JAUES

Journal Of Al-Azhar University Engineering Sector

Vol.15, No. 54, January, 2020, 80- 91

IMPLEMENTATION AND ASSESSING UTILIZING OF VARK THEORY AT PEDAGOGY IN THE ARCHITECTURAL DESIGN STUDIO: EXPERIMENTAL STUDY

Emad Eldin Hamdy Abd Elhamid Abd rabboh
Architectural Engineering Department, Canadian International College (CIC),Giza,Egypt.
E-mail: emadeldin_hamdy@cic-cairo.com

ABSTRACT
Visual, Auditory, Read/Write and Kinetic/Kinesthetic (VARK) theory contends that one's preferred learning modalities (LM) influences the best method to receive information, in order to the superior learning process. It proposed to examine this theory with the sophomore level (Level II) architecture students in methods of architectural learning in architectural design studio. This study was applied to the undergraduate class of the architecture program at the Canadian International College, El Sheikh Zayed Campus, Giza; Cairo (CIC), the study conducted through two years, however, data collected during spring 2017 and fall 2018 semesters. The current study verify the utilization and adoption of VARK as a learning method, through questionnaires as a survey distributed to students to solicit their opinion regarding this experiment, and the perceived influence it had on their architectural educational achievement, So as to take into account the impact of learning styles (LS), the study proposed that the VARK theory will be applied in all architectural student cohorts. Consequently, the conclusions of this study will determine whether this pedagogical methodology should be further applied to all architectural students – freshman, junior or senior level– or not. Eventually, the results showed that all architecture students were Multimodal, the majority of students (36%) tend to the Kinesthetic learner, furthermore, the students illustrate positivity about the application of the proposed experiment, besides, the study showed the progress of students' grades after applying the experiment.

KEYWORDS: Architecture pedagogy- Learning styles- Visual, Auditory, Read/Write and Kinetic (VARK) learning style

تجربة وتقييم استخدام نظرية فارك فى التعليم فى استوديو التصميم المعماري: دراسة تجريبية

عماد الدين حمدى عبدالحميد عبدربه
قسم الهندسة المعمارية، المعهد الكندي العالى للهندسة، بالسادس من أكتوبر،الجيزة، مصر
البريد الاليكتروني: E-mail: emadeldin_hamdy@cic-cairo.com

الملخص
نظرية فارك هى نظرية لأنماط التعليم المفضلة لدى الطلاب، وهى اختصار المتعلم البصري و المتعلم السمعي ومتعلم القراءة والكتابة و المتعلم الحركي، وهى تعد من طرائق التعلم المفضلة لتلقي المعلومات لدى الفرد والتى تؤدي الى عملية تعلم مميزة. أقترحت الدراسة الحالية دراسة وتطبيق هذه النظرية مع طلاب الهندسة المعمارية فى المستوى الثاني، وتطبيقها فى أساليب التعلم المعماري في استوديو التصميم المعماري. تم تطبيق هذه الدراسة فى برنامج الهندسة المعمارية في الكلية الكندية الدولية ، حرم الشيخ زايد، الجيزة؛ القاهرة، أجريت هذه الدراسة على مدار عامين، بينما تم جمع بيانات الدراسة خلال ربيع عام ٢٠١٧ وخريف ٢٠١٨. تتحقق الدراسة الحالية من اعتماد استخدام فارك كوسيلة للتعلم هى استوديو التصميم المعماري، تمت الدراسة

من خلال استبيانات يتم توزيعها على الطلاب لاستطلاع رأيهم بشأن هذه التجربة، وتقييم التأثير الملحوظ الذي أحدثته على تحصيلهم التعليمي المعماري، بعد تطبيق نظرية فارك(ومراعاة أساليب التعلم. نتائج هذه الدراسة ستحدد ما إذا كان ينبغي تطبيق هذه المنهجية التربوية على جميع طلاب الهندسة المعمارية، طلاب (مبتدئي – متوسطى – متقدمى) المستوي أم لا. في النهاية ، أظهرت النتائج أن جميع طلاب الهندسة المعمارية الذين تم التجربة عليهم كانوا متعددي الانماط التعليمية، غالبية الطلاب (٣٦ ٪) يميلون إلى التعلم الحركي، علاوة على ذلك، أتضح اتجاه رأى الطلاب الإيجابي بخصوص تطبيق التجربة المقترحة، إلى جانب ذلك ، الدراسة أظهرت تقدم درجات الطلاب وتقديراتهم بعد تطبيق التجربة.

الكلمات المفتاحية: نظرية فارك في التعليم المعمارى، أنماط التعلم ،أسلوب التعلم المرئي، السمعي، القراءة ، الكتابة والحركي ، استوديو ، التصميم المعماري.

1. INTRODUCTION

The acronym VARK stands for Visual, Auditory, Read/Write, and Kinesthetic sensory (LM) that are utilized for learning information, The VARK theory concerns the people and their diverse educational modalities, and ways of focusing on the preferable perceptual preferable perceptual[١]. The present study has tended to emphasis on the utilization of VARK theory as a teaching method in the architectural design studio, since it applied straightforwardly, likewise, appropriate for the architectural program students. Noticeably, the pedagogical experiments required a progressive elaboration to ameliorate it in further studies. For Pedagogical development what is required is an investment in the research related to teaching and pedagogy to best prepare and qualify the students who are to build our communities and who will shortly embark on professional careers in architecture. Consequently, the learning methods and styles of each student should inspect individually. The (LS) is the learner's concepts and preferences in using a specific learning pattern to be taught[٢]. Recently, there is an extensive debate about the importance of using (LS) models and theories in undergraduate education and the use of these models. There are also those who dismiss their importance and express against their demands at this level (Kirschner, P. A. 2017)[٣]. The effect of applying the theory of VARK and learning preferences on the students' achievements studied[٤]. The strategies of teaching/learning and the techniques of communicating with students require more from the personalization of instruction in accordance with (LS), to enhance the understanding between the students and the faculty. The result of this understanding will help ensure that the required curriculum outcomes are met. In general, the objective of the learning process is to facilitate the goal of assisting the student to attain a suitable scientific level for the professional workplace and bridge the knowledge gap for the student. Moreover, this will help the students achieve the desired balance between academic and personal skills, as they progress through the process of self-development. The aim is to have the students develop thinking skills in general and critical and creative thinking specifically. Such students, who might well encounter professional difficulties, would have by this point developed in individuals with a strong sense of self and personal drive to overcome any of the future challenges of their scientific discipline.

Students with a visual dominant (LM) will design and conduct visual models and metaphors to reflect the appropriate architectural concepts of the projects. Correspondingly, teaching faculty will include visual aids and representations in their pedagogy. Those students with a preference for receiving information through auditory channels will receive auditory, descriptive explanations as a prime method of tutoring and project critique as well. Besides, Students were given the opportunity to discuss their projects with supervisors and their colleagues. In response to Read/Write (LM) Special attention will be aspects of accessing and reading in the stages of the project, furthermore, will stimulate the students with this (LM) to read some architectural references appropriate for the project set for them, in order to simulate their preferred (LS). Kinesthetic learners will design and conduct concept generation workshops empowering them to conceptualize the project in a concrete and physical technique; they will share in this workshop and examine their concept in a physical, tangible way (learning by doing). This is appropriate for this (LM), the favorite actions for them to test the experiment for their projects and thoughts by themselves.
Students do not respond to activities within the design studio in an identical manner[٥]. Broadly, the author not separate students into (LM) groups. Nevertheless, in some cases, the faculty may separate students into groups based on their dominant (LM). Additionally, orientation sessions conducted the

tutors to train them about the different (LM) and how to deal with the varied situations for teaching and assessment, which they may encounter in the different architectural critique.

1.1 Study Objectives and questions:

This research examines the successfulness of VARK approach implementation in the design studio. The contribution of utilizing VARK approach in raising students' academic level. The students' satisfaction with the application of VARK approach, as well as their contribution to improving their grades. The study will achieve these goals by answering the following questions:

Q1: Is the implementing VARK in the design studio positive for students? In order to answer this question, the students asked via a structured questionnaire.

Q2: Is the VARK application influence the students' grades positively? To reply to this question, the students' course work grades checked after and before the implementation of VARK.

Q3: Is there a correlation between the dominant (LM) and academic progress, when applying VARK in the design studio? To answer this question the relationship between dominant (LM) and student grades will be studied.

Q4: Is there an association between the students' gender and academic progress when applying VARK? The effect of students' gender on academic progress after applying VARK activities illustrated to response to this question.

Q5: Is there a relationship between the students' determined their (LM) via VARK questionnaire and students who not determining it, and between academic progress? The student grades for students who fill the VARK questionnaire vs. who don't fill it will be examined.

1.2 Study hypotheses:

The current study is based on a set of assumptions, which will be tested to reach the objectives of the study and answer the different questions and these assumptions as follows:

H1: Implementing VARK in the design studio positive for students.

H2: There's a relationship between VARK application and students' academic progress.

H3: There's a relationship between the dominant (LM) and academic progress when applying VARK in the design studio.

H4: There's a relationship between the gender of the student and academic progress when applying VARK

H5: There's a relationship between the students' determining their (LM) via VARK questionnaire and student who not determining it, and between academic progresses.

2. STUDY METHODS

This paper was based on a previous study that discussed the importance of utilizing the (LS) in the architectural design studio. In the above mention study, the importance of the use of (LS) has verified. Hypothetically, this study proposed that VARK is suitable for architecture students. The properties of each sense was examined, then the study sets appropriate learning methodologies for the design studio, based on the students' dominant (LM). Learning strategies and learning activities were designed for each style, these were also taken into account for the proposed projects; these strategies matched to the curriculum specifications and intended learning outcomes which fulfilled the architecture program specifications. learning mechanisms were proposed for each style in the architecture learning activities, the previous mechanisms relied on the modern psychological theories in the formation of university students and how to motivate them to reach the best academic performance, as well as taking into account the psychological aspects of each student on my own, also taking into account the individual differences between students in the classroom. Correspondingly, the study doesn't set separate fixed groups for each (LM) in the architectural design studio. Broadly speaking, this study examines the successful implementation of the VARK approach in the design studio, besides, its contribution to raising the level of students and their satisfaction with the architectural educational process, as well as their contribution to improving their grades.

This experiment was applied on the students enrolled in architectural design studio II, III, the study conducted through two years, however, data collected during spring 2017 and fall 2018 semesters, the students were taught by the author before the experiment and also after the experiment. One of the most important objections to the VARK theory is that it is applied during the day-to-day activities in the design studio, and the students have trained with it the design process. In contrary,

this is not done in the final exam[٦], therefore, the current study depends on only the course work scores for students. the primary data were collected via questionnaire consists of 16 questions, each question contains four answers, each answer determines the (LM), the student can choose one or more, the student who chooses one choice is Unimodal, while more than one choice is Multimodal, the questionnaire disturbed for (42) students which represent 72% from the study sample (58) students, 27(64%) male, and 15(34%) female.
Additionally, after the experiment structure questionnaire distributed to the student to validate the experiment. The study sample consists of (58) architecture students, on the sophomore level, the study demographics as follows: 19(33%) male, 39(67%) female. The primary data were analyzed via SPSS V.20 software, the associations determined via Chi-squared test, the statistical correlations identified via considering if the p-value was **<0.05**. The methodology used in the study shown in Fig. 1.

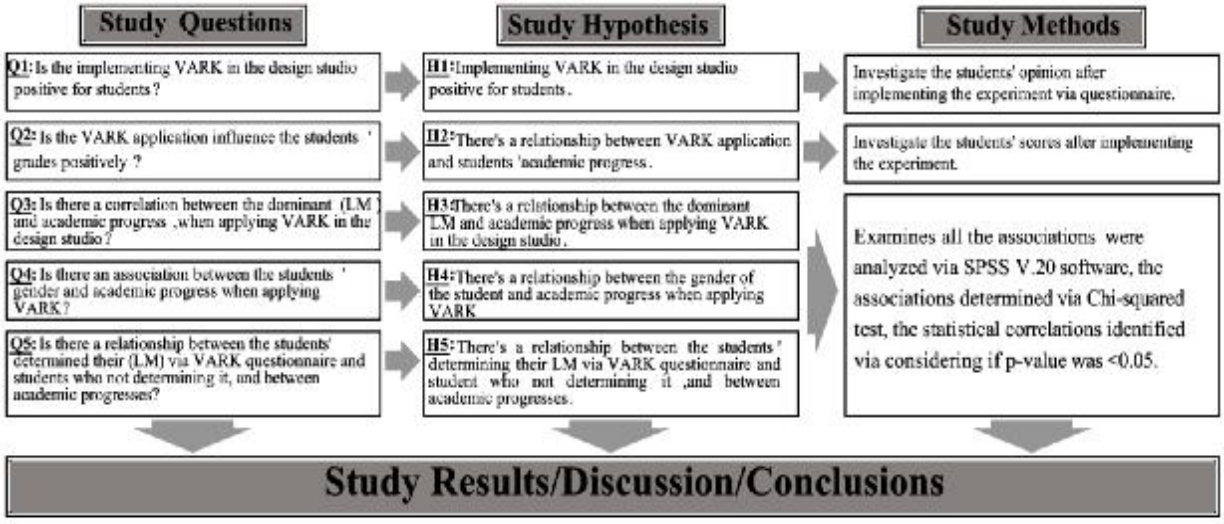

Fig.1 The methodology used in the study. Source (Author).

3. VARK THEORY

VARK stands for visual, auditory, read/writing and kinetic. Obviously, The terminology based on the five senses and how to enhance them. Fleiming proposed the VARK model[٧], many scientists develop models: Dunn and Dunn, Kolb, Feldane and Solomon, and Fleming, Sarasin later revisited it. V. Chislette and A. Chapman also developed the VARK theory (Deshmukh, V. B., et al. 2014)[٨]. Lastly, VARK was developed by Fleming (2006) (Othman, N., & Amiruddin, M. H. 2010)[٩]. VARK model depends on a questionnaire distributed to the students to determine the (LM) suitable to them. Then the students were divided into two sets of groupings, taking into account consideration for individual differences among the students, the proposed sets as follows:

3.1 Visual learners' preferences:

Visual learners prefer the use of figures and graphs, flow charts, hierarchies, models, and arrows, which represent printed information (Othman, N., & (Ictenbas, B. D., & Eryilmaz, H. 2011)[١٠]. The visual learners prefer the order around them. Otherwise, they remember colors, illustrations, graphs, charts. They have a problem with remembering names, and titles (Chang, Y. C., et al. 2009). Students adopted this manner are likely to present a presentation and can learn through descriptions. Visual students are easy to feel disturbed or change focus through movements or actions, while noise usually does not bother them (Othman, N., & Amiruddin, M. H. 2010)[١١].

3.2 Read-write learner preferences:

Read/Write Learners prefer to read and write words and printed texts as a means of absorbing information; they also prefer lists, glossaries, textbooks, lecture notes or pamphlets (Ictenbas, B.

D., & Eryilmaz, H.2011)[١٢]. Those students prefer the words and printed text as a means of obtaining information (Othman, N., & Amiruddin, M. H. 2010)[١٣].

3.3 Auditory learner preferences:

Auditory learner, mention "Heard" information, and thus like discussions, lectures and tutorials when new information is obtained (Ictenbas, B. D., & Eryilmaz, H.2011)[١٤]. Auditory learners like to talk, sing, and whistle. They learn by listening to lectures, reading aloud, and discussions. They remember well music and the conversations, however, may have problems with reading the graphic forms, such as maps, geometry. They prefer to speak about the action rather than watching it. They require silence to learn, music and noise do not allow them to focus. The Auditory learners learn a language easily

Audio learners enjoy talking, singing, and whistling. Listening to lectures, reading aloud and discussing, the best way to learn for them. They remember music well, but conversations may have problems reading illustrations, such as charts and graphs. They prefer to talk about the event rather than watching it. They require silence to learn, music and noise do not allow them to focus. Those Learners learn a language easily (Chang, Y. C., et al. 2009)[١٥].

3.4 Kinesthetic learner preferences:

Kinesthetic learning is a multimodal type that uses a range of sensory functions. Kinesthetic Learners must feel kinetic or live the learning experience; they prefer to simulate real practices, experiences, and the field experiments (Ictenbas, B. D., & Eryilmaz, H.2011)[١٦]. The kinetic learner feels the best in movement. They were tired sitting at the bench, listening to a lecture. During the speech, they often gesture. They require a break between learning sessions. They love to work in a group. (Chang, Y. C., et al. 2009)[١٧].

4. PROPOSED TEACHING TECHNIQUES BASED ON (VARK) THEORY FOR ARCHITECTURE STUDENTS:

Previous studies have been conducted, drawing on planning and design of (LM) assignments in higher education[١٨]. The study responds to every (LM) on two levels: **Level one** is the general level: used some tactics in the general design level activities, adapting some group learning methods/strategies via the design studio lectures and events in order to match all student (LM). The secondary strategy for the general level was to include some linguistic terminologies which are suitable to every (LM) and also talking with tutors to use this terminology for the visual, auditory, reading/writing and kinetic styles. **Level two,** the students were divided into subgroups based on their (LM). Correspondingly, the intent is to diversify the learning and teaching methodologies and strategies. The proposed techniques are as follows:

Visual learner techniques:

Visual learner, more aware when they perceive information in the form of graphics, forms of maps, and mind maps. A visual learner may remember words after seeing them several times (Çetin, Yakup. 2009)[١٩]. The following techniques were implemented in the design studio in order to engage the visual learners:

1. Design lectures concentrating on visual effects, as well as suitable to the nature of the project.
2. The students are required to present samples from similar projects in the research phase that required in the beginning of the project.
3. The tutors present their vision about the project with visual works to verify the scientific content starting from student instructor, then the tutors and then the students.
4. Group critiques conducted to empower the student to assessment their peers' projects and positively influence it.
5. Requesting research about the project at the beginning of it contains design guidelines visually: graphs, images, figures, and examples – as many as possible.

Reading/Writing learner techniques:

Diverse strategies designed for the reading/writing learner as follows:

1. Assigning them in the research in the data collection phase (while in their initial groups).
2. Prepare a list of references and data books about the projects.

3. The reading/writing learner to be used in the design studio where these aspects are needed.
4. Prepare lectures in the library to aid the students to extract data from data books.

Kinesthetic learner techniques:
The proposed strategies for the reading/writing learner as follows:

1. Conduct an overall master plan and context physical model for the project site.
2. Held concept generation workshop to generate the project concept based on preliminary physical models.
3. For the kinetic student, the project outcomes depend on physical models.
4. Assign the kinetic students as work-group coordinator for physical model work-group.
5. The student presents the overall physical model for the generic project zone as project outcomes.

Auditory learner techniques:
Aural students learn something by listening. These students give more attention to the words delivered by tutors. They prefer to listen than writing lecture notes. After lectures end, they choose to discuss topics, which taught with classmates, as a way to clarify their understanding. To aid with their (LM), aural students discussed on answers or by listening to recording over the discussion topics, the proposed techniques as follow:

5. Part of the decision-making stage in the design studio based on open discussion.
6. At the project beginning, the student presents their research with an oral presentation.
7. Oral discussion in groups and individually conferencing.
8. Prepare oral lectures about the projects.

5. RESULTS

The paper used a questionnaire of one of the most popular websites that determine the learning preferences for students (http://vark-learn.com/the-vark-questionnaire/), in this questionnaire the student can choose multiple responses in the same question when they see it suitable for them. Moreover, they can leave the answer blank if none fit them. Fig. 2 shows the dominant (LM) for the architecture students.

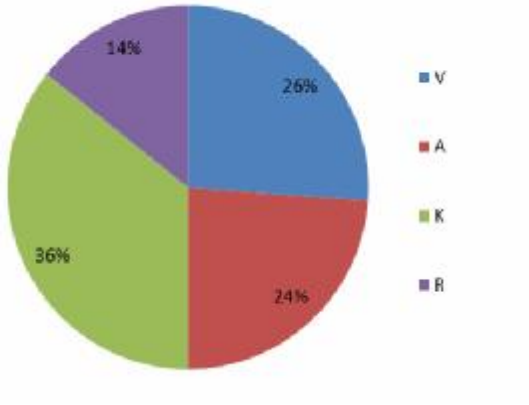

Fig.2 Result of dominant (LM) for students, Source, Author.

` The dominants (LM) gender differences for the study sample shown in table (1).

Table (1) dominants (LM) gender differences for students.

(LM)	**Visual**	**Auditory**	***Kinetic***	***Read/Write***	**Total**
Male	7 (25%)	7 (25%)	11 (39%)	2 (7%)	**27**
Female	4 (27%)	4 (27%)	3 (20%)	4 (27%)	**15**
					42

5.1 VARK Implementation students' opinion:

In terms to answer **(Q1)**, the paper used a structured questionnaire to evaluate students' opinion toward VAKR. In this questionnaire, a qualitative measure was developed to test students' opinion. This questionnaire consisted of equal linear distribution scores, very negative, negative, intermediate, positive, and very positive. The results as shown in the Fig. 3 below:

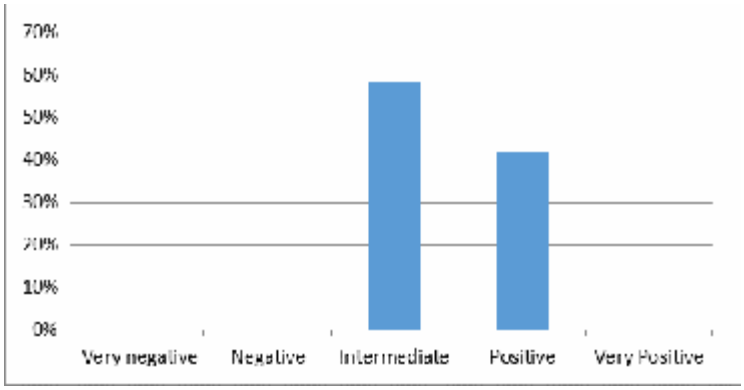

Fig.3 An overall average of the students' opinions toward the experiment, Source, Author.

5.2 The relationship between VARK application and students' academic progress

(Q2) answered via comparing class work grades, in the architectural design courses before and after implanting VARK experiment, for the both tested cohorts. The result illustrates clear progress in the student score after implementing VARK activities, as shown in Fig. 4,6,5, and 7.

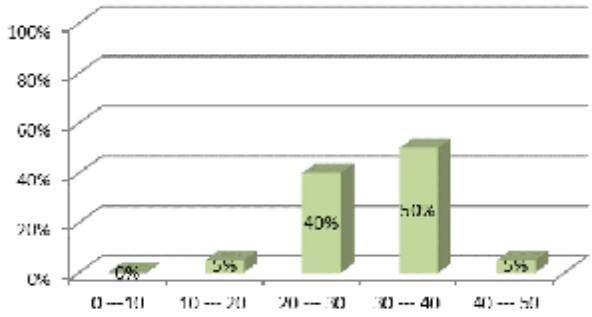

Fig. 4 Students' statistics for Design II fall 2016 (before VARK) Source, Author.

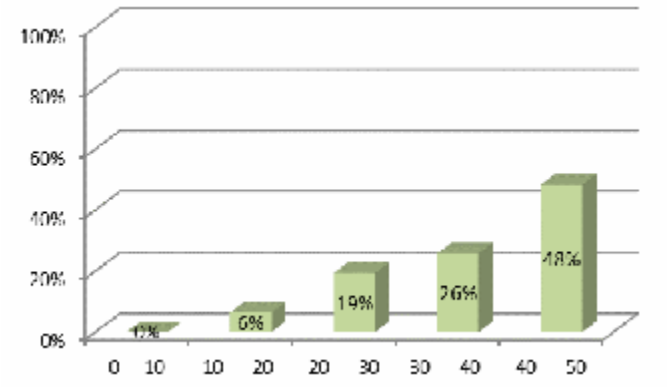

Fig. 5 Students' statistics for Design III Spring 2017 (after VARK) Source, Author.

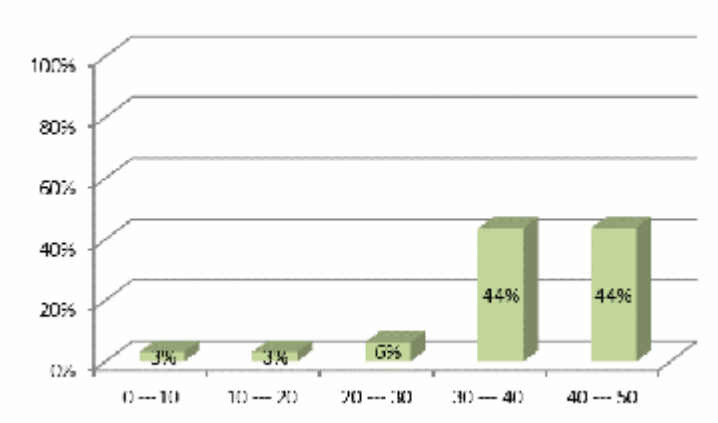

Fig. 6 **Students' statistics for Design II spring 2017 (before VARK), Source, Author.**

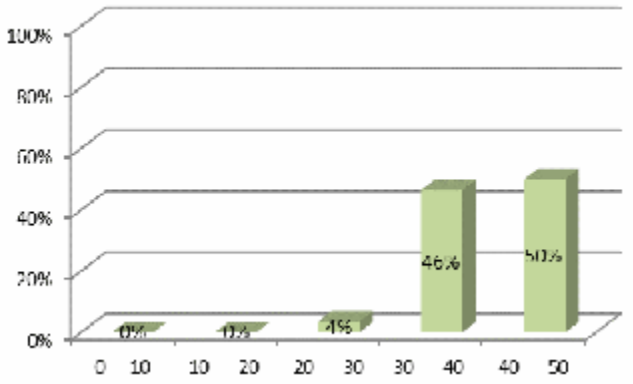

Fig.7 **Students' statistics for Design II fall 2018 (after VARK), Source, Author.**

5.3 Dominant (LM)/academic progress relationship when applying VARK:

This result is shown from answering **(Q3)**, the results illustrate that there's no statistical correlation between the dominant (LM) and academic progress. Since p-value of chi-square test (0.639) > 0.05, as shown table (2).

Table 2 Chi-Square Tests for gender to academic progress.

	Value	df	Asymp. Sig. (2-sided)	
Pearson Chi-Square	**24.795**[a]	**28**		**0.639**
Continuity Correction				
Likelihood Ratio	**28.052**	**28**		**.462**
Linear-by-Linear Association	**.068**	**1**		**.794**
N of Valid Cases	**58**			

5.4 Gender/academic progress relationship when applying VARK:

In terms of the relationship between the gender of tested students, and academic progress, it's measured via a chi-square test, the p-value of chi-square test (0.432) > 0.05. That's mean there is no statistically significant association as illustrated in the table (3).

Table 3 Chi-Square Tests for gender to academic progress.

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	**24.516**[a]	**24**	**0.432**
Continuity Correction			
Likelihood Ratio	**30.974**	**24**	**.155**
Linear-by-Linear Association	**1.368**	**1**	**.242**
N of Valid Cases	**58**		

5.5 Determination of (LM) or not/ academic progress relationship:

There's a relationship between the students' determining their (LM) via VARK questionnaire and student who not determining it studies, depends on the results that indicated that there is no a statistically significant association, since p-value of chi-square test (.610) > 0.05. As shown in table (4).

Table 4 Chi-Square Tests for the determination of (LM) or not/ TO academic progress. Source, Author.

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	**21.483**[a]	**24**	**0.610**
Continuity Correction			
Likelihood Ratio	**26.719**	**24**	**.318**
Linear-by-Linear Association	**.638**	**1**	**.424**
N of Valid Cases	**58**		

6. DISCUSSION

Countless architectural studies have provided, nevertheless, more pedagogical experimental methods are required, and in particular, it would seem desirable to make several experiments on architectural design studio whose properties can vary slightly from one to the other country. In comparison to architectural research produced in the field of architecture, the study correlated to teaching experiments in the design studio is not the same amount of other studies, one of these experiments have been verified in this study to determine the efficacy and attempt to develop teaching methods used in the design studio.

Develop methods of teaching needs to develop the mind set for students who are accustomed patterns of educational earlier formed some scientific and mental concepts that are inconsistent with the required creative thinking in students of architecture. Educational experiments and methods of teaching in the design studio requires first to generate the convictions inside students before being applied, so by convincing them their usefulness to students on a personal level and academic level as well. Different (LM) can be utilized for the development of mental skills and creative thinking and critical thinking required strongly in architecture. In the current study, the focus was on the development of cognitive and intellectual skills of students in practical terms, likewise, the focus was on the development of cognitive and intellectual skills of students in practical terms. As observed in the application phase of the present study, the students' interest in learning by experimentation which means learning by doing, Kinesthetic was the dominant (LM) of most of the students as evidenced by the results. Worth mentioning that, all students have a multimodal VARK profile.

It turns out the results, as shown in Fig. 2, the direction of the students towards positivity of the study experiment; this is in line with some other studies[٢٠]. Based on the above, the utilization of VARK (LM) in the design studio as teaching methods should be circulated in the educational process in higher university education in general, and education architecture in particular. The architectural design studio requires more in-depth experiments on the various models of teaching and learning, besides, applying it in the process of education and improvement it, in order to engage students to their scientific specialties, as well as the development of education within the design studio to keep pace with modern pedagogical developments.

In the current study, VARK was utilized as an educational approach for architecture students in the architectural design studio. It was found that the experiment was positive for the students as in Fig. 2. It shows that 58% of the students report that the effect of the experiment was intermediate and 42% (36%) of student report that the effect of the experiment was positive, thus, the hypothesis **(H1)** is approved. In terms of the dominant (LM) of the students, the results showed that the dominant (LM) was kinetic 15 (36%), followed by visual and auditory 11 (26%), While females do not have a clearly dominant (LM). The above indicates that the kinetic/visual is the dominant (LM) on the architecture students, which needs to be confirmed in more of the other design studios.

The results showed that all students were multimodal, there were no unimodal students, multimodal students were classified as 57 (99%) tetramodal, whereas 1 (1%) were teramodal, and there were no statistical differences between males and females in the multimodal/unimodal type. This is in line with OJEH, N., (2017)[٢١]. The study proposed a diversity of activities to suit the different students (LM) and multimodal of the students, the aforementioned activities were applied and tested, the students reported positive directions after these implementing these activities.

As for the hypothesis **(H2)**, the results were shown in table (5), which includes, the demographics data and the frequency and percentage of students, they were classified according to progress/delay in grades in form of a five-point scale, from (+25 to +21) till from (-11 to -15), the highest percentage of students was 17 (29%). Their grades improved from (+1 to +5). Overall, 28(48%) of students improved, and 25 (43%) of student delayed, 5 (18%), of students their condition has not changed. Putting into Consideration that the grading range tends to progress (+25) and the delay is (-15) degrees, the maximum raised degree was (+22), and maximum decreases grades were (-15). In general, the grades sum of progress grades and subtracting the grades of delay =(+20) grades, additionally, the average grade of students before the application of the experiment was 37.85 degrees, while reaching 39.51 degrees after the application of the experiment. The above illustrates the validity of the hypothesis **(H2)**.

Table 5 the classification on student progress/delay status.

Grade range	Gender		Total
	Male	Female	
▲ From +21 to+ 25	**1 (100%)**	**0 (%00)**	**1**
▲ From +11 to +15	**2 (67%)**	**1 (33%)**	**3**
▲ From +6 to +10	**4 (57%)**	**3 (43%)**	**7**
▲ From +1 to +5	**10 (59%)**	**7 (41%)**	**17**
Neutral	**2 (40%)**	**3 (60%)**	**5**
▼ From -1 to -5	**12 (86%)**	**2 (14%)**	**14**
▼ From -6 to -10	**5 (71%)**	**2 (29%)**	**7**
▼ From -11 to -15	**4 (100%)**	**0**	**4**
			58

With respect to **(H3)**, there is no statistical correlation between the dominant (LM) and academic progress; this indicates that the hypothesis **(H3)** is not proven, since p-value of chi-square test (0.64) > 0.05. Furthermore, there is a no statistically significant association, between the gender and the progress in the grades, throw the experiment, that's mean the hypothesis **(H4)** not true,

since p-value of chi-square test (0.432) > 0.05. There is no correlation between the student's they perceived 38(66%) or not perceived 20(34%) their (LM) and the academic progress during the current experiment, this indicates that it is not important to conduct a VARK questionnaire to measure the dominant (LM) before the start of the experiment. It also indicates that all students benefited from the activities that were actually done regardless of thy perceived their (LM) or not, the statistical relationship has not yet been confirmed, since p-value of chi-square test (0.61) > 0.05. Hence, **(H5)** not proven. VARK theory required numerous applications in the design studio, as well as the rest of the curriculum, in order to mature it via students' opinions about what they need to develop the proposed methodology. Taking into account the individual characteristics of students and patterns of different education, in one hand, enriches the design studio, on the other hand, provides architectural variety of activities that enhance the positive learning milieu. Furthermore, escalation the students' interaction and their active participation in the studio activities increase the students' achievements and outcomes. it results in an understand for the way in which students like learning in architectural education, the above mention techniques leads to a self-driven figures and the architectural identity for the student will be mature and distinct. Fig. 8 show the final results.

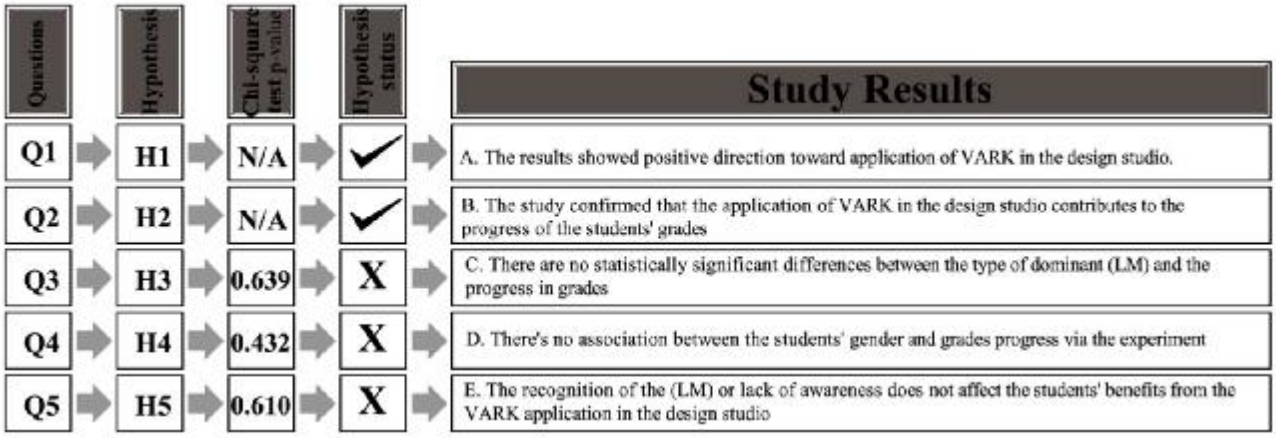

Fig. 8 Final results. Source (Author).

7. CONCLUSION

In a summary, this study was based on a previous study recommended utilizing one of the (LS) in the design studio pedagogy. The VARK nominated as a method of learning in the architectural design studio. The experiment conducted via using the Validated VARK questionnaire. The current study proved that the VARK teaching and learning method is suitable for architecture students. According to the students' opinion, the results showed positive direction toward application of VARK in the design studio, at the same time, there are no statistically significant differences between males and females. The male-dominated (LM) is kinetic, while females have no dominant (LM). A variety of educational activities and treatments designed, to suit all (LM) in-class design activities in the process of education. Moreover, the student interaction amplified based on the diversity of activities in the design studio. Obviously, through educational practices in the design studio students inspired via kinetics class action. The study confirmed that the application of VARK in the design studio contributes to the progress of the students' grades. There are no statistically significant differences between the type of dominant (LM) and the progress in grades, there's no association between the students' gender and grades progress via the experiment. The recognition of the (LM) or lack of awareness does not affect the students' benefits from the VARK application in the design studio. Therefore, the student questionnaire is not very important in influencing the experiment.

Acknowledgment

The author would like to thank the CIC administration, as well as all teaching assistants and students who participated in the application of this terrific and fruitful experiment.

REFERENCES

1. Fleming, N. D. (2012). Facts, fallacies and myths: VARK and learning preferences. 2012. Available as PDF at: http://vark-learn. com/wp-content/uploads/2014/08/Some-Facts-About-VARK. pdf.
2. Chandrasekera, T., & Yoon, S. Y. (2018). Augmented Reality, Virtual Reality and Their Effect on Learning Style in the Creative Design Process. Design and Technology Education, 23(1), n1.
3. Kirschner, P. A. (2017). Stop propagating the learning styles myth. Computers & Education, 106, 166-171.
4. Moayyeri, H. (2015). The impact of undergraduate students' learning preferences (VARK model) on their language achievement. Journal of Language Teaching and Research, 6(1), 132-139.
5. Leite, W. L., Svinicki, M., & Shi, Y. (2010). Attempted validation of the scores of the VARK: learning styles inventory with multitrait–multimethod confirmatory factor analysis models. Educational and psychological measurement, 70(2), 323-339.
6. Pashler, H., McDaniel, M., Rohrer, D., & Bjork, R. (2008). Learning styles: Concepts and evidence. Psychological science in the public interest, 9(3), 105-119.
7. Vaseghi, R., Ramezani, A. E., & Gholami, R. (2012). Language learning style preferences: A theoretical and empirical study. Advances in Asian Social Science, 2(2), 441-451.
8. Deshmukh, V. B., Koti, A. B., Mangalwede, S. R., & Rao, D. H. (2014). A Learning Style Classification mechanism using Brain dominance and VAK method in m-learning Environment.
9. Othman, N., & Amiruddin, M. H. (2010). Different perspectives of learning styles from VARK model. Procedia-Social and Behavioral Sciences, 7, 652-660.
10. Ictenbas, B. D., & Eryilmaz, H. (2011). Determining learning styles of engineering students to improve the design of a service course. Procedia-Social and Behavioral Sciences, 28, 342-346.
11. Othman, N., & Amiruddin, M. H. (2010). Different perspectives of learning styles from VARK model. Procedia-Social and Behavioral Sciences, 7, 652-660.
12. Ictenbas, B. D., & Eryilmaz, H. (2011). Determining learning styles of engineering students to improve the design of a service course. Procedia-Social and Behavioral Sciences, 28, 342-346.
13. Othman, N., & Amiruddin, M. H. (2010). Different perspectives of learning styles from VARK model. Procedia-Social and Behavioral Sciences, 7, 652-660.
14. Ictenbas, B. D., & Eryilmaz, H. (2011). Determining learning styles of engineering students to improve the design of a service course. Procedia-Social and Behavioral Sciences, 28, 342-346.
15. Chang, Y. C., Kao, W. Y., Chu, C. P., & Chiu, C. H. (2009). A learning style classification mechanism for e-learning. Computers & Education, 53(2), 273-285.
16. Ictenbas, B. D., & Eryilmaz, H. (2011). Determining learning styles of engineering students to improve the design of a service course. Procedia-Social and Behavioral Sciences, 28, 342-346.
17 Chang, Y. C., Kao, W. Y., Chu, C. P., & Chiu, C. H. (2009). A learning style classification m.echanism for e-learning. Computers & Education, 53(2), 273-285.
18. Medina, A. M., García, F. J. C., & Olguín, J. A. M. (2018). Planning and allocation of digital learning objects with augmented reality to higher education students according to the VARK model. IJIMAI, 5(2), 53-57.
19. Çetin, Yakup. "Teaching VAK-abulary." (2009): 73-80.
20. Wright, S., & Stokes, A. (2015). The application of VARK learning styles in introductory level economics units. Issues in Educational Research, 25(1), 62.
21. OJEH, N., et al. (2017). Learning style preferences: A study of Pre-clinical Medical Students in Barbados. Journal of Advances in Medical Education & Professionalism, 5(4), 185.