

# The Role of Talents in Stimulating Skills in the World of Computer Techniques learning system for Creative Architectural Design Process.

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**Abstract**— Architectural design process needs many skills for creative design. In the last decades, there was a shift in architecture learning according to the impact of world media and computer techniques. The research is a trial to determine the most essential issues that influenced the design process according to the previous major change. The research concentrates that world view and architecture ages are changing and developing, so that matter affects the demanded talent as a reflection of new attitudes. The research problem appeared through talent epistemological shortage requirements in computational techniques, and media for developing skills toward creative architectural design process to be explicit guidelines for testing students' talents before architecture learning courses. The research assumed that computational techniques as a learning system need special talents to stimulate skills toward the creative architectural design process. There is no limitation between fields classification of talents. Analytical - descriptive methodology depended on a model contains many indicators of talents and skills. This indicator is applied through a sample of selected students with a questionnaire to reach many points. Points which are concentrated on the importance of many talents indicators like abilities, knowledge, performance, potentials, and the capability of skills. Moreover, the contribution relate with the science of mathematics, algebra and many other sciences beside qualification of art and imagination for the creative design process as findings.

**Keywords**— *architectural design process, talent, skills, computer techniques, creativity.*

## I. INTRODUCTION

Recent studies pay great attention to talent, talent management, and talent identification, for it is an integrated process of ensuring any organization for continuous supply at the right time. Learning is a crucial element in talent and talent management. They are learning-driven, and once an individual has learned some skills. Knowledge in learning provides the skills, insight, and competence to perform well. It enables people to become better at problem-solving, with more creativity and as innovative makers. (Vnouckova, Lucie, 2016), declared that talent changes with context and technology, then experience dominates when the venture context is unfamiliar, so talent is more important. individuals with expertise and skill handle many aspects." [1].(Pecker, Huselid, 2006, Dries, 2013, Vandin, Bonek, 2018) declared that talent relates to attraction, retention, development, knowledge, ability, training, and evaluation"

[2]. More studies make divisions between talent fields, Bloom 1985, in his study of talent development proposed four areas of talents: athletic or psychomotor, aesthetic, artistic (cognitive and intellectual ), and interpersonal relations "[3]. According to Gardner 1983, that led to fields of linguistics, spatial, musical, bodily, logical, interpersonal and intrapersonal." [4]. According to the new age technology of media and computer techniques born to break the boundaries of talent fields classification toward integrated and interrelated fields, that distinct division is born to break the boundaries of talent fields classification. Architectural learning is one of the most important fields that is attended of. The transformation from pure artistic talent to the scientific design process and design project in the concept of creativity and innovational attitude. So what appropriate teaching and learning strategies for the architectural design process and what talents demanded in the pedagogic design studying will affect the research procedure and its research problem.

### A. Research problem

The research problem appeared through an epistemological shortage of talent requirements in computational techniques, and media for developing skills toward creative architectural design process to be explicit guidelines for testing students' talents before architecture learning courses.

### B. Research methodology

The research depended on analytical – descriptive methodology to a model containing many indicators of talents, such as dependent variables. Moreover, many indicators and characteristics of skills, such as independent variables. It can be applied through a sample of selected students with a questionnaire depending on their previous experiences. Subsequently, to know what talent's indicators which are the most important in the world of media and computer techniques for the creative design process.

## II. CONCEPTUAL FRAMEWORK

Conceptual research framework extends through the theoretical approach concentrates on many indicators and values relate with the research problem, in order to build theoretical base.

*A. Architectural learning ages*

Architectural education had left four systems, which are quite different before the modern movement. Before the academic education on architecture, master – pupil system with the community-oriented view was responsible for data transition with little creativity. The opening of architectural schools and their head school of fine – arts in Paris (1795-1950), the traditional method had continued in an academic form. Bauhaus school was opened in Germany (1922-1933), was the pioneer of the modern movement; they applied new approaches, including a reconciliation of art and craft in solving problems. In the last half-century -coinciding with the post-modern movement developed. It was the time of the new system's pluralism, emphasis on learning and motivation, and applied models, such as teamwork. Creative teachers started with their creative process in a motivated and creative environment that makes learners thinking of creativity, high-performance training experience, further professional of needing award of complexity and rapid changes." [5]. In the 1660s, there was a shift in learning and design method diminished subjectivity in design, to apply scientific knowledge more effectively and using information technology." [6]. Those changes led to the new birth of the architectural design learning age. Computational support tools such as computer-aided design(CAD) rapid prototyping and applications of artificial intelligence have sprung from the design methods movement to enrich and facilitate the design process declaring that the design process does not follow rigid rules." [6].

*B. Architectural design, creativity, and learning*

The architectural design process is based on a creative phase, where creativity is highly valued. Creativity is rich to simulate the decision-making process and rarely present in building design processes as a tool. [6]. According to Chen, 2010, the value of design changed from aristocratic monopolism to more liberal, so the design methodology paradigm has been changed. [7]. Bloom (1985), in his study of talent and development, classified four distinct areas of talent, as in Table I.[8].

In recent decades, universities and architectural schools have made important efforts to improve design education to enrich architecture's artistic vision by insertion of scientific knowledge and social responsibility.

Contemporary design education includes tools to stimulate creative solutions to problems and a solid scientific basis for decision –making process. With its dynamic production of knowledge and speed in technological advances and an essential human asset, the contemporary world needs a deeper understanding of background knowledge and need to acquire new abilities and attitudes forward design with the increased demand for creativity [6]. An individual preferred method for receiving information in any learning environment as a learning style. Learning can be defined as an internal process that is different from every individual, and learning style can be described as the way learners

acquire new information. (Fox&Bartholme) described learning styles as a biological and development set of personal characteristics that defined learner process information. Individuals preferred learning ways of perception, organization, and retention of information as distinctive consistent [9]. Concerning design education, most universities have adopted projects-based learning as the key to teaching – learning strategies. Creativity is one of the key concepts when judging a designer or a design solution. A question that still has to be answered is, how can knowledge that enhances creative designing? Various methods found in the literature that may stimulate creativity as below: Assumption busting, CATWOE, cause-effect diagrams, Crawford slip method, Delphi method Force – field analysis, Gallery input-output, Morphological analysis, NAF (novelty, attractiveness, and functionality), other people viewpoints, PDCA(plan, do check, act), QFD, Random stimuli, Related words, Scamper, Six sigma(DAMIC and DMADV), six thinking hats, SWOT, Synectics.[6]. We can classify various methods that stimulate creativity with the creative process phase, as in Table II.

TABLE I. TALENTS DEVELOPMENT IN LEARNING, F.JHON, FIELDHUSEN, 1994.

Talents develop-ment	Academic intellectual	Artistic	Interposal social	Vocational technical
Field	science	Graphics	Leadership	Home economics
	Math.	Drama	Care gifting	Trade- industrial
	English	Dance	Sales	Business – office
	Social studies	Sculpture	Human services	agriculture
	languages	Music	-	Computers & techniques
	-	Photography	-	-

TABLE II. VARIOUS METHODS OF CREATIVITY SIMULATION IN THE PHASE OF THE CREATIVE PROCESS, DEMIRBAS, O.O., 2003.

Creative process phase	Methods
Problem definition	Assumption Busting: Assumption surfacing, back words Front words planning boundary Examination, CATWOE, chunking, Five Ws and Hs, Multiple definitions, other people definitions, paraphrasing keywords, why why why
Idea generation	Analogy , Attribute listing , , Biomimicry, Mind mapping , Morphological analysis ,Nominal group Techniques , Pictures as idea triggers , Pin cards , Random stimuli , Taking pictures , TRIZ
Idea selection	Advantages, Limitation, and Unique Qualities, Anonymous Voting, Consensus mapping, Idea advocate, NAF, Pluses potential and concerns, Sticking dots, Unique qualities
Idea verification	PACA, QFD , Six Sigma

Creativity in engineering is the effectiveness of producing ideas as products. According to the shah, Vargas, 2003, this

field broadly addresses the production of ideas, products, and processes. The effectiveness of idea generation can be linked to the method used by engineers to generate concepts.” [10].D. Donald, 2002 declared that many key-characteristics and indicators of creativity, generating ideas, according to fluency, flexibility, Elaboration, Metaphorical thinking, and originality ‘[11]. Each of those indicators is of many values, as declared in table III.

TABLE III. DECLARES THE MAJOR INDICATORS AND CHARACTERISTICS OF SKILLS , J.DONALD,2002.

Indicators	Characteristics
<b>Fluency</b>	Ability to generate a large number of ideas in response to open-ended questions or thinking process
<b>Flexibility</b>	Ana Ability to shift the direction of ones thinking or to change ones point of view
<b>Elaboration</b>	Ability to add details and to expand ideas, and for making ideas richer, more interesting
<b>Metaphorical thinking</b>	Ability to use comparison or analogy to make new connections. To make the strange familiar or to make the familiar strange.
<b>Originality</b>	The ability to generate new and unusual ideas, to generate options statically infrequently

### C. Talents classification, indicators, and possible values

The idea of talent is an old one – dating to ground 2400 years ago in Plato's republic. It extended into one of the cornerstones of modern economics by Adam Smith, from labors' division among people with different talents. Less attention has been paid to how people come to discover their talents. Sometime talents are apparent, but moreover, they must be discovered in the rule, not in the exception" [12]. Talent is a complex issue of aptitudes or intelligence, learned skills and knowledge and motivations, attitudes- dispositions that affect persons"[8]. Talent classification is difficult to determine, many specialists around the world try to develop methods of talent identification that support scientific theory and evidence" [13]. According to mckinsey, Talent is concerned with developing strategies through a variety of initiatives, knowledge, skills, and competences" [14]. Although philosophical discussion about putting talent in classifications of developed talents, adopted talents, inborn talents, and natural talents, the concept of talent is always related to performance and achievement. Talent is what enables facilitating future achievements. Reference to a talent of a person does not point to the skill of trait that a person may have."[15]. Some people define talent as a collection of individual capabilities, including skills, knowledge, and improvement; in another definition, talent refers to those with the high potential ability with high performance, so that talents may possess specific skills and knowledge. Talent is defined as an innate ability, which involves individual differences. Talent is considered as knowledge and skill that is learned, teachable, permanent, and incomparable. It is argued that talent is a property that leads to the creation of value in the organization and

identified GOD-GIVEN power and ability and compliance [16]. The cretin talent is innate and reflected in a person's biological makeup. Talent is based on a model of distinct facilities with special abilities adjacent to each other. Skills and fluency, verbal memory is extended in the realm of skill and cognitive abilities such as a working memory that correlates with the performance [17]. Many terms are commonly associated with talent in many literatures. Hosseinzadeh, sadeghen, 2015, according to (Gaghe,2000, hinrinchs 1966, Michaels at al 2001; Jerico 2001; Stanhetal, 2007; Bathle- langenegger , 2012; Alrich, 2007; Cheese et al., 2008; Tanseley et al, 2007, 2006; Buckham,2001; Cheese; 2008) referred that: ability, capacity, capability, commitment, competence, contribution, experience, knowledge, performance, potential, patterns of thought and feelings behavior, and skills, are basic talents indicators [16]. Ability always refers to Cognitive abilities & gathering information. Capacity is how to detect or deploy with exploring new external knowledge, which refers to performing the function and solving problems. Capability always engages with modifying for successful performance. Commitment is the measure of competitive advantages for creation. Competence engages with personal intelligence to create and do something well. Contribution relates to choices, decisions, and the potentiality to add values. Experience is the meaning of how to create, how to communicate toward understanding the usability. Knowledge is the art information, technology, and communication experts, a combination of data, information experience, and individual interpretation. Performance is an efficiency toward standards of quality and quantity. Potential is the type of treatment, a model to measure performance, mathematics equations, and differential geometry. Patterns of thought, feelings, and behavior deal with social participation. Skills are carrying out complex activities involving ideas of cognitive skills, technical skills, thinking, intellectuality of excellence" [18],[19]. All those indicators and their related terms are very important to be independent variables for application, corresponding with the indicators of skills and their characteristics, as dependent variables. The conception of giftedness used often in gifted programs conceptualizes human abilities as synthesized in a general unitary ability called intelligence or giftedness. Alternative conception, namely "talents", "aptitudes" or special intelligence in defining high-level abilities.

Aptitudes, talent, or special intelligence may suggest more view of human abilities, which be nurtured, and aptitudes, which are amenable to development. According to Terman, 1925, giftedness and the following of Marland 1977 viewed giftedness as a fixed unitary trait manifested dichotomously, what some people have. In contrast, the unitary trait concept, most youth have intellectual strength, but those strengths are diverse. Some people show talent or aptitudes in mathematics, others in verbal communication, activities, and some in other domains, like how economics, creative writing, learning a foreign language, or dramatics. There is

a wide difference among youth in their aptitudes for test areas and their interests and motivations. Nature and nurture operate in school, home to provide educational opportunities for requested skills associated with the talent area. Giftedness is a Static concept; it is fixed. Talent and talent development are dynamic concepts in which individual studies and their special abilities can grow and develop [3]. The framework of human facilities of intelligence or talent varies in the domain of psychology.

#### *D. Computational tools, Techniques and Learning*

Recent theories of form in architecture have focused on computational methods of formal exploration and expression. The exploration of hypersurfaces, bobs, and folds for new forms tendency. For the last decades of the twentieth century, according to Marcos (1988), computational conceptions, Williams Mitchells (1990), Logic of architecture, Peter Eissenman (1992), Vision unfolding and Frasers (1995), Evolutionary Architecture, Grey Lynns(1999)Animate from, and many attitudes that made architects concentrated with the use of the computational mechanism as New techniques and methods. New possibilities and strategies most universities have on and diprojects-based learning gital technologies with the new relation of as approach tools serving human creativity and interpretation [20]. Results created in a design studio using computers can only be attributed to the capacities of the media. In that process, two elements are very important: 1- The conceptual paradigm ways of thinking of architecture; this includes predominant theoretical discourses and images of influential design, ideas, and everything, discuss and produce. 2- The personal factors that include personality, cultural background, and affinities of students; moreover, their particular design talent, and the capacity of an educator to build up a conceptual framework with developing the creativity of their ideas [21].

The fundamental issues of whether CAAD is a design or drafting tool. CAAD tools impact areas of the design process and important in the conceptual phase of design. The process of design embodies many elements, such as creativity, intuition, imagination, and originality. Koestler discerned two types of thinkings routine and creative thinking. The first operates on a single plane, but the second operates on more planes. It is the ability to bring something new into existence. Personality plays a great role in creativity, and architects were divided into three groups based on their creativity levels. Most creative groups were focused around meeting internal artistic standards of excellence, where least creative do with the general standard of the architecture profession. Creative artists tend to have a preference for complexity, asymmetry, and incompleteness. The early design process is the role of sketching, forming ideas at the early design stage. It is the stage of three relations between active sketching (hand) Passive perception (eye), active cognition (brain) in a term of figural conceptualization. The

role of CAAD is still preferred to manipulating and editing of drawings for creating realistic images for creative design and design development" [21]. Digital devices are seen as tools for exploring why is known and portals for entering into what is unknown toward new concepts. It is beyond the limit of perception. Computational machines are perceived as a non- human creation and can consider distant and remote. Creativity in architecture traditionally has always been intuition and talent, while an individual provides stylistic ideas as a group of talent.

In contrast, computation as a process is not necessarily credited to its creator. The process is understood as mathematical operations that can be applied to any kind of elements [20]. Finally, we can be discerning two stages of the design process: sketches design before computer design, and design creativity and computer-aided design [22]. An architectural project is a process supported by different tools, paper/ pencil, CAD tool, and optimization tool. From sketches to precise elaborated plans, as cognitive, different architectural design distinguished into two main phases: the design, creative and conceptual, and mainly individual based on paper/ pencil sketches. The productive phase defines the project with a geometric and technical solution. Sketches are still widely used in the early stages of design for the sketch are ambiguous and allow multiple explorations; it is a cognitive process of design to support thinking artifacts. On the other hand, CAD representations allow only models that have to be changed [23]. In that approach, we can concentrate on talents that will be dependent on both phases, about human intuition and ingenuity as starting point and other talents relate to computational exploration, that will check in our application.

### III. APPLICATION

The research application includes many steps according to a survey of the questionnaire and a method as below:

- Many indicators of talent and other skills are selected from the theoretical framework as an application model, containing a list of 60questions to declare the impact of computer techniques and programs on talent indicators and skills characteristics toward the creative architectural design process.
- The questionnaire will apply to a sample of 92 architectural students at Tartous University. That means the total society of third-year architectural students (as an intermediate stage). To check the impact of talent indicators in computer techniques, programs, and the media world to simulate skills, depending on their previous experience, towards the creative architectural design process.

A. Analysis of the results:

The data depends on a questionnaire that will analyze by linking the impact of the development of computer use and modern technologies depending on the variables of talents and the characteristics of skills, in the sequence as below:

TABLE IV. THE PERCENTAGE OF TALENT INDICATORS IN RELATION TO EACH SKILL CHARACTERISTIC, THE AUTHOR.

Talents indicators	skills characteristics				
	originality	Metaphorical thinking	Elaboration	Flexibility	fluency
ability	0.61	0.74	0.89	0.73	0.63
capacity	0.61	0.78	0.75	0.61	0.59
capability	0.66	0.78	0.80	0.89	0.80
commitment	0.50	0.39	0.62	0.26	0.34
competence	0.63	0.66	0.89	0.59	0.67
contribution	0.72	0.66	0.76	0.59	0.76
experience	0.64	0.76	0.83	0.74	0.75
knowledge	0.65	0.77	0.78	0.75	0.80
performance	0.55	0.74	0.77	0.70	0.75
potential	0.65	0.74	0.79	0.64	0.61
skills	0.70	0.77	0.89	0.59	0.57
Patterns of thoughts, feelings, behaviors	0.60	0.71	0.67	0.67	0.75

Values related to talents indicators according to (ability, capacity, capability, commitment, competence, contribution, experience, knowledge, performance, potential, skills and patterns of thought ,feelings and behaviour) were characterized by their rates relative to response values for skills characteristics according to the values (63%, 73%, 89%, 74%, 61%), (59%, 61%, 75%, 78%, 61%), (80%, 89%, 80%, 78%, 66%), (34%, 26%, 62%, 39%, 50%), (67%, 59%, 89%, 66%, 63%), (76%, 59%, 76%, 66%, 72%), (75%, 74%, 83%, 76%, 64%) , (80%, 75%, 78%, 77%, 65%), (75%, 59%, 89%, 77%, 70%) (75%, 67%, 67%, 71%, 60%) respectively with (fluency, flexibility, Elaboration, Metaphorical thinking and originality).

B. Discussion:

The results are discussed in many directions, according to:

- The most effective values of evolving talent indicators with the use of modern technologies for learners are ; (ability, commitment, competence, contribution, experience, performance, potential, skills) concerning the elaboration, (capacity) in relation to metaphorical thinking ; (capability) in relation to flexibility and (contribution, knowledge, Patterns) in relation to fluency.
- The most effective values in the characteristics of skills for various types of indicators are evolving talent indicators using modern technologies, for learners are in the field of elaboration and fluency for their highest

percentages.

- The Minimal effective values in the characteristics of skills for various types of indicators are evolving talent indicators using modern technologies, for learners are in the fields of originality, flexibility, and metaphorical thinking.

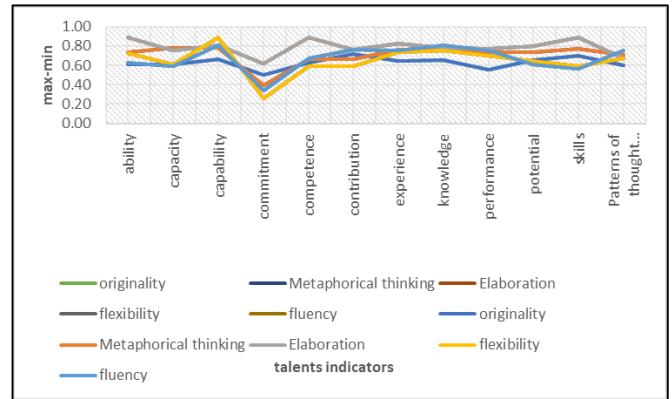


Fig.1. A diagram shows the lowest and highest values of skills characteristics in an architectural design compatible with talent indicators, the author.

IV. CONCLUSION

- Specialists divided talents into many groups or domains of psychology as spatial, musical, bodily, logical, interpersonal, and intrapersonal, and each domain leads toward special skills.
- Architectural learning and design processes need special talents that may be innate reflects a person's biological makeup as GOD-GIVEN, or learned by considered knowledge and skills.
- In the world of media and computer techniques learning, individual needs talents to simulate many skills toward creative architectural design process in comparing with the previous stages, but those skills are still in two phases: the phase of sketching as an active hand, supported by different tools from sketches as the elaborated process of thinking artifacts precise plans of cognitive, creative conceptual, and phase of CAAD for maintaining and editing of drawings for creating realistic images for creative design.
- There are no limitations between talent domains classification in the learning requirements of computer techniques, but there is an interrelation between various talents for the creative architectural design process.
- The application reached that there are many talents extended from many domains and supporting each other in computer learning for creative architectural design which simulated the characteristics of skills that relate with elaboration, metaphorical thinking, fluency, flexibility, and lastly, originality, as presented computational machines are nonhuman creation and digital devices for exploring and entering into what is unknown toward new concepts.

- The application declared that talent indicators, such as ability, capability, competence, experience, and skills, greatly impact skills characteristics of elaboration through the ability to add details and expand ideas for making ideas richer. Capability affects fluency through the issue of generating a large number of ideas. Ability, capacity, capability, experience, knowledge, performance, potential, and skills affect metaphorical thinking's characteristics skills through the ability to use comparison or analogies to make new connections. The other indicators of talents of ability, capability, experience, and knowledge affect flexibility by the ability to shift the direction of thinking by computer techniques stimulation.
- The application reached that other talent indicators affect skills characteristics of elaboration to add details and expand ideas, and fluency, which engages with the ability to generate a large number of ideas. Metaphorical thinking took space according to the analogy to make new, and finally, flexibility by shifting the direction of ones thinking but with lower values.

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