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The Comprehensive Definition of Creativity in the Architectural Design Action

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Abstract. Creativity considers as a fundamental issue of architecture at all levels, i.e., designer, design action, design environment, and an architectural product. Understanding these classifications is essential to review creativity in previous literature through different contexts: psychology, philosophy, and architecture. The research problem is non-presence a clear definition of creativity in the design action. The research depended on the hypothesis that many indicators, values , and factors affect design action. This study aims to reach a multi-dimensional definition of creativity that illustrates the impact of the indicators of creativity on design action. According to analytical data collection, a questionnaire depended on the research objective by selecting Kufa University students as a community. The findings reveal that creativity is a mixture of personal characteristics that help to use all brain skills that play a role in the design process and lead to producing an innovative product. The paper concluded that, first, creativity indicators affect most design stages, and these indicators are divergent thinking, originality, flexibility, novelty, sensitivity to problems, imagination, and adaptation. Secondly, creativity can be developed by education.

INTRODUCTION

Creativity is a field of human activity. It has become an important aspect since the beginning of the last century, Therefore, creativity took wide space of specialists, psychologist, and architects' thinking. Society's need for creative activity has increased because it has become the main engine that pushes society forward. And creativity is the best solution to the problems and challenges the world faces.

Al-Razi mentioned that (creativity is the production of something out of non-existence into existence), and It means starting something without a previous example(Al-Razi, 1995, p. 27). The philosophical dictionary refers to creativity as a new creation of earlier elements, but with new and original relationships(Salibya, 1994, p. 31). Baalbaki pointed out that creativity is everything that is characterized by novelty and creation, not imitation. (Baalbaki and Baalbaki, 2008, p.289). Creativity is understood as a phenomenon in human life, and it has different meanings according to the cultural field it includes. Architecture is one of the most important fields that require creativity at all levels, i.e., designer, design action, design environment and an architectural product. The importance of the research is to extract a definition of multi-dimensional creativity by presenting many types of literature in psychology, philosophy and architecture. To achieve the research objectives, the analytical methodology was adopted with two theoretical and practical axes, and a stratified sample was selected. Which represents two groups of students from the University of Kufa. Finally, the research found that there are a set of indicators that affect the design action according to stages

THEORETICAL FRAMEWORK

The theoretical framework will shy light on creativity according to many epistemological fields to declare the relations between their attitudes and fundamental values, as follows:

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Creativity in Philosophy

Kant referred to creativity as a talent for producing what cannot be described with a fixed base, It means mental liberation through which nature gives the basis to art (Kant. 1966, p.150). Nietzsche mentioned Creative work is characterized by deviation from norms and changing and modifying the values of life (Foque & sharp. 1972, p.5). Finally, Heidegger saw that the creative output reveals a fact found in the product's physical composition (Heidegger. 1975, p.15), and the creative effort is to reach this truth (Yasser, 2002, p.253).

Derrida describes creativity as the result of challenging and displacing fixed metaphysical foundations. By opening the academic borders between texts (art, literature, philosophy, architecture) by mixing art with others and dispersing contexts (Derrida, 1989, p.73).

Al-Rashid defines creativity as a definition that includes multiple concepts. Creativity is created without a previous example, moreover, it departs from the traditional if the disorder of its logic is realized (Al-Rashid, 1992, p. 57-58). Plato emphasized creativity as a divine or heavenly energy, he called it inspiration that drives and controls a person, and this energy comes in a moment and ends. Francis Galton explained that creative abilities are derived through heredities. Therefore, the individual cannot be separated from the nature of his parents. Aristotle represents the creative processes of industry. It comes from ideas or skill and can happen spontaneously or by luck (Runco, 2007, p.395).

Creativity in Psychology

Saleh defined creativity as the ability of a person to completely break away from traditional or convergent thinking (Saleh, 1981, P.14). Roshka defined creativity as the integrated unit of a set of subjective and objective factors that lead to creating of a product characterized by originality and novelty and of value to society (Roshka, 1989, p. 16-17). Abdul Razzaq explains that creativity is produces novelty and originality and achieves the desired goal (Abdul Razzaq, 1993, P.472). While Morris declared that creativity depends on the intuition transcending the limits of self, time, and place, he called it the triangle of oppression. He summarized creativity according to this triangle, it is the expulsion of oneself from another, so it is a transgression of self-conquering. It begins with a moment, extends life, and transcends time's conquest. It represents the emergence of a creation characterized by novelty. It changes the place's density, which means transcendence to conquer the area (Roshka, 1989, p.19).

Guilford mentioned: “Creativity is a predisposition trait that includes fluency in thinking, flexibility, originality, sensitivity to problems, and redefining and clarifying the problem” (Jarwan, 2002, p.25). Creativity results from adopting a new style or method in creation and production. And potur mentioned creativity is the cognitive ability of individuals to solve problems uniquely and intelligently directed to the emergence of a product. Outputs are the most common means of determining creativity (Potur, 2006, p.113).

On the other hand, Torrance presents his ideas about creativity “It is a process of sensitivity to problems and awareness of weaknesses, gaps, inconsistencies, lack of information, Finding and predicting solutions, formulating new hypotheses, Test hypotheses and reformulate or modify them to come up with new solutions or connections using the available data and transfer or communicate the results to others”(Al-Akhdar, 2011, p.32). The research will mention other definitions of creativity, including:

McKinnon says that creativity combines arts, science and technology (Broadbent, 1975). (Simon, Noel, Shaw) consider creative thinking to be a sophisticated human activity, which appears in solving problems. This solution is considered creativity if it achieves a product characterized by novelty and non-convergent thinking (Roshka, 1989, p.195). Lubart defines creativity as “the sequence of thoughts and actions that leads to a novel adaptive production” (Lubart, 2001, p.295). Palfinger explained creativity (It is the process of merging familiar images or facts that have no apparent relationship to reach new and innovative contexts). Donald Campbell concludes that human creativity is a process that includes sequential stages, which is the collection of ideas, then regrouping and arranging them, followed by a selective approach to sort out good ideas from bad ones, and this process occurs below the level of the mind (subconscious) (Pfinger, 2003, p. 384). It is the act of a person who generates something new, resulting from the interaction of past experiences with knowledge and imagination to form a picture of the future (Vygotsky, 2004, p.50). Sternberg saw that creativity is a multi-dimensional phenomenon, and maybe one of the elements of intelligence (Walia, 2019, p.1-3)

Buzan indicated that individual creativity occurs in the mind, which uses both its left and right parts, and using one of them means that the efficiency in our work is 50%, that is, we make ourselves half-intelligent and use half the skills of the brain (Buzan, 2007, p.33). Creativity is the action of a creative person, which no one else has done before; it leads to a tangible product that is beneficial to individuals and society. Hennessey deduced that creativity is an

action that results from the interdependence of a group of forces at different levels, and requires interdisciplinary cooperation (Hennessey & Amabile, 1998, p.675).

Creativity at the individual level is the creation of one imagination. Creative processes occur due to the creator's daily interaction with the social, cultural, historical and ideological context (Thibodeaux, 2014, p.835). Maslow stated creativity depends on the social climate of the individual, and he distinguished between two types of creators: the self-actualized creator and the talented creator. And that the first live the real world of nature, unlike the second, which lives the world of theories and abstractions (Omar, 2019, p.10).

Freud defined creativity as the broad imagination and expression of the contents of creative output, which stem from the subconscious and are socially acceptable. Kube disagrees with him, saying that creativity needs necessary processes, which are the pre-consciousness process, which includes all creative activities, and The symbolic consciousness processes that are used by individuals to link one meaning to another (Runco, 2007, p.397). While Stuhlfaut mentioned creativity is a process that drives innovation, it is difficult to study because it cannot be observed (Stuhlfaut & Bergh, 2014, p.385).

Creativity is a psychological-social-logical phenomenon, and the works of creators include the interaction of the characteristics of individual creators with their environment and culture, so the creative outputs may be personal but social in origin (Lebuda & Csikszentmihalyi, 2018, p.13). Albert stated that creativity is a behaviour based on knowledge, which grows through the development of experiences and the needs of the self. Walia defined creativity as an action that arises from realizing an imbalance in the environment, which leads to human activity that challenges traditional thinking, and produces a new physical, mental or emotional creation (Walia, 2019, p.6). Agnoli indicated creativity is a human act that appears as a result of the availability of knowledge, the use of some types of intelligence, interaction with the social environment, and the various movements in the mind of the thinker (Walia, 2019, p.6-8)

On the other hand, Dr Tariq Sweidan knows creativity, is looking at the existing and the traditional in an unfamiliar way, then transforming this view into an idea, then a design, then a viable innovation (El- Eqapy, 2020, p.9). It is the ability to express, imagine, and create something that was not present or familiar (Lucas, 2021, p.9).

Creativity in Art

Matisse reminds "creativity is the real job of the artist, and when there is no creativity, there is no art ". The original creator is not the one who possesses an innate talent only but is the individual who can organize a set of activities to reach the final result, which is the creative product (Abdul Hamid, 1978, p. 13). The artist's creativity is considered a continuation of the creativity of nature and requires special features in the creator, such as freedom and independence to achieve aesthetic values. Creativity in art is the product of the artist who sees the world differently. The artist performs the creative action in his way; it relates to the individual and is closely associated with his personality (Al-Rubai, 2004, p. 200).

Davinci believes that artistic creativity requires deep thinking, not genius, to reach innovation, invention and innovation (Bshiwa, 2013, p. 84). Creativity is a phenomenon related to the social and cultural experiences of individuals and societies. The creative process requires an open-minded person to be willing to receive new ideas and cultural contexts (Earnshaw, 2016, P.1). Darwish defines creativity as a genius innovation process that emerges as a result of several factors related to the artist, such as originality (Darwish, 2017, p.1). Others define creativity as the production of new forms, and the achievement of aesthetic values, the product of creativity is acceptable to the recipient within a specific context (Pelowski, 2017, P.82). Khairy explains that creativity in art is finding new, and the product must be characterized by beauty (Khairy, 2019, p. 4). Al-Muhadi defines creativity as a vision based on imagination that achieves originality in art (Al-Muhadi, 2021, p.).

Creativity in Architecture

The concept of creativity in architecture was influenced by philosophy and psychology, which we referred to above. However, Creativity is a multidimensional topic that philosophers, psychologists, social critics, artists and architects still do not fully understand. Scientists and Researchers have developed theories of creative thinking from the time of Plato until today. Dorset and Cross see creativity as necessary in various professions, including architecture and industrial design (Irouke, 2013, p.4). Creativity represents any form of innovation in a a building's style, concept, or physical entity (Sobhiyah & Keshtiban, 2008, p.49). Creativity motivates the architect within an appropriate environment, to achieve an innovative, sustainable and environmentally compatible product (Haseeb, 2011, P. 26). According to Michael, creativity is a process of individual experience of excellence and self-creation. Creativity is

often defined as the ability to generate valuable and innovative ideas. McKinnon views creativity as a combination of science, arts and technology (Irouke, 2013, p.4). As for Al-Mamoori, creativity is a phenomenon that has a significant impact on the design process according to the concepts of this process, which helps individuals to enjoy a high ability to create and produce novelty through their creativity (Al-Mamoori & Isaa, 2018, p.1). Louis Sullivan states that creativity and imagination are innate, but that they seem to be natural talents that can be acquired and nurtured with appropriate training (Chang and others, 2019, p.18); Creativity incorporates existing intellectual elements in new ways.

A high capacity for imagination characterizes a creative person. From Alomar's point of view, creativity in architecture is the formation of new socially acceptable products or ideas. Creativity is a valuable tool that needs to provide a suitable climate to ensure efficient use (Alomar, n.d, p.3-12). Creativity in architecture represents design and innovation by the scientific and engineering rules and regulations resulting from multiple values and cultures. Thinking is the essence of the creative process: the emergence of ideas stemming from engineering-environmental and social values and transforming them into innovative products (Mohammed & Aboubakr, 2018, p.20). Daemen defines creativity as a combination of many factors, including innovation, flexibility and sensitivity to problems; these factors help the learner move beyond traditional thinking and reach a satisfactory product (Daemei & Safari, 2017. P. 101).

Others see the concept of creativity as the product of creative thinking. The product of creativity is valid and meets the satisfaction of a group of people in a given period (Abdul Mukhtar and Farid, 2011. p. 6). El-Eqapy states that a creative action requires a human being with some traits, including imagination, originality, novelty and communication with the ancient to reach the starting point of the creative state and produce a new product (El-Eqapy, 2008, p. 5). Khalifa stated that creativity includes critical important dimensions within the creative process that represents creative psychological activity, the creative process takes different stages, from defining the problem and to reaching and evaluating the creative output (Kharoufa, Imad & Majid, 2009. p. 151). From Al- Raouf's point of view, “creativity is the ability to produce outstanding architectural work that balances the wishes, aspirations and visions of the architect with the requirements of the user, the client, the environment and society” (Al- Raouf, 2011, P.5).

Abu Ragheef referred to creativity as a mental activity that integrates subjective and objective factors to arrive at original ideas, valuable solutions and a new product. Creativity depends on imagination and flexibility within a multicultural context and dynamic conditions. While Moran explains, “Creativity is an individual phenomenon that needs a specific cultural context, and architects use their style to express the absence of their culture and introduce it innovatively”. The most crucial cultural qualification of an architect (the creator) is" to resist imprinting, transcending, imagining, visualizing"(Abu Ragheef, 2016. pp. 17-18). Rzouki defines creativity as an event that occurs for the first time by the creator and is unpredictable, so it is distinct and original based on a different vision towards a task or situation.

Ghada mentioned the stages of the creative process, which are multiple and based on a leap in thought that eventually reaches the creative output (Rzouki, 1996, p.212). According to Al- Saadi, creativity is getting a product or idea that is unique and different from the usual and original (Al- Saadi, 2021, p.12). Christopher describes creativity as the result of contact with the world, and creativity is a human, design-conscious response rather than personal self-realization. In Khadim's view, creativity is a process that represents a circular movement that moves the creator in steps to form the product. The creative process includes Analysis and Synthesis to produce creative work (Khadim, n.d, p. 4).

Although most researchers and scientists have admitted that creativity is a sophisticated mental activity of the individual, they differ in the ways to define it, and Its definitions are varied, and each researcher knows it according to his point of view, and one of the most important classifications of these definitions is: (Abu Ragheef, 2016, p.17)

- Definitions dealing with creative climate.
- Definitions include the creative person in terms of personal and cognitive characteristics.
- Definitions focus on the creative process in terms of the stages it goes through, patterns of thinking, and the moment of reaching a solution.

Definitions include creative output, and these definitions are the most common because they reflect the physical aspect of creativity. (Omar, 2019, p.4).

Creativity indicators will be extracted from the previous definitions literature as follows:

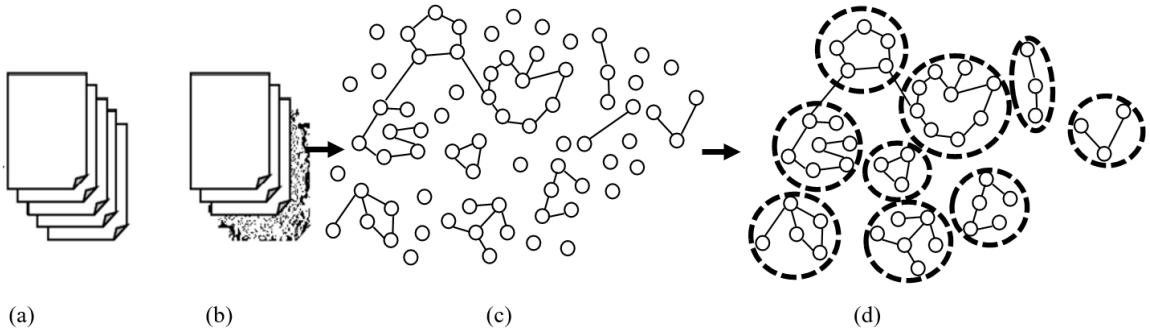

FIGURE 1. (a) Obtain previous studies from the database. (b) remove unrelated studies. (c) The creativity indicators network is created based on previous definitions.

The indicators are originality, novelty, flexibility, fluency, divergent thinking, adaptation, innovation, intelligence, inspiration, communication, beauty, social climate, visualization, mental liberation, transcendence, Self-resistance, unique ideas, the multiplicity of values and cultures, a unique and original event, a sustainable product, a social product that achieves satisfaction, a fantastic product that achieves balance. (d) The most significant connected component is extracted. Each network group represents an indicator; the most frequent hands are divergent thinking, originality, flexibility, novelty, innovation, adaptation, unique ideas.

TABLE 1. The major indicators and characteristics of creativity. Source: The researcher.

Indicators of creativity	Characteristics
Divergent thinking	The ability to think unconventional, that is, link ideas that are not related to each other in reality
Originality Unique ideas	The ability to generate new and unusual ideas
Flexibility	Ability to shift the direction of ones thinking or to change one's point of view
Novelty Innovation	The ability to reach a new product that is different from the context
Adaptation	The ability to adapt to external conditions

Creativity and Architectural Design

Dana referred to creativity as “the cornerstone of architecture” because it represents the ability to produce original inventions from old ideas and that creativity and design are the backbones of architecture (Danaci, 2015, p. 1310). Christopher Alexander described the design as human action, and humanity affirms all the values and meanings in life. Intrinsic beauty is not based on institutional competence, education, or intellectual understanding. Still, it depends on the language of creativity, which cannot be explained or imitated empirically, but everyone can touch it. Alexander stated that the design process consists of two primary stages: analysis and synthesis. At the same time, Lawson believes that the creative process includes five stages: first insight, preparation, incubation, illumination, verification. According to Riba, the design process consists of three stages: Analysis, Synthesis and Evaluation (Daemei, 2016, p.101). Jones identified the relationship between the three stages in the Jones model, a pie chart that representing the development of an abstract idea into a decision and then into a final idea (Gross, 1996). Two main features characterize the design process: first, it is an action that requires creative effort, and second, it is associated with painting (Mozaffar and Khakzand, 2009, p.53).

From Archer's point of view, the design process includes eight stages: familiarity, programming, data collection, analysis, synthesis, development, communication, and solution.

The design process is drawing ideas emanating from the subconscious and the person’s experience. It is gradually developing into a tangible reality by transforming subjectivity into objectivity. and creativity is one of the basic requirements for the design process to reach an architectural space as in the Fig. 1 (Daemei & Safari, 2016, p. 101).

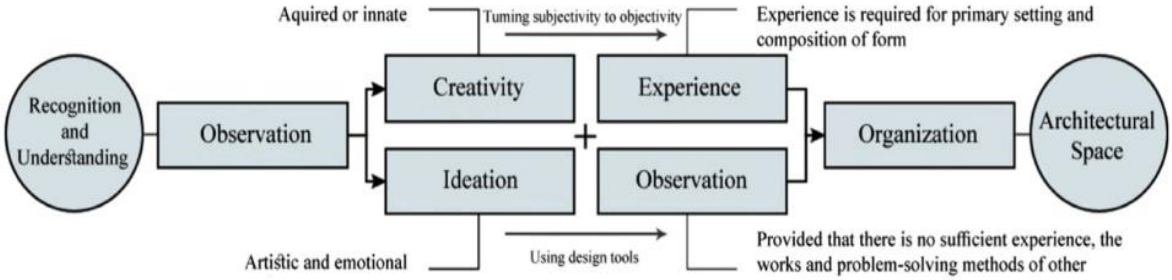

FIGURE 2. A design process model. (Source: The researcher).

Ghonim stated that the design process includes three stages: the problem exploration stage, the idea generation stage, and the evaluation stage (Ghonim, 2016, p.5). Al-Eqapy classified the design process into three primary intellectual stages: (analysis, synthesis, evaluation), which consists of defining the design problem, generating the solution, and evaluating it (El-Eqapy, Al Asad, 2020, p.6). Brooke believes that the creative person uses special skills, traits or abilities during the design process, and these traits are sensitivity to problems, flexibility (the ability to change), intellectual fluency (generating a large number of ideas), originality, and the ability to improve and adapt. Brooke confirms the architect's education to solve real-world problems during the study period and not just unspecified issues. Dealing with real issues improves architects' design skills and creative expression (Irouke, 2013, p.80).

Alex presented a theory of the creative design process consisting of eight steps: observation, facts gathering, problem definition, idea generation, evaluation and testing, plan development, acceptance and action. Others have attempted to integrate these steps into a four-stage model: First the first insight, which includes defining and formulating the problem. The problem definition stage may take hours or days and perhaps years and this stage needs a great effort to understand the situation in depth. Second the preparation stage which includes collecting information, reading, taking notes, questioning, explaining, presenting possible solutions and balancing the strength and weaknesses of each solution.

Third the Incubation, which includes thinking about ideas at the subconscious level. This stage represents the non-sensory activity; that is, the role of inspiration begins with the availability of some knowledge and experience after the work of the conscious mind in the early stages. Fourth, illumination is the stage of reaching a solution and the sudden emergence of an idea or group of ideas. Finally, verification includes the conscious development of the creative process; at this stage, the architect begins to show ideas, then begins judgment and evaluation to complete the work started by the imagination (Mohammed and Aboubakr, 2018, p. 14). Other studies showed that the design process consists of different stages that begin with a feeling of a specific problem to the design decision to solve the problem. These steps overlap with to reach an architectural product (Helal, 2010, p. 5).

Pour stated that the design process depends on a set of overlapping phases from studying the problem to the solution, which results from creative thinking, so thinking is the essence of the creative process and architectural creativity. The design process transforms immaterial ideas created in the architect's imagination into more natural products (sketches, models, ... etc.), to reach an innovative architectural product (Mohammed and Aboubakr, 2018, p. 12). Amer explained the design process as a set of mental activities that include different stages that start with design decisions and arrive at a three-dimensional design solution (an architectural or urban product with specific moral qualities and dimensions). The design action is based on dialogue between the designer and himself about the design problem.

The design process is divided into four stages: the first stage (analysis and data collection), the second stage (the initial design stage), the third stage (the detailed design stage), the fourth stage (the implementation design stage), leading to a solution to the problem (Amer and Jaber, 2018, p.5). Architectural design is an action that aims to change the environment through construction, and one of its most important skills is the rapid ability to solve problems in a specific period. Alexander defines design activity as "a specialized, self-aware activity, not a non-self-aware approach based on craftsmanship, and it is a response to changes in the social and cultural context. Design action includes the inclusion of all requirements of a particular design problem and the search for relationships between these requirements (Al-Sudkhan, 1992, p.11).

Design is human work that involves dealing with various types of information and integrating it into a set of ideas to reach a final vision represented by a solution. The architectural design appears in drawings that illustrate the designer's ideas and expressions (Saleh et al., 2017, p. 2). Al- Eqapy sees design as simulating the existing forms of

nature and artificial forms by directing the designers' thinking. It is considered an area in which intuition and logic are integrated. Al- Eqapy categorized three stages of the design process: Divergent thinking is the stage of expansion of the designer's intellectual base. Transformational thinking is the indicator of the state of innovation in the solution, Convergent thinking is a shorthand indicator for making decisions, and all these stages are reflected in the solution (Al- Eqapy, 2008, pp. 11-19).

Khadim defines design as "an action, make, or activity carried out by man or society to meet changing human purposes." He divides design action into six stages: understanding, observation, definition, discussion, basic models, The test (Khadim, 2019, pp. 19-37). Brown stated, "Design is a verb that ultimately leads to an innovative solution." Brown divided the design process into three stages: inspiration, thinking (ideation), implementation (Melles, 2011, p.302).

Darren stated that the practice of design is a very complex action, consisting of a deeply personal engagement, communication, and reciprocal relationship with professionals in different disciplines. The designer does not think of design as rules that are applied mechanically, but through an internal sensitivity that produces decisions and actions that end with an original solution (FINLAY, 2014, p. 11).

TABLE 2. Stages of the design process.

Authors	Stages of the design process
Christopher	Analysis → Synthesis
Lawson	first insight → preparation → incubation → illumination → verification
Riba	Analysis → evaluation → Synthesis
Jones	Abstract idea → decision → final idea
Archer	Familiarity → programming → data collection → analysis → synthesis → development → communication → solution.
Ghonim	Problem Exploration → Idea Generation → Evaluation
El-Eqapy	Analysis → evaluation → Synthesis
Alex	Observation → collecting facts → defining the problem → generating ideas → evaluation → making a plan → accepting → action
Alomar	first insight → preparation → incubation → illumination
Helal	Sensitivity to the problem → the decision → the solution
Amer	Analysis → plementary design → detailed design → implementation design.
Khadim	Understanding → observation → definition → discussion → basic models → testing
Brown	Inspiration → thinking → implementation.

Source: The researcher according to (Daemei, 2016, p.101), (Gross, 1996), (Ghonim, 2016, p.5), (El-Eqapy, Al Asad, 2020, p.6), (Mohammed and Aboubakr, 2018, p. 14), (Helal, 2010, p. 5), (Amer and Jaber, 2018, p.5), (Khadim, 2019, pp. 19-37), (Melles, 2011, p.302).

Based on the above table, the design action model was reached, as in Fig. 3

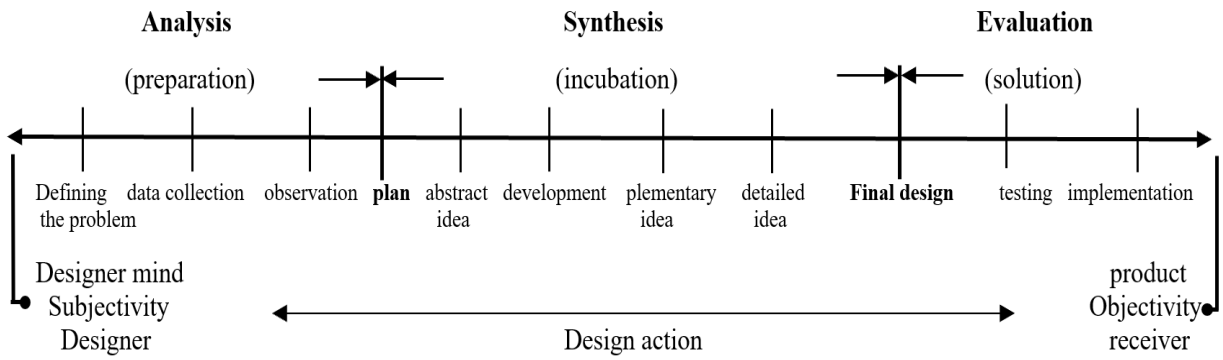

FIGURE 3. Stages of the design action. Source: The researcher based on the previous sources.

Based on (Table 1, Fig. 3), the effect of creativity indicators on the stages of design action was reached (Table 3).

TABLE 3. The most important indicators, will depend on the investigation of the questionnaire. Source: The researcher depends on (table 1, 3).

Creativity indicators	Stages of the design process	
divergent thinking	Analysis	Defining the problem
Originality		data collection
Unique ideas		observation
		plan
flexibility	Synthesis	Abstract idea
Novelty		development
Innovation		Elementary idea
		Detailed idea
		final design

APPLICATION

The application of the research includes conducting a questionnaire, according to a survey form prepared by the researcher. The questionnaire was conducted according to the following steps:

A- (18) questions were prepared by the researcher. (9) Questions are closed-ended, and the answer is according to the Triple Likert scale (weak = 0, medium = 1, high = 2. (9) the other questions are open-ended to ensure the correctness of the respondent's answer.

B- The survey form included (gender, age, secondary school) for the respondents to compare its impact on creativity.

C- The questions depended on the indicators of creativity that were extracted from the theoretical framework And the stages of the design process mentioned in (table 1, Figure 3) as shown in Table (3), to test the effect of creativity indicators on the design action.

D- The study included several (70) undergraduate students in the Department of Architecture at the University of Kufa. The study divided the research sample into two groups of different levels of education to compare the effect of creativity on design action. The first sample group (first stage students), consisted of (30) females and (13) males. The second sample group (last stage students), consisted of (20) females and (7) males.

RESULTS AND DISCUSSION

The research reached the results of the questionnaire applied to the selected sample as shown in Table 4.

The results are discussed in many directions according to:

- The most effective indicators of creativity according to last stage students are firstly (novelty, imagination), secondly (flexibility), third (originality, sensitivity to problems), and finally (divergent thinking, adaptation), Which affected the following design stages: (implementation, abstract idea, initial idea, Defining the problem, Elementary idea).

- The most effective indicators of creativity according to first-stage students are firstly (novelty, adaptation), secondly (sensitivity to problems), third (flexibility, originality), and finally (imagination, divergent thinking), Which affected the following design stages: (implementation, abstract idea, initial idea, Defining the problem, Elementary idea).
- The values of the last stage students are higher than the values of the first stage students.
- The values in some design stages are zero as in (data collection, observation, plan).

TABLE 4. The results of the impact of creativity indicators on each stage of the design.

Creativity indicators	Stages of the design process																	
	Analysis								Synthesis									
	Defining the problem		data collection		observation		plan		Abstract idea		development		Plementary idea		Detailed idea		final design	
	1 stage	last stage	1 stage	last stage	1 stage	last stage	1 stage	last stage	1 stage	last stage	1 stage	last stage	1 stage	last stage	1 stage	last stage	1 stage	last stage
divergent thinking	4	12	0	0	0	0	0	0	51	54	47	50	45	58	46	52	50	57
Originality	0	0	0	0	0	0	0	0	30	52	9	39	19	45	37	41	53	56
flexibility	8	38	0	0	0	0	0	0	54	58	52	58	49	60	53	56	52	57
Novelty	5	20	0	0	0	0	0	0	49	56	43	50	32	55	56	56	52	58
adaptation	60	50	0	0	0	0	0	0	22	20	25	20	22	25	30	35	56	58

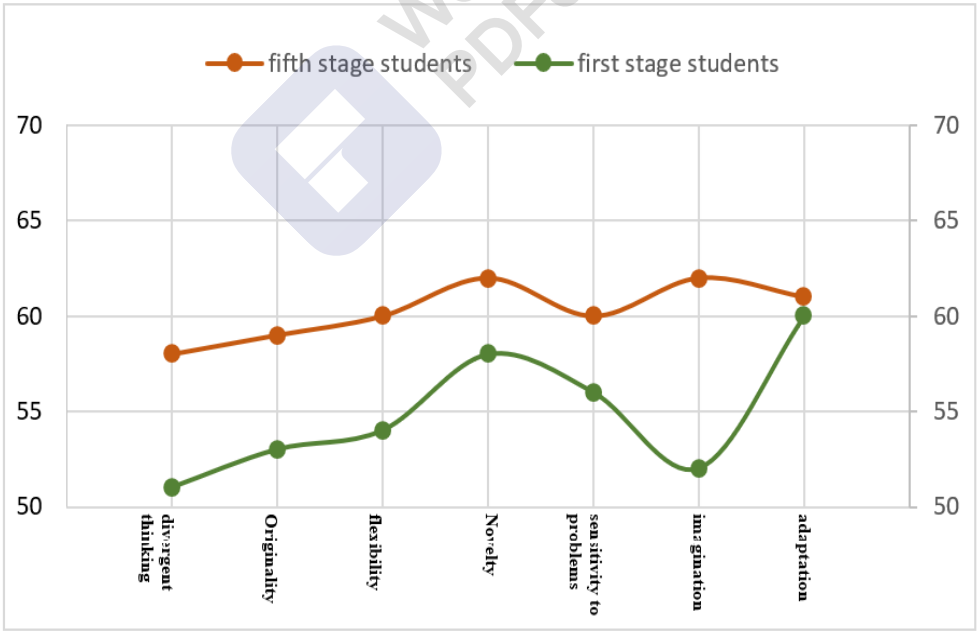

FIGURE 4. The values for indicators of creativity for the first and last stage.
Source: The researcher.

Through the above, we reach the action of creative design. See the diagram (Fig. 5).

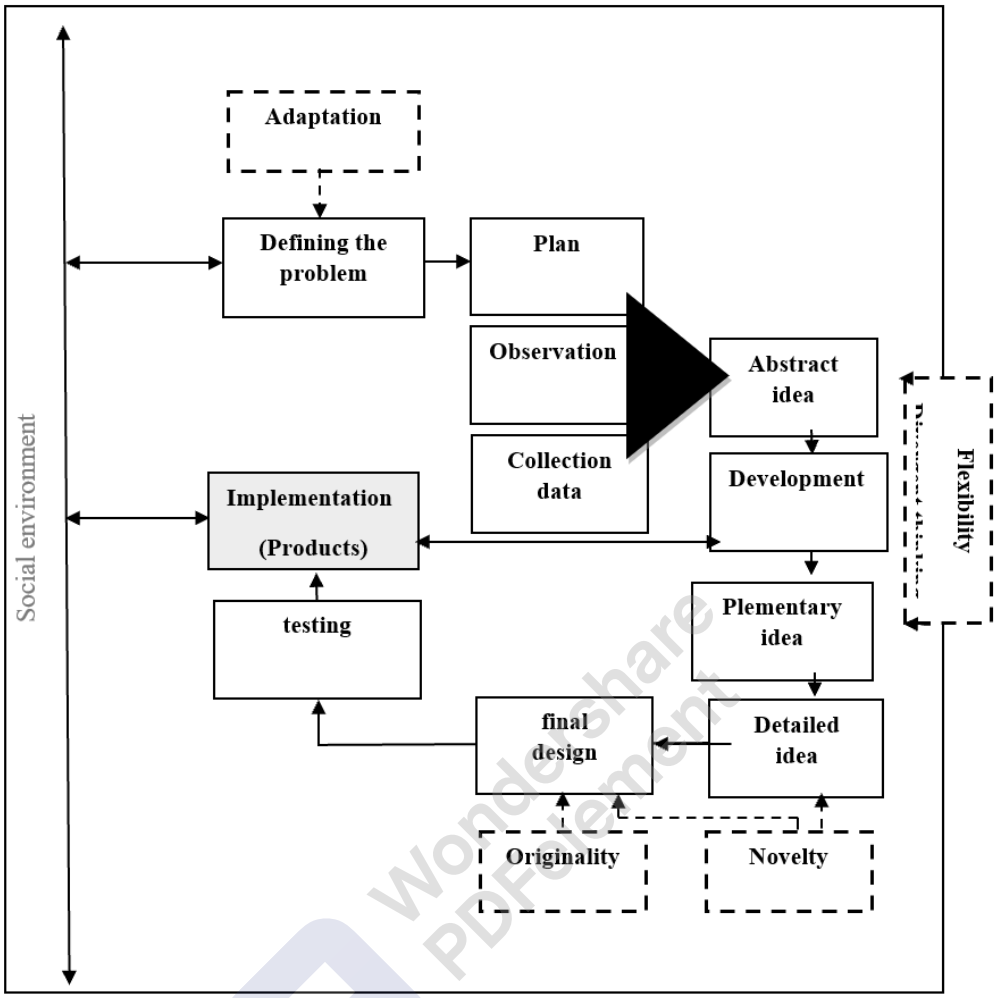

FIGURE 5. The Comprehensive Definition of Creativity in the Architectural Design Action (Source: The researcher)

CONCLUSION

The values of creativity indicators for the last stage students are higher than for the first stage students. We conclude that creativity can be developed through education, so curricula must be constantly developed in architecture schools, and students should be encouraged to think creatively in design studios. Creativity affects the design action in certain stages. At the same time, we find some other states that do not need creativity, such as (data collection, observation, plan) and the high values of creativity indicators in the synthesis stage because it is considered the stage of reaching the idea and the final design. We conclude that novelty values are very high and are important indicators in the design process. In contrast, divergent thinking values are low and considered the basis of the design process to reach creativity and achieve originality.

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