve real-world problems and challenges. To achieve this goal, teaching and learning methods should be directed in a way that they can simulate students' academic motivation and enhance their creativity. Since in the discipline of architecture, unlike most academic disciplines, students do not obtain a sufficient background from the pre-university course, they suddenly face the field of architectural design without understanding and recognition of its effective components and this will not be desirable. Therefore, design courses should be taught to students in an appropriate way to enhance their academic motivation and creativity. The present study aims to investigate the effects of combined (concurrent teaching of basic courses) and disintegrated (separate teaching of basic courses) teaching methods on architecture students' academic motivation and creativity in basic courses and to present strategies to enhance architecture students' academic motivation and creativity. In the first part of this study, the components of creativity, academic motivation, architectural education are discussed and research background is reviewed. Then, the exercises carried out in "Architectural Basic Design" course taught using a combined teaching method at Islamic Azad University, Urmia Branch are examined and the impact of these

exercises on students' academic motivation and creativity are examined.

2. Research Background

At most Iranian universities, architectural basic courses are taught in the first three semesters based on the curriculum approved by Iran's Supreme Planning Council. Gharibipour and Toutouchi (2015), in their article entitled "Comparative Revising the Curriculum of Basic Design Studios in Undergraduate Studies of Architecture", have studied the architectural basic design courses at three universities in Iran, as shown in Table 1.

Mayahi and Mazaheri (2022), in their study, stated that the level of architecture students' information about creativity and ways of its development are not enough and the creativity issue is not obvious and known for most of them. It is suggested that design professors use various methods to reach the desired designs in order to achieve desired designs in order to achieve creative studios. Abedi et al. (2020), in their study, have studied the educational strategy for concept in the process of architecture based on Mise en Scene's theory in Architectural Design Basic (II) Course. The results show that the proposed design method was effective in empowering students to create ideas, express and present their mental concepts at macro and micro level. Kalantari et al. (2020), in their study, stated that the conceptual elements of creativity, including person, environment, process, and product, are very significant in

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creativity enhancement in design studios but these factors alone cannot promote students' creativity. Motiei et al. (2019), in their study, investigated the effect of concurrent and combined teaching of architectural basic courses on students' academic motivation in applied geometry course and stated that educating basic courses such as applied geometry in architecture using concurrent and combined teaching method increases architecture students' interest and enhances their intrinsic and extrinsic motivation and consequently improves the quality of education. Motiei et al. (2018), in their study, stated that a dynamic and purposeful education can be achieved by concurrent and combined teaching of the basic courses, preparing a common course plan and keeping the continuity of the exercises in order to make them more realistic, emphasizing individual and group exercises as well as

promoting architecture novices' motivation, emotional intelligence and creativity.

Priya and et.al (2020), in their study, stated that the architectural design studio is an important process, which aims to shape the skill, knowledge, and sensitivities of students and enhances their lateral thinking as well as their problem solving skills. Swanzy-Impraim and et.al (2023) in their study, stated that innovative learning environments (ILEs) have been regarded as one of the contributing factors that facilitate creativity in learners.

Although many studies have been carried out on the academic motivation and creativity, there is no study on architecture and the impact of methods used for teaching basic courses on the academic motivation and creativity of architecture students in the "Architectural Basic Design I" course.

Table 1

Architectural basic design courses at three universities in Iran (Arranged and derived by Authors, from Gharibpour and Toutounchi, 2015, 64 and 65)

Tehran University	In Tehran University, architectural design basic courses are presented in two parallel workshops, in the form of a set of "Architectural Basic Design I, II and III" and Architectural Communication I, II and III" courses, within about 16 hours per week during three semesters.
Shahid Beheshti University	Basic courses are presented in two studios with the same structure. In the first semester, the workshop of "Architectural Basic Design" which is almost equivalent to the total basic courses presented in the first semester in the curriculum approved by the Supreme Planning Council. From the second semester, architectural design workshops are presented, that are equivalent to "Architectural Basic Design I, II" in the approve curriculum. The "Presentation Methods 1 and 2" courses are also equivalent to "Architectural Communication I and II".
Iran Science and Technology University	In this university, the basic courses presented in the curriculum approved by the Supreme Planning Council are taught. They are present in three semesters and with various professors. In each academic year, students pass "Architectural Basic Design" courses in two consecutive semesters while they starting other courses.

3. Theoretical Framework Creativity

It is almost impossible to define creativity in a single sentence (Horikami and Takahashi, 2022:1). The relationship between creativity and innovativeness is perceived by most researchers; however, the ways of explaining the mutual relations between the phenomena vary between scholars (Gajdzik and Wolniak, 2022: 2). Creativity is a human phenomenon that has existed since the creation of mankind (Mahdi et.al, 2021: 466). Creativity is one of the most essential skills for success in life in our dynamic, complex world (Rahimi and Shute, 2021:1). Initially, interest in creativity as represented by invention and discovery has a long history, and creativity research has been conducted mainly in psychology (Kondo and et.al,

Creativity, a fundamental driver of development and growth across many disciplines, holds increasing importance in today's knowledgecentric, globally competitive and dynamic workplace (Amin and et.al, 2023: 107287). Creative activity concentrates in particular places and at particular times (Doehne and Rost, 2021:1).

The ability to solve problems creatively is a vital educational outcome (Loh and Lim, 2020: 1) Creativity is a novel solution that is appropriate to a specific design project (Vo and Asojo, 2021: 2). Creativity is broad term encompassing convergent thinking, divergent thinking, and insight creativity as well as any idea, imagination, or

production that is both original and of value (Frith and Loprinzi, 2020: 827). Guilford (1967) associates convergent thinking with intelligence and divergent thinking with creativity. In Guilford's theory, divergent thinking consists of several factors, the most important of which are: Fluency: the ability to produce a great number of ideas; Flexibility: the ability to generate varied and unusual ideas; Originality: the ability to use unique and new solutions; and Elaboration: the ability to develop a detail of the decision (Enayati & Abedi, 2016, 3).

Academic motivation

Motivation is important in everything a person does because it affects a person's well-being, how people approach tasks, and how they perform (Degrave et.al, 2023, 2). Motivation is one of the most important prerequisites in the educational process (Khakpour, 2016, 48). Experts have divided motivation into two major groups: intrinsic and extrinsic. The factors of intrinsic motivation are internal and personal enhancers that provide the necessary attraction for any activity, whereas the factors of extrinsic motivation refer to external enhancers and due to their influences, an individual tries achieve an independent goal (Beyrami et al., 2014, 188).

Architectural education

Architectural design studios use various types of models as design tools, including handmade conceptual, land, mass, and working models (Özeren et.al, 2023: 1). The design

studio term is usually used to define a location where the architectural design is learned and practiced (El-Latif and et.al, 2020: 753). The first milestone and the foundation in every architect's life is architectural education. As creativity is the core of successful architecture, focusing on its development in the pedagogical years would enhance every architect's future career (Hemdan, et.al. 2023: 847). Academic and planned architectural education has been established in Iran since about 1939. Until 1998, the discipline of architecture had been offered as a continuous master's degree and students had been admitted through the entrance exam. Since 1999, the status of architectural education has undergone some changes with the change of degree from continuous master to continuous bachelors.

4. Research Methodology

This research is a descriptive, causal-comparative study. To collect quantitative data, Vallerand's Academic Motivation Scale and Abedi's creativity questionnaire were

used. Vallerand's Academic Motivation Scale includes 28 questions based on 5-point Likert Scale. After verifying its content validity and localizing it by experts, its reliability and internal consistency were confirmed by two-week test-retest ($r = 0.75$) and Cronbach's alpha (0.88), respectively. The questionnaire has three types of components, including intrinsic motivation (2 items), extrinsic motivation (4 items), and amotivation (four items) (Roshan et al., 2011, 359). Abedi's creativity questionnaire has 60 3-option items and its test-retest reliability was estimated 0.83. This questionnaire randomly and irregularly measures creativity at three high, medium, and low levels with the four subscales of fluency, elaboration, originality, and flexibility. The sum of the scores obtained in each sub-test indicates the subject's score in that subscale (Rahimiand & Abbaspour, 2015: 125). Quantitative data analysis was performed by two-sample t-test using SPSS software. Figure 1 presents the theoretical framework of the research.

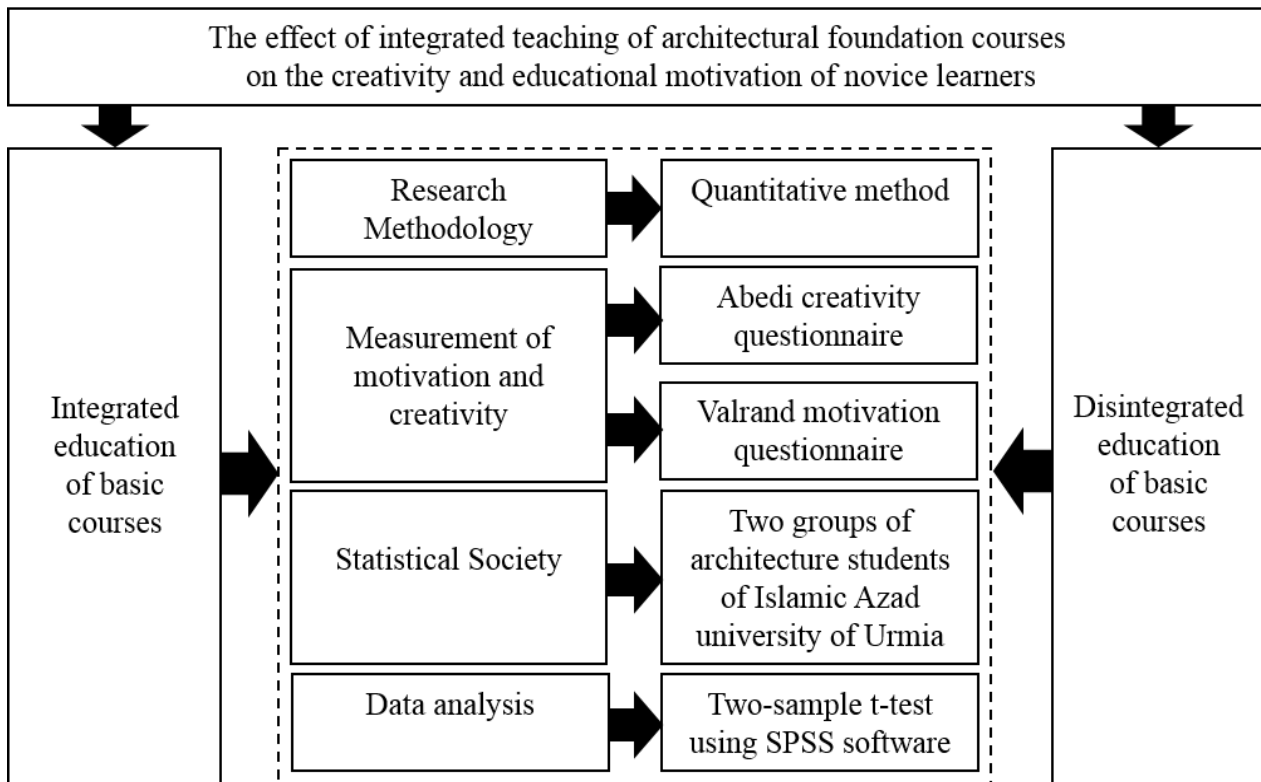


Fig. 1. The theoretical framework of research

5. Results and Discussion

After dividing participated students into two groups of teaching method (combined and disintegrated), applying the relevant teaching method for one semester, they were performed the exercises of "Architectural Basic Design" course. In the first group, the disintegrated teaching method (independent teaching of basic courses by different tutors) was applied and students performed exercises independently and individually. While in the second group, applying the combined method (simultaneous teaching of basic courses by a group of tutors), students did continuous exercises and additionally, individual and group exercises, in which drawing, architectural model-making and

presentation were taught. The statistical population consisted of the second semester students of Islamic Azad University (Urmia Branch) who attended in "Architectural Basic Design" class and taught with one of the two abovementioned teaching methods for one semester. One of the important basic courses in the discipline of architecture is the course of "Architectural Basic Design", which is presented in the second semester. Based on the approved syllabus, the goal of this course is to enhance visualization, getting familiar with the constituent physical elements of buildings. In this course, students should become familiar with the basic and primary principles of design (Table 2).

Table 2
The syllabus of “Architectural Design Basics 1” course

Architectural design basics	0 theoretical and - 5 practical units
Objective	Enhancing student’s visualization, imagination and reasoning, familiarity with the physical elements of the building
Subject	1. Building elements such as: ceiling, floor, wall, window, semi-open space, stairs, etc. 2. Topics discussed in space-making such as the organization of components within space, the role of materials and colors in architecture, lighting in architecture, etc.

Although there are various exercises at different universities, as the preliminary requisites of teaching architectural design, designing simple single-function constructions, such as alcove, bus stop, portal, and so on,

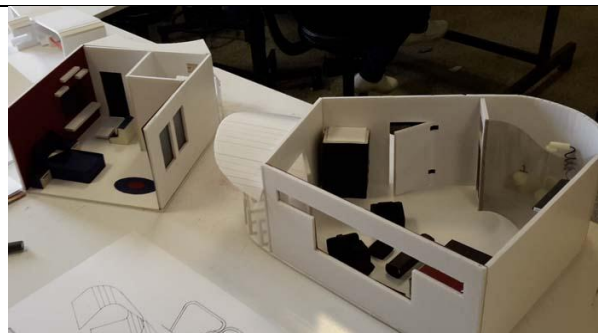
can be considered as starting practices in order to teaching some concepts such as rhythm, basic agent, and hierarchy by focusing on the concept of equilibrium and stability (Table 3).

Table 3
Single-function building design exercises in “Architectural Basic Design” course in the combined studio-based teaching group (simultaneous teaching of basic courses) at Islamic Azad University, Urmia Branch.



1- Alcove: Using rhythm, base agent, and hierarchy. Presentation of the project in a paper of A3 to practice rendering, drawing and architectural model-making

2- Bus station: It is more complex than the design of the alcove and the connection between the bus station and the place of ticket booth should be taken into account.



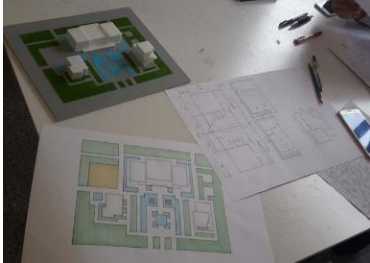
3 Gate: It is more complex than the bus station design. Being inviting pedestrian safety, car entry and exit, guard place are considered in the design.

4- Bedroom: making the architectural model of an ideal bedroom at 1:25 scale to make students familiar with the size of beds, closets, desks, bookshelves, doors, windows

By performing single-function building design exercises, the student's mind becomes ready to perform more complicated exercises. At this point, considering an exercise consisting of the design of 2 or 3 buildings with simple functions together, on a site with no limitations of climate, access, terrain, focuses the student's mind on the link between these functions. In the present study,

designing an ablution and a prayer room together in the park was considered for this stage. Such a site was considered to set aside design constraints and design criteria and merely to familiarize students with the initial design process including initial site analysis, development of physical plan, drawing of diagram, structural drawing, architectural model-making, and rendering (Table 4).

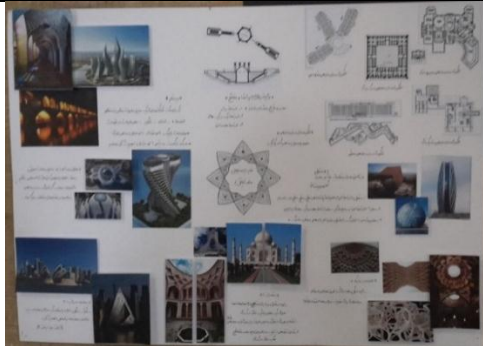
Table 4
Complicated design exercise in “Architectural Basic Design” course in the combined studio-based teaching group (simultaneous teaching of basic courses) at Islamic Azad University, Urmia Branch.

Exercise	Description	Photo
Design of toilet and prayer room in park	To know the dimensions of the simple toilet and that one constructed for the disabled, orientation of the prayer room towards Qibla, how to connect the sanitary service with the prayer room, location of servant room, buffet, storage, door openings, how to place the building on the platform, the use of ramp and how to calculate its length, how to draw plan, facade, cross- section, perspective and rendering in a paper of A2	

Considering some exercises for familiarizing students with Iranian and international architectural works and also some exercises for finding examples of rhythm, basis factor, hierarchy, and equilibrium, in the international architectural works, reveals the importance of these

concepts in architectural design for students. Considering these exercises in a group manner, in addition to teaching the abovementioned concepts, can increase students' individual abilities in teamwork (Table 5).

Table 5
Group exercises in “Architectural Basic Design” course in the combined studio-based teaching group (simultaneous teaching of basic courses) at the Islamic Azad University, Urmia Branch.



Building analysis



Analysis of the project in the history of Iranian and world architecture



Analysis of Villa la Rotonda, Villa Savoye, Vanna Venturi House, Villa dall'Ava



Study of the spaces in a house

Architecture students of the Islamic Azad University (Urmia Branch) were taught in two separate studios by applying two combined and disintegrated teaching methods. In the combined teaching group (simultaneous teaching of basic courses), it was tried to simultaneously

teach basic courses of applied geometry, Environmental Communication, Building Materials Workshop and Architectural communication along with the course of Architectural Design Basics by a group of professors & tutors; presenting related exercises to enhance students'

individual skills and abilities. In the disintegrated teaching group (independent teaching of basic courses), according to the common teaching process, the courses were taught separately and independently. Each course was discretely taught solely based on its syllabus, with separate exercises and without the simultaneous attendance of professors in studios of basic courses. At the end of the second semester, students of both groups completed Vallerand’s Academic Motivation Scale. Two-sample t-test was used to analyze the data. In this model, one variable is examined in two groups. One of the following hypotheses is intended in this analysis:

H0: According to respondents, there is no difference between the two combined and disintegrated teaching methods.

H1: According to respondents, there is a difference between the two combined and disintegrated teaching methods.

To test this hypothesis, the independent t-test is applied if the variables are normal. The normality of the observations is examined using Shapiro-Wilk test (Table 6).

Table 6
Examination of normality of observations using Shapiro-Wilk test

	Shapiro-Wilk		
	statistic	df	Sig.
Intrinsic	0.955	36	0.149
Extrinsic	0.964	36	0.287

Table 8
Independent two-sample t-test using Spss software

	t	df	Sig. (2-tailed)	t-test for Equality of Means			
				Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
						Lower	Upper
Intrinsic motivation	-2.542	34	0.016	-8.77778	3.45329	-15.79570	-1.75985
Extrinsic motivation	-2.855	34	0.007	-8.55556	2.99661	-14.67540	-2.46571

In this study, the first group was considered the disintegrated studio-based teaching method and the second group as the combined studio-based teaching method. According to Table 8, about the impact of disintegrated and combined teaching methods on intrinsic motivation, it can be seen that Sig. (2-tailed) is 0.016 and less than 0.05. Therefore, there is a difference between the means of the two combined and disintegrated teaching methods and the null hypothesis is rejected at 95% confidence level. Since the mean difference between the two groups is less than zero, the mean of the combined teaching method group is smaller than the mean of the disintegrated teaching method group.

About the impact of disintegrated and combined teaching methods on extrinsic motivation, it can be seen that Sig. (2-tailed) is 0.007 and less than 0.05. Therefore, there is a difference between the means of the two combined and disintegrated teaching methods and the null hypothesis is

rejected at 95% confidence level. Since the mean difference between the two groups is less than zero, the mean of the disintegrated teaching method group is smaller than the mean of the combined teaching method group. At the end of the semester, the same architecture students attended in “Architectural Design Basics” class at the Islamic Azad University (Urmia Branch) completed the Abedi’s Creativity Questionnaire. Accordingly, one of the following hypotheses is intended:

Table 7
Equality of variance test

	Levene's Test for Equality of Variances	
	F	Sig.
Intrinsic motivation	0.812	0.374
Extrinsic	0.028	0.868

In Levene’s test performed to examine the equality of variances, the null hypothesis implies the equality of variances and the alternative hypothesis implies the inequality of them. Since the value significance was obtained greater than 0.5 for both variables of intrinsic and extrinsic motivations, the variances of these two variables are equal. So, t-test can be applied.

In this test, the null hypothesis implies the normality of variables and the alternative hypothesis is contrary to the null one. Since the value significance was obtained greater than 0.5 for both variables of intrinsic and extrinsic motivations, the data for these two variables can be assumed normal at high confidence level. Now the mean comparison test is performed for the normal variables. Another important test for comparing means is the test of equality of variances (Table 7).

rejected at 95% confidence level. Since the mean difference between the two groups is less than zero, the mean of the disintegrated teaching method group is smaller than the mean of the combined teaching method group. At the end of the semester, the same architecture students attended in “Architectural Design Basics” class at the Islamic Azad University (Urmia Branch) completed the Abedi’s Creativity Questionnaire. Accordingly, one of the following hypotheses is intended:

H0: According to respondents, there is no difference between the two combined and disintegrated teaching methods.

H1: According to respondents, there is a difference between the two combined and disintegrated teaching methods.

To test this hypothesis, the normality of variables is examined in a way discussed earlier and finally, the independent t-test is applied.

Table 9
Independent two-sample t-test using Spss software

	t-test for Equality of Means						
	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
						Lower	Upper
Fluency	-4.274	34	0.000	-1.16582	0.27277	-1.72016	-0.61148
Originality	-3.024	34	0.005	-0.90799	0.30022	-1.51811	-0.29788
Elaboration	-8.915	34	0.000	-7.72222	0.86624	-9.48262	-5.96182
Flexibility	-3.734	34	0.001	-4.00000	1.07135	-6.17724	-1.82276

In this study, the first group was considered the disintegrated studio-based teaching method and the second group as the combined studio-based teaching method. According to Table 9, about the impact of disintegrated and combined teaching methods on the component of fluency, it can be seen that Sig. (2-tailed) is 0.000 and less than 0.05. Therefore, there is a difference between the means of the two combined and disintegrated teaching methods in relation to this component and the null hypothesis is rejected at 95% confidence level. Since the mean difference between the two groups is less than zero, for this component, the mean of the disintegrated teaching method group is smaller than the mean of the combined teaching method group.

About the impact of disintegrated and combined teaching methods on the component of originality, it can be seen that Sig. (2-tailed) is 0.005 and less than 0.05. Therefore, there is a difference between the means of the two combined and disintegrated teaching methods in relation to this component and the null hypothesis is rejected at 95% confidence level. Since the mean difference between the two groups is less than zero, for this component, the mean of the disintegrated teaching method group is smaller than

the mean of the combined teaching method group. About the impact of disintegrated and combined teaching methods on the component of elaboration, it can be seen that Sig. (2-tailed) is 0.000 and less than 0.05. Therefore, there is a difference between the means of the two combined and disintegrated teaching methods in relation to this component and the null hypothesis is rejected at 95% confidence level. Since the mean difference between the two groups is less than zero, for this component, the mean of the disintegrated teaching method group is smaller than the mean of the combined teaching method group.

About the impact of disintegrated and combined teaching methods on the component of flexibility, it can be seen that Sig. (2-tailed) is 0.001 and less than 0.05. Therefore, there is a difference between the means of the two combined and disintegrated teaching methods in relation to this component and the null hypothesis is rejected at 95% confidence level. Since the mean difference between the two groups is less than zero, for this component, the mean of the disintegrated teaching method group is smaller than the mean of the combined teaching method group. (Figure 2)

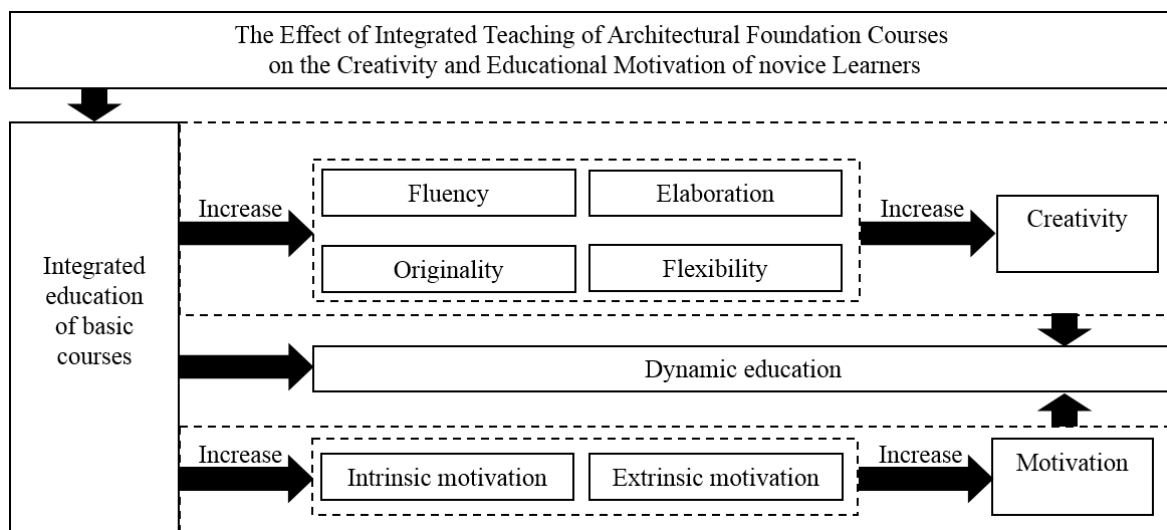


Fig. 2. The effect of integrated teaching of Architectural foundation courses on the creativity and educational motivation of novice learners

6. Conclusion

According to Table 8 and 9, it can be found that teaching “Architectural Basic Design” course using a combined

teaching method increases students' both intrinsic and extrinsic motivations and creativity in the all of four components of fluidity, elaboration, originality, and

flexibility. Today, in architectural education, we see problems such as the lack of students' motivation that result in their diminished creativity. In this regard, prerequisite design courses which play the most important role in students' understanding of architecture and nurturing their capabilities of required skills are of great importance. Due to miscellaneous training and arbitrary choice of exercises for the prerequisite design courses, the lack of coordination between studio tutors in the selection of the types of exercises and the lack of a clear link between the courses, students' confusion, decline of skills and empowerment and thereby their reduced academic motivation are observed. Therefore, there is a need for methods to generate academic motivation and enhance creativity amongst architecture students. According to this research, teaching prerequisite design courses with a proper teaching method such as combined studio-based teaching, will enhance students' academic motivation and increase their creativity. Simultaneously teaching basic courses in "Architectural Basic Design" course can enhance students'

abilities to draw building plans and perspective, render relevant exercises and make architectural model. Moreover, enhancing these abilities, as essential tools, increase students' confidence and motivate them to produce new ideas, resulting in the improvement of students' creativity. Figure 3 illustrates the impact of simultaneous teaching of basic courses on the training of efficient architects. According to figure 3, simultaneous teaching of basic courses eliminates students' weaknesses and improves their visual and verbal skills, increasing their interest in architecture and thereby enhancing their motivation to continue this path. Architecture novices require a creative mind to obtain unique solutions to design problems, and this ability can be enhanced by anticipating appropriate exercises incorporating all aspects of education into the Architectural Basic Design course. Increasing novices' motivation and creativity guarantees the development of efficient architects and this necessitates the simultaneous teaching of the basic courses and the anticipation of common exercises in them.

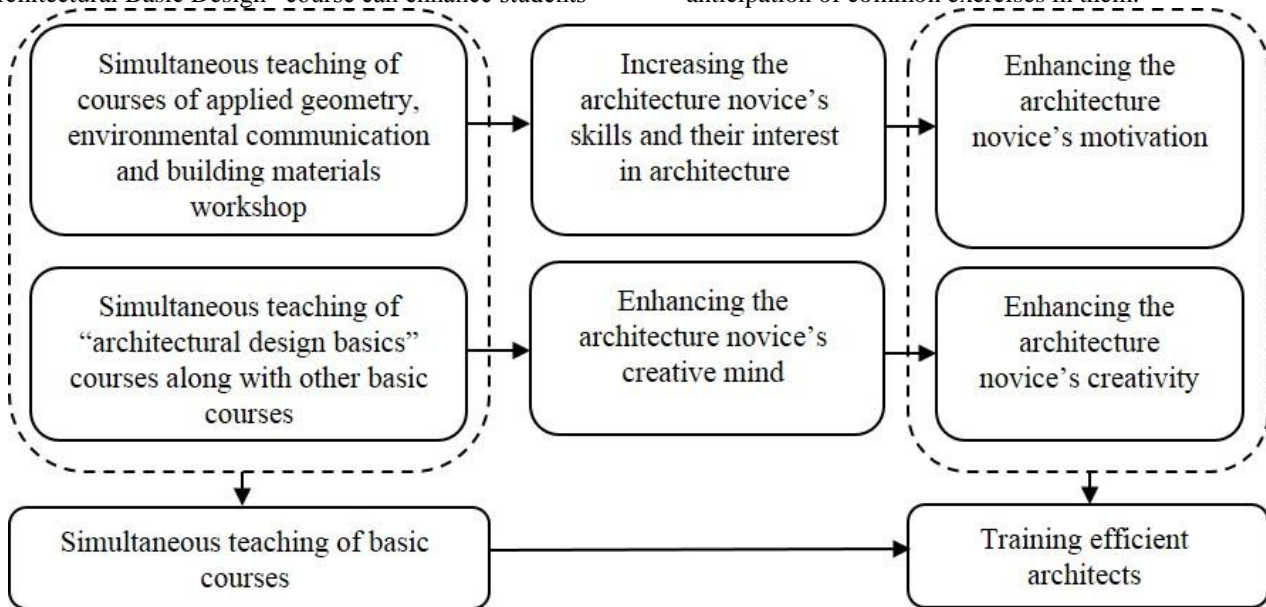


Fig. 3. The impact of simultaneous teaching of basic courses on training of efficient architects

When an architecture novice has high levels of motivation and creativity, s/he will be able to find unique design resolutions and, therefore, determines his/her design path and achieve a desirable design by choosing the right concept and idea. According to the studies, if students are taught architectural design basics and prerequisite courses with an appropriate teaching method such as a combined teaching method (combined and simultaneous teaching of basic courses and coordination between studio tutors and purposeful selection of exercises), their academic motivation and creativity can be enhanced. Teaching "Architectural Design Basics" course using a combined teaching method (simultaneous teaching of basic courses) increases architecture novices' extrinsic and intrinsic motivations because using this teaching method for the abovementioned course improve the drawing skills of novices. Choosing the exercises of simple function building design, such as alcove, familiarizes the novices

with the basic design elements such as rhythm, basic agent, equilibrium, and increase his/her interest in learning discussions such as drawing and architectural model-making to present his/her own intellectual ideas and ask his/her tutors' opinion on his/her design to eliminate his/her weaknesses in presentation. Increasing the novice's drawing abilities has a great effect on increasing his/her motivation. As her/his motivation increases, the novice's mind becomes more capable of creating new ideas and will be able to expand it by applying acquired abilities. This means that the novice's creativity is enhanced. Undoubtedly, enhancing the academic motivation and creativity of architecture students is the main goal of any educational program, and this can only be achieved when there is continuous and dynamic education.

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