

Exploring artistic abilities and creativity perceptions for the enrolled architectural engineering students

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ABSTRACT

Architecture is considered one of the most significant human arts aims creativity in design. Therefore, it requires certain artistic skills and certain knowledge and perception from students. Architects are expected to have graphical communication skills enable them to translate their thoughts and ideas to sketching, drawing, model making, coloring, and rendering. The staff of first stage noticed the inadequate level of knowledge and shortfall in students' abilities throughout years of education. Therefore, this paper aims to explore artistic abilities and creativity perceptions for the enrolled architectural engineering students. The research focuses on the first-grade students in Architectural Engineering Departments of University of Mosul. Mixed approaches were adopted for data collection including two surveys and ten in-depth interviews with the students after one month from their enrollment in university. The survey includes 68 questions serve four main axes, particularly, explores personal characteristics and abilities, traces students' knowledge, investigates students' artistic abilities and creativity perceptions, and tackles the role of school in developing artistic abilities and creativity for students. Findings reveal lack of student's experience in artistic skills including sketching, drawing, or coloring, basic knowing about international or local architecture. This low qualification refers to underestimate art subject and lack of basic knowledge of architecture gained during students' secondary education.

Keywords: artistic abilities, creativity, architecture, basic knowledge, secondary education

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1. Introduction

Architectural design is an interaction of cognitive, dynamic, and creative structure, derived from a complex of ideas, perceptions, and knowledge that serves social, environmental, and economic demands; been presented by drawings, presentation, and rendering [1], [2]. Architectural design aims creativity [3], which based on skills, knowledge and personal abilities and capacities [4], [5], [6]. Architects are expected to have graphical communication skills to present projects of buildings by drawing, model making, coloring, and rendering [5]. Moreover, creativity is affected by working environment. It might be promoted or impeded [7], [8], [9]. Accordingly, architectural design is varied among individuals. In respect with creative ability existing in them and their working circumstances [1], [7], [10], [8], [11]. Therefore, education play a vital role in developing creativities of students. The students feel restricted when there are limited opportunities to develop their creativities. The objective of courses and aims of instructor determine this opportunity of creativity in school environment [7], [8].

The staff of first stage in Architectural Engineering Departments noticed the inadequate level of knowledge and shortfall in students' artistic abilities and creativity throughout years of education. Hereupon is the problem statement of the research. This lack of none-previous experience demands additional efforts form the staff to upgrade students' cognition, abilities, and skills. Consequently, this research aims to investigate artistic abilities

and creativity perceptions for the first stage architectural engineering students. The research focuses on the enrolled students in Architectural Engineering Departments of University of Mosul. This research contributes to the current education at secondary schools in terms of art subject and its contents under supervision of authority's directives.

2. Literature Review

2.1. The relation between art, architecture, and creativity

Art is part of general human cognition [12]. It is a permanent system of communication [10] where humans recognize and appreciate the presence of knowledge, elements, feelings, desires, or ideas, then, expressing that by recording them in a symbolic or visual form [12], [13]. In order to attain an artwork, capacity for creativity is manifested. Hereupon, art is related to all domains including science, engineering, and education, etc..[10]. Therefore, art promotes general progress. One of the most important forms of human arts is architecture [3]. Art is in harmony with architecture and considered the generator of it [13], [14]. Architecture is the art or technique of building. The place between art and architecture is the function. Architecture responses to social, economic, and environmental concerns achieving certain function [15]. However, in the late 19th Century, architecture as a domain was shifted from art movement by as Bauhaus school of architecture teaching was established in Germany and continues since then [14]. Architecture as a discipline aims to present creativity in design. [3]. To achieve creativity, architect is demanded to be educated, conscious about history, philosophy, and other different domains, and to be skillful, and have the capacity to work and design. Consequently, architecture education is devoted developing artistic abilities and skills, and transmitting knowledge [5].

Creativity in general refers to generating new ideas, perspectives, or products. It requires tacit knowledge, skills, and process [1], [8], [10], [14]. However, productive work or design in art or architectural may not involve creativity because it is not always meet originality [11]. Creativity in architectural design is the interaction between perceptible creating and constructional, functional, environmental, social, economic problem solving [1], [4], [16], [17]. It is the production of interaction among conception, expression, perception, and interpretation [1]. However, capacity for creativity varied among individuals [1], [10], [11]. Consequently, these skills are effectively trained and developed through architecture education [1], [18].

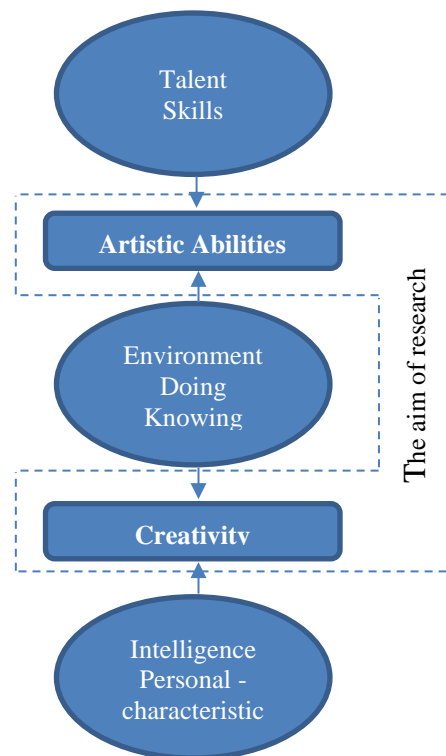


Figure 1. Factors involving creativity in architecture education.

Resource: the researchers

In teaching methodology, students' creativity can be based on personal skills, based on knowing and intelligence, or based on experience [19]. Creativity can be approved by training and promoting, or can be stifled by external pressures under certain environment in home, school, or university [7]. According to Bloom's taxonomy, creativity promoted within three levels, namely, cognitive including intelligence and knowing, personal attitude including abilities and capacity, and skills [20]. Figure 1 illustrates the factors involving creativity in architecture education.

2.2. Courses in Architectural Engineering Education Related to Artistic Abilities and Creativity Perceptions

Many courses are related to artistic abilities and creativity perceptions, particularly they are:

- **Architectural design, Interior design, Landscape design, Urban design**

Design studio is the core of architectural engineering education [16]. There are four courses depend on design studio where students submit a comprehend design project, namely, architectural design, interior design, landscape design, urban design. Design process demands artistic abilities and creativity perception of students. The student applies his or her artistic abilities and skills to his or her knowledge to form the project through his or her perception [1], [2]. Architectural design course is required in every stage in architecture education. Interior and landscape design courses are demanded in 4th stage. Urban design is taught in the 5th stage.

- **Applicable arts, and Geometric Studio**

These two courses are practical relating to artistic abilities and creativity perception in design. Applicable arts course is considered as an effective tool stimulating creative perception in design process. Geometric Studio course serves as an essential tool to develop students' skills in model making. These two courses are taught to first stage of architectural engineering department in University of Mosul.

- **Freehand drawing**

Freehand drawing course is related to artistic abilities that includes sketching and painting with colors. Architects usually start to design and express their thoughts by freehand sketching on piece of paper making compositions [13]. Therefore, freehand drawing course is considered an element in architecture whereby students are introduced to geometric composition, proportions, rhythms, and spatial organization [21]. This course is taught in the first stage of architectural engineering department in University of Mosul.

- **Architecture drawing**

This course is a complement of freehand drawing course, where sketches are transferred to architecture drawings that insists of graphics, techniques of drawing, and painting [22]. architecture drawings considered the main documents elucidates how the design has to be constructed [23]. The architecture drawings can be conception drawing, analysis drawing, or graphical techniques. This course relates to artistic abilities, skills, and creativity perception [21]. This course is delivered to first stage students of architectural engineering department in University of Mosul.

- **Art and architecture**

In this course the convergence between art and architecture is clarified where elements and principles of art and architecture meet. The elements are such as point, line, surface, color, and texture. Besides, the basic principles are for example symmetry, continuity, repetition, inclusion, unity, balance, and domination. Hereupon, art and architecture course is considered an element in architecture where theoretical subjects transfer to practical artistic homework. It is taught in the first stage of architectural engineering department in University of Mosul.

- **Engineering drawing**

Engineering drawing is the graphical language of industry. it comprehends the orthographically of an object, two dimensions projections from, and three geometry form [4]. This course is given to first stage students in architectural engineering department in University of Mosul.

- **History of architecture, Local Iraqi architecture, Arabic Architecture, Islamic architecture**

These four courses related with history. Studying history of architecture offers a conceptual communication tool sought to investigate contents of architecture [24]. Since architecture responds to conditions, studding history explains the development of architecture throw eras [24], [25]. Architecture in its different backgrounds such as ancient, local, Contemporary Arabic, and Islamic architecture is a holder of ideologies, meanings, symbols, and contents [26]. Hence, studying history has a role in increasing students' creativity in design [27]. In addition, these courses emphasis local cultural heritage preservation which is national wealth need protection and attention [28]. These courses are given in 2nd, 3rd ,4th, and 5th stages of architectural engineering department in University of Mosul.

- Computer aided architectural drawing

Architectural drawing by engineering programs has become an essential tool since few decades. This technique of design has been an essential requirement in professional practice field [29]. It involves sketching, modeling, design surrounding environment, and rendering [30]. This requires students to learn and gain skills and have the capacity to complete the drawings [31]. Besides, this requires understanding image colorization including many aspects related to art such as contrast and similarities in color tones, highlights, and shadows etc.. [32]. During 1st, 2nd, and 3rd stages of architectural engineering department in University of Mosul, several engineering programs are delivered efficiently.

Table 1 indicates the Courses in architectural engineering education related to artistic abilities and creativity perceptions. Noticeably, knowledge including intelligence and cognition is required in each course [33]. It is important in design courses where resources of ideas are collected and composed. Intelligence is demanded specially in engineering drawing, and computer programs.

Table 1. Courses in architectural engineering education related to artistic abilities and creativity perceptions

| No. | course | stage | knowledge | Artistic Abilities | skills | Personal capacity |
|-----|--------------------------------------|--|-----------|--------------------|--------|-------------------|
| 1 | Architecture design | 1 st , 2 nd , 3 rd , 4 th , 5 th stages | ● | ● | ● | ● |
| 2 | Freehand drawing | 1 st stage | ● | ● | ● | ● |
| 3 | Art and architecture | 1 st stage | ● | ● | | ● |
| 4 | Applicable arts | 1 st stage | ● | ● | ● | ● |
| 5 | Geometric Studio | 1 st stage | ● | ● | ● | ● |
| 6 | Architecture drawing | 1 st stage | ● | ● | ● | ● |
| 7 | Engineering drawing | 1 st stage | ● | | ● | ● |
| 8 | History of architecture | 2 nd , 3 rd stages | ● | | | ● |
| 9 | Local Iraqi architecture | 4 th stage | ● | | | ● |
| 10 | Islamic architecture | 4 th stage | ● | | | ● |
| 11 | Computer aided architectural drawing | 1 st , 2 nd stages | ● | | ● | ● |
| 12 | Interior design | 4 th stage | ● | ● | ● | ● |
| 13 | Landscape design | 4 th stage | ● | ● | ● | ● |
| | Contemporary Arabic architecture | 5 th stage | ● | | | |
| 14 | Urban design | 5 th stage | ● | ● | ● | ● |

The source: the researchers

Besides, artistic abilities are harnessed in freehand drawing, all design courses, art and architecture, applicable arts, geometric studio, and architecture drawing [2]. These forementioned courses require drawings and coloring for projects and tasks. Moreover, skills are acquired during training and doing [8]. Therefore, all courses relate to design, drawing, and running computer programs demand skills. In addition, personal capacity is important factor to achieve any task. It is related to students' attitude and differs among individuals [10].

3. Methodology

The research adopted quantitative and qualitative approaches for data collection. The research focuses on first grade students, Architectural Engineering Departments of University of Mosul.

Two surveys were conducted from the students after one month from their enrollment in university, in fall academic term of year 2021-2022. Two surveys were developed include nominal scaling questions, rank ordering, and ordinal scaling. The questions were organized in a hierarchy to conduct the required data from the students. The surveys' links were emailed to 70 students, and they were reminded to complete the surveys, however, 52 students participated. Besides, ten in-depth interviews semi-structured were held with random sampling of students as involves open-ended questions.

3.1. Survey instrument

Two surveys were designed to exploring artistic abilities and creativity perceptions for the enrolled architectural engineering students through 68 questions serve four main axes:

- The first axis explores personal characteristics and abilities including students' attitude and skills. These characteristics contribute to student creativity. This axis contains 12 questions.
- The second axis traces students' knowledge involving firstly students' intelligence such as school grade and geometric questions, secondly, knowing general information about civilizations, regional famous skyscrapers, local heritage buildings, local sculptures, and international paintings. This knowledge contributes to artistic abilities and creativity perceptions. This axis contains 36 questions.
- The third axis investigates students' artistic abilities and creativity perceptions. This axis contains 13 questions.
- The fourth axis tackles the role of school in teaching and developing artistic abilities and creativity. This axis contains 7 questions.

Generally, the first survey includes the first and second axes, and the second survey contains the third and fourth axes.

3.2. In-depth interview

Ten in-depth interviews were held with random sample of students. The interviews were semi-structured comprehended open-ended questions that addressed defining creativity, giving synonyms of it, and the role of school in promoting skills and basic knowing of art, artistic abilities, and creativity.

4. Results and discussion

The results of survey and interview are discussed in respect with the four axes of the research:

4.1. The first axis: evaluating personal characteristics

According to survey results, 86% of the students choose to enroll in architectural engineering program, while 11.5 did not tend for it. About 13.5 % of the students were derived by circumstances to take this program. In Iraq, the application for colleges in universities depends on exam grade of the last stage in secondary school. Therefore, many students enrolled in specialists far from there inclinations. Students' capacities were explored within three questions in the survey addressing duration of doing the homework, the duration of daily study, and the teamwork, as Figure 2 elucidates. Since capacity of a person is subjective matter that affected by many factors such as attitude, personal preferences, and surrounding environment, it is varied among students.

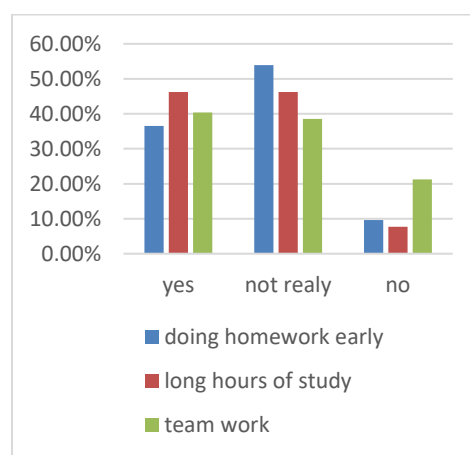


Figure 2. Students' capacities

The results of survey show the students have been grouped equally into three categories ranging between doing tasks early, not that early, and late. About half of the students are studying not really for long hours. Besides, around 40% of students' intent to be part of teamwork, while 21% prefer to work alone. The interviewees agreed that discrepancy in their capacities. Due to personality, family promoting and follow, teachers' roles in schools in trailing students performances. Students' skills were examined through survey question about using programs design or modifying images.

Architecture and design buildings programs such as AutoCAD, Revit software, and 3D studio Max are included in architectural engineering courses which require skills and experience to be used. Around 55.8% of the student do not have the skills of using software graphics editor programs, and 36.5% have limited skills. Only 7.7% of the student can use these programs effectively.

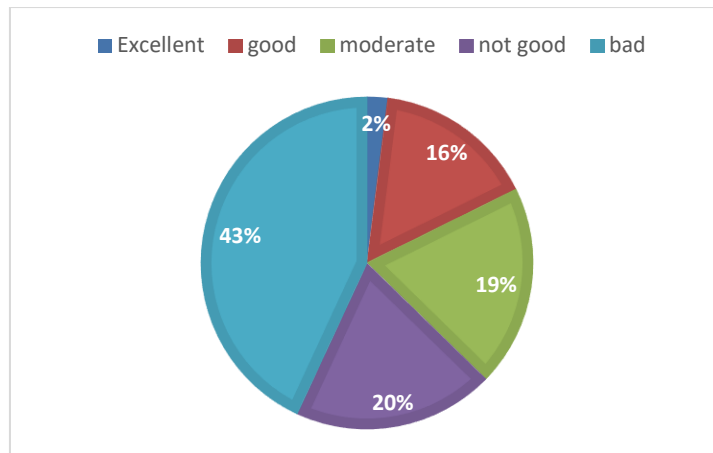


Figure 3. Student's skills in using graphical programs

The result of interview asserted that schools do not involve any graphical programs in art course. Therefore, having skills of these types of programs depends on students' tents.

4.2. The second axis: evaluating students' knowledge

Knowledge has general meaning, therefor, to explore students' knowledge, three parts of questions were conducted to tackle their intelligence, understanding, and knowing. The first part is about grading of students which they compete with to enrol to university. The results are determining students' intelligence. The second part includes four questions about geometrical shapes. This question explores understanding and analysis of students for proportion and shapes. The third part is about general information where seven subjects were addressed, and each subject includes four questions. The subjects cover questions about, local sculptures, international tower buildings, location of international buildings, local heritage buildings, ancient civilizations, and lastly international paintings.

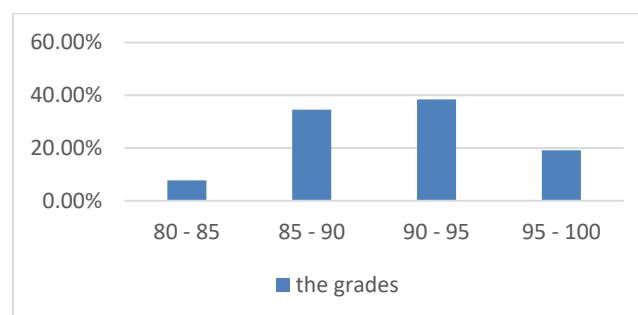


Figure 4. Grades of students

The results reveal that more than half students are so intelligent. Around 19% of students score 95-100 mark, and 38.5% get 90-95 mark. Moreover, about 42% gain marks ranged from 80 to 90.

The second part is a test includes four questions in geometrical shapes. The average of correct answers was about 39%. There is lack of realizing the proportions. The rate of students who recognized the correct proportions between two shapes are 37.5% and 14.8% for triangles and parallelograms respectively. Besides, about 27% and 75.6% of students answered two questions about polygonal cone shape correctly.

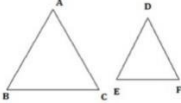

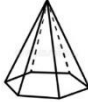
| | 1/4 | 1/2 | 1/3 | 2/3 |
|---|-------|-------|-------|-------|
|  | 10.4% | 29.2% | 33.9% | 37.5% |
|  | 29.8% | 14.8% | 42.6% | 12.8% |
| 5 | 6 | 7 | 8 | |
|  | 2.1% | 68.7% | 27.1% | 2.1% |
| What is the shape of the base for five-sided pyramid? | 75.6% | 15.6% | 44.4% | 44.4% |

Figure 5. Geometrical shapes test

In general, the knowing of students about proportions, and compositions of geometrical shapes is low. The results of interview come in parallel with survey results. The students confirmed that they depend on math curriculum to study and understand geometrical shapes, and there is no extra activities been held to promote this knowledge. In the third part, the average of every four question is taken for each subject as determined in Figure 6. The results show that about 80% of students know about the famous sculptures in Iraq. Besides, about 78% of the students have adequate knowing about recent international buildings. However, 66% of students answer the questions about ancient civilizations correctly, including Assyrian civilization, Sumerian civilization, Pharaonic civilization, Greek civilization, and Chinese civilization. The students have inadequate knowing about international paintings where barely 48% of them answered the related questions.

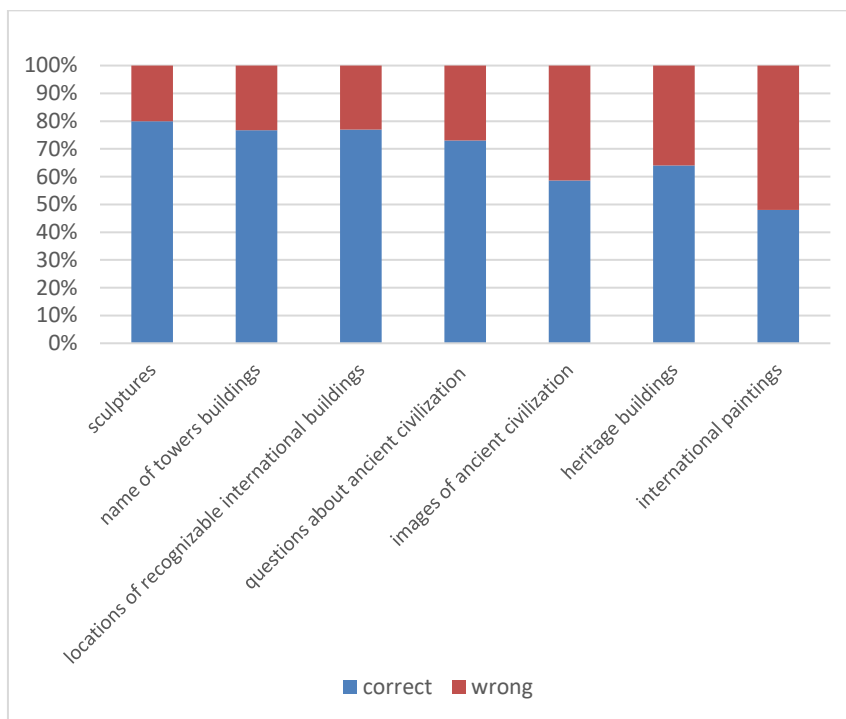


Figure 6. Examining general information





















| sculptures | Name of towers buildings | Locations of recognizable international buildings | Questions about ancient civilizations | Images of ancient civilizations | Heritage buildings | International paintings |
|---|---|---|---|--|--|---|
|  |  |  | Which is the oldest ancient civilization |  | To which era belongs the big Nori Mosque? |  |
|  |  |  | Gilgamesh is from which civilization? |  | To which era belongs the iron bridge? |  |
|  |  |  | Akhenaten is from which civilization? |  | Where is Nabi-Younus Mosque located? |  |
|  |  |  | Mosul City is extended of which civilization? |  | Where is Sharqia high school for boys located? |  |

Figure 6. Examining general information

The interviewees emphasized that general information is gained by individual according to related environment such as family, home, and school. In some environments, reading general cultures, conservations, and pursuit of knowledge are encouraged. In some schools, competitions between students hold to motivate them to educate themselves in general topics, while other schools burden their students with courses.

4.3. The third axis: students' artistic abilities and creativity perceptions

To explore artistic abilities of students, two questions through survey about sketching and shading skills were directed to the student to evaluate themselves, besides, an evaluation was taken from the lecturers who teach freehand drawing course, as shown in Table 2. The results indicate a discrepancy between student and lecturer evaluations. Students tend to think that they have artistic abilities of sketching and shading. About 32.6% of students claimed that they are in very good level in sketch, while the lecturers confirmed that about 11.5% of students on that level. The evaluation of both students and the lecturer converges in good and acceptable level of sketching at about 25% of students. On other hand, the assessment of the lecturer neared double the percentage at not good and bad level, where students rated about 9.6% of them at those levels, whereas the lecturer enrolled 19%. According to shading artistic abilities evaluation, the students presume that 48% have good shading abilities. Moreover, around 21.2% and 13.5% have not good and bad abilities respectively. However, the lecturers indicated that about one third of the students have good shading artistic abilities, and on third are acceptable, while the last one third are not good.

Table 2. Evaluating students' artistic abilities

| Type / evaluator | Very good | Good | Acceptable | Not good | Bad |
|--------------------|-------------|-------------|-------------|-------------|------------|
| Sketching/student | 17 32.6% | 13 25% | 12 23.1% | 5 9.6% | 5 9.6% |
| Sketching/lecturer | 6 11.5% | 12 23.1% | 16 30.8% | 10 19.2% | 8 15.3% |
| Shading/student | 7 13.5% | 25 48.1% | 11 21.2% | 7 13.5% | 2 3.8% |

| Type / evaluator | Very good | Good | Acceptable | Not good | Bad |
|-------------------|-----------|-------------|-------------|-------------|------------|
| Shading/ lecturer | 5 9.6% | 12 23.1% | 17 32.6% | 11 21.2% | 7 13.5% |

The interview results show that there is lack of drawing and coloring experience. The students referred that to school education approach. Schools underestimated art subject. Therefore, the students have limited experience and skill in drawing, coloring, sketching, and shading. Besides, the students have exerted their efforts to sketch and shade in freehand course despite their bounded skills and abilities, therefore, they evaluated themselves more than they been evaluated from lecturers.

The perception of students about art elements were explored. The results show wide discrepancy. The students emphasized color and tones elements where their rate about 87% and 82% respectively. On other hand, only 63% selected highlights and shadows. About half the students at 52.6% found that color plan is an art element. Moreover, around 37% and 34% chose balance and harmony respectively. Only 26% of students thought that rhythm, and unity belong to art elements. Besides, 21% selected contrast. The fewest percentage of students which is about 11% believed that the golden ratio, energy, and mobility are art elements. No student selected function or problem solving.

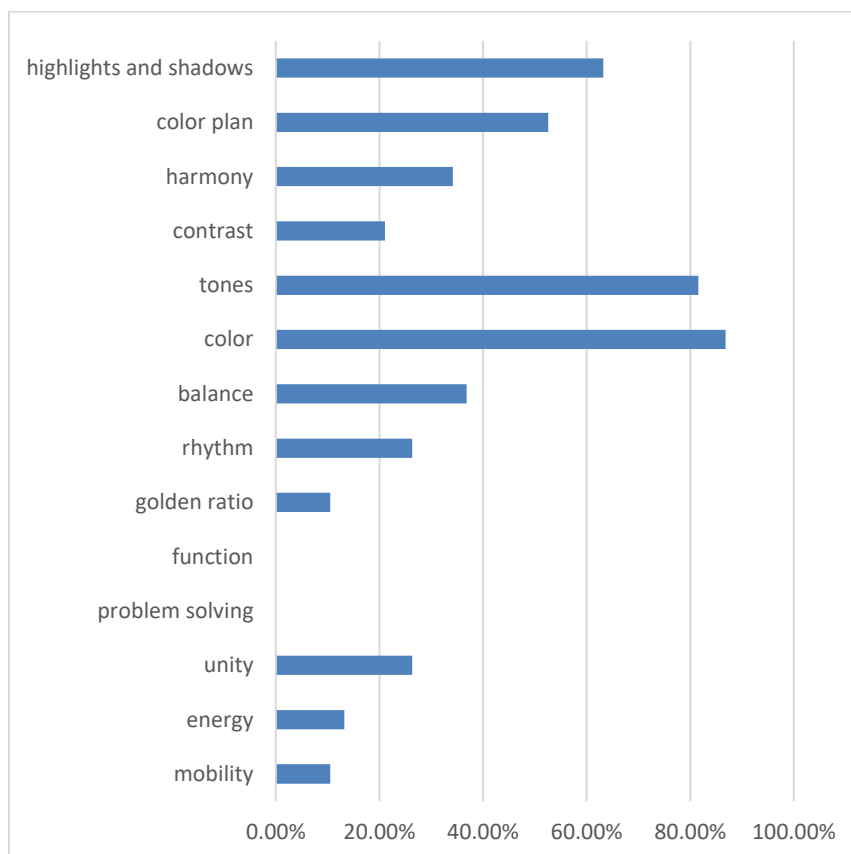


Figure 7. Exploring student' perception about art elements

The interviewees clarified that they have limited knowing about art elements, and they have learned more during art and architecture course in architectural engineering department. Interviewees number 1,2,4,5,6,7,8, and 9 confirmed that during school education, no theoretical information was delivered for them about art. The art subject was a limited time when student draw and color under a certain topic. Therefore, few students selected element such as harmony, contrast, balance, rhythm unity, and golden ratio. They barely have previous knowing about these elements in art. Questions about art principles were directed to the students, as illustrated in Figure 8, to evaluate their art knowing and creativity perceptions. The results generally reveal that around 55% of the students realized the art

principle of the given design, while others dispersed in their answers. About 60% of students observed repetition principle in (I 1), while other students were confused. About 48% of students understand central principle in (I 2), whereas the other rate was uncertain. Moreover, only 43% of students recognized rhythm principle in (I 3), while other students were confused. Around 56.5% asserted graduation principle in (I 4), and 51% realized the rhythm principle in (I 4). The interviewees determined that they depended on their understanding and on knowledge gained from art and architecture course to answer these questions in the survey. The second set of questions is about creativity. This part includes four questions. The first question is about explanation creativity by teachers in school, the second question is about creativity definition, the third question is about the relation among art, architecture, and creativity, and the fourth part is about classifying students sheet work in design course in terms of creativity. The results of survey show that around 87% of students did not receive any information or definition about creativity in art subject during secondary study. About 10% reveal that limited information about creativity was explained to them. Moreover, about 2.6% of students gained an adequate definition about creativity by instructors in art subject.

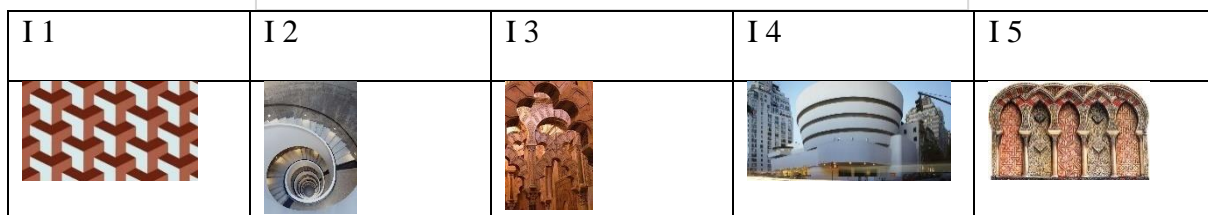
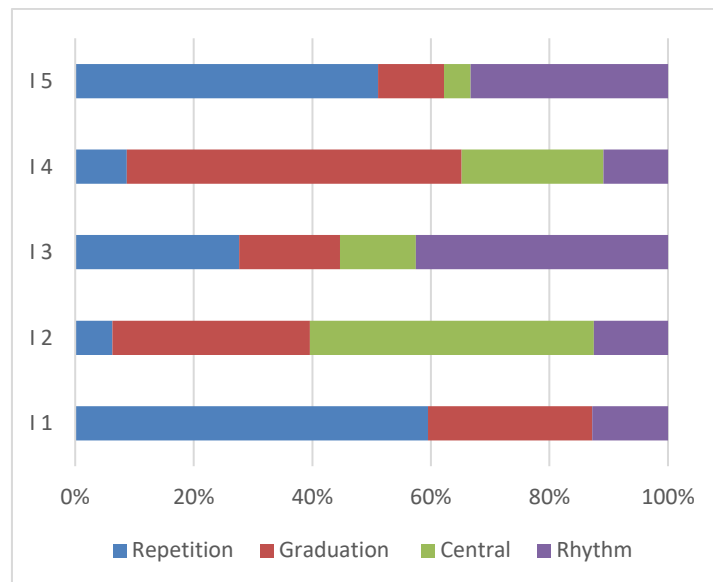


Figure 8. Examining students understanding for art principles

The results of an open-ended question in the survey which was about defining creativity shows that about 46% realized that creativity is related to produce a new idea, while 27% of students referred creativity to talent. Besides, 22% considered that creativity relates to beauty and art. Around 5% of students believed creativity is about developing products. The results of survey addressing the relation among art, architecture, and creativity indicated a confirmation of these relations. Particularly, about 81.6% emphasized the relation between art and creativity, and art and architecture. However, only 15.8% and 13.2% thought that the relation is not that strong respectively, and only 2.6% of the students assumed there is no relation between art and creativity. The majority of students at rate 92% consider the relation between architecture and creativity is exist, whereas about 8% claimed that this relation is to some extent.

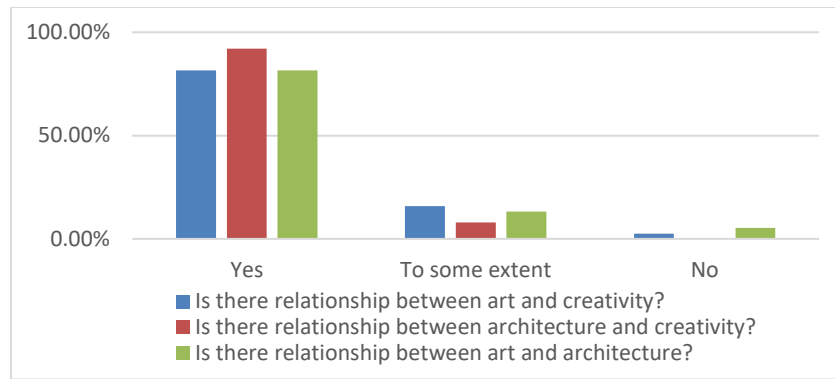


Figure 9. Perceptions of students towards the relation among art, architecture, and creativity

Interviewee number 1, 5, and 9 confirm that they tend to study architecture engineering. They presume that they enjoy artistic abilities and talent. Therefore, they believe the relation among art, architecture, and creativity.

The results of survey shown that about half of the students considered the texture sheet work is a creative work. This task includes similar requirement from all students, as illustrated in Figure 10. Moreover, about 71% of students indicated that the primitive shape composition sheet work is a creative work. This work depends on individual perception and drawing, as elucidated in Figure 10.

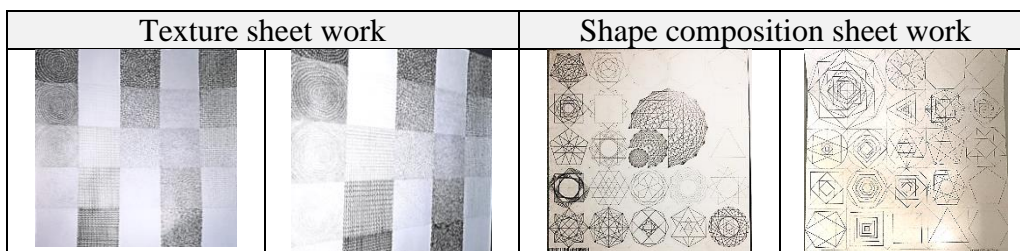


Figure 10. Samples of sheet work of texture and shape composition

4.4. The fourth axis: the role of school in teaching and developing students' artistic abilities and creativity

About 72% of students stated that art subject was neglected during school study, while, about 13% claimed it was important like other subjects. The other rat of student at 15.4% indicated that to some extent, schools pay attention to art subject. Besides, about half the students at 46% announced that the schools did not encourage them to contribute to art exhibitions, whereas 28% of students were motivated by schools to participate in these activities. Around 25.6% informed that the schools have limited role in inducing students to have a presence in art exhibitions, as shown in Figure 11.

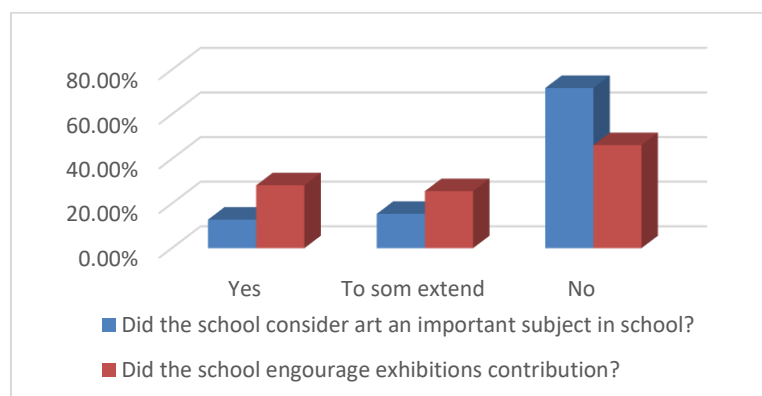


Figure 11. Importance of art subject in schools

The interview results show that art subject is neglected in schools. It is included in the schedule; however, it can be taken by another teachers, and another subject is discussed. Artistic abilities need doing and practicing. Consequently, these abilities will to be gained and developed. Therefore, students' experiences, and skills are limited. Interviewee number 2 revealed during the first class of freehand drawing in architectural engineering department that it is the first time he is drawing, where no teacher asked him to draw throughout his secondary school. His struggled to draw. There was obvious lack of perception, skill, and ability. Moreover, Interviewee number 5 confirmed that she has the talented of artistic drawing and she use different types of coloring; however, the school did not upgrade her. She used to draw during her free time without supervision from instructors.

Moreover, the students at 55.3% confirmed that schools depend on the talented students who have artistic abilities and skills, while about 26.3% of students clarified that the schools depend on them and promote other students' abilities to give them future opportunities to participate in activities. Nevertheless, around 18.4% of students asserted that schools did not put any efforts in developing students' artistic abilities, as illustrated in Figure 12.

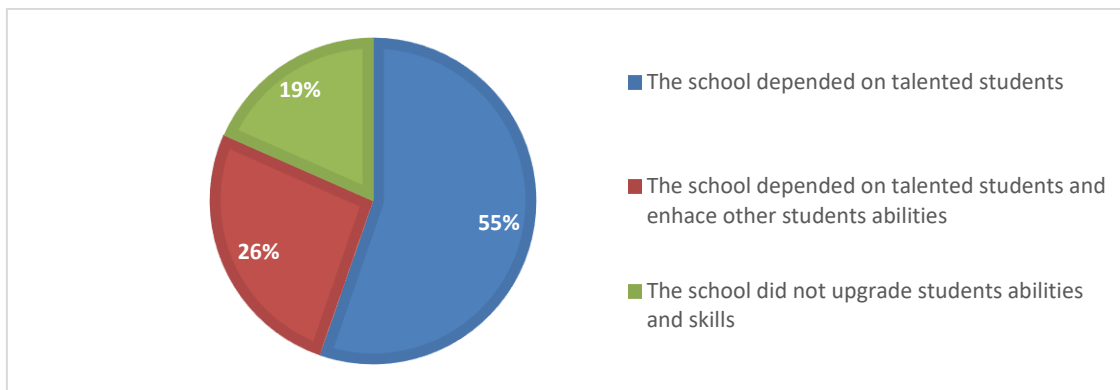


Figure 12. Role of schools in upgrading students' artistic abilities

Interviewee number 9 claimed that since she has the talent of drawing, the school depend on her in drawing posters or paintings for the school without referring to other students. Interviewees number 1, and 3 clarified that they have bounded artistic abilities; therefore, they practiced drawing a specific topic and they repeated it in different arrangement during their secondary study. The instructors in schools did not try to develop the student abilities nor theoretically neither practically. On other hand, interviewee number 4 indicated that there is no need to upgrade students' artistic abilities in school because it is an era of technology. Design with its required architectural and engineering drawing can be mastered by computer. Therefore, the schools have the right to limit the efforts and time for art subject.

In addition, three questions subjected to the students in the survey to evaluate the topics addressed in art subject in secondary schools. The first question is about type of tools that teachers guide the students to use. the results show that around 65.5% of students were oriented towards using color in their drawings, while 34.5% were promoted to use pencils. Remarkably, the results ensured that no school offers clay sculpting in art subject for students.

Moreover, the second question subjects the topics of art subject. The results indicates that about 64% of students did not receive any explanation in art subject during school study. Around 23% of students claimed that the teachers in schools explained to them meaning of colors and color wheels. Nevertheless, sketching by pencils had few attentions by teachers where the rate of students was 18% who been thought this technique. Both contrast and harmony of color, and shading technique gain the less focus from teachers to teach the students, where only 10% of students had the potential of learning these information and techniques. Besides, 2.6% of students claimed that proportion analysis was explained for them by instructors in the schools, as illustrated in Figure 13.

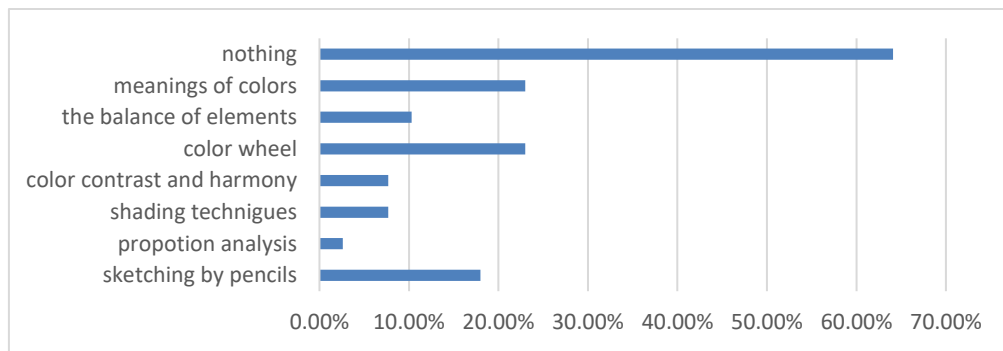


Figure 13. Exploring the topics of art subject taken during secondary education

The interview results are in parallel with survey results. Interviewees number 1,2,4,5, 6, 8, and 9 indicated that no information about art was delivered to them during their secondary education. However, interviewee number 7 clarified that the teachers explained the color well and how to mix colors, meaning of colors, sketching by pencil, and shading technique. Besides, interviewees number 3 and 9 informed that short information was taught by instructors to individual students especially the talented students about balance of drawing elements and proportion analysis of a painting.

5. Conclusion

The research has examined the artistic abilities and creativity perceptions for the enrolled architectural engineering students. It has established that these students are incompetent. There is lack of student's experience in artistic skills including sketching, drawing, or coloring that they ought to gain during their secondary education. Besides, there are lack of their knowing about architecture in general. This low qualification due to underestimate art course in school. Therefore, grades obtained through examination system in school do not reflect the true ability and students' knowing of art and architecture. There is frank negligence upon upgrading students' knowledge, artistic abilities, and skills that leads to prevent upgrading towards creativity. Architecture is considered one of the most significant types of art that aims creativity in design. Therefore, it is recommended to make subject the applied students to a test before they are accepted into the Department. This test can involve freehand drawing to explore students' artistic abilities and skills, besides, an interview can be made to examine their knowledge, intent, and their personal capabilities, as Table 3 shows.

Table 3. Tests and interview for applied students in architectural engineering department

| Target | Test |
|--|----------------------------|
| skill test | freehand drawing |
| abilities test | |
| intellectual test | interview with the student |
| testing the limits of students' capacity | |
| intent test | |
| inter -personal test | |

It requires a specific education system that involves enhancing artistic abilities and upgrading basic knowledge, and creativity perceptions for students. This requires cumulative cognition and promoting artistic skills throughout school education. Hereupon, there is urgent need to enable art subject in school to discover talents and artistic ability of students and promote it. Besides, secondary school education might be reviewed by adding the basic knowledge of architecture to a certain subject. Then,

students will be aware about architecture field, and will be given an appropriate to choose the course according to their intent. According to resent situation, there is need to overhaul admission approach in architectural engineering department by examine the candidate students and assess their knowledge, artistic abilities, and creativity perception. Other option is guiding the enrolled students to undergo one year of foundation pre-diploma program that will equip them with the required knowledge, abilities, and skills to be creative architects.

Declaration of competing interest

The authors declare that they have no any known financial or non-financial competing interests in any material discussed in this paper.

Funding information

No funding was received from any financial organization to conduct this research

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