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Digital Games: A Tool for Evaluating The Mutual Interaction between Architecture and Cultural Values of Society

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ABSTRACT: One of the most obvious dilemmas that face architectural educators is to teach students how to deal with the imported sparkling architectural culture of the "Other". "Deal" here does not necessarily mean to stand against or reject, but how to investigate, analyze, filtrate, and finally choose what suite our culture. Of course, it is necessary here to define our culture and our social needs as a society not as individuals. It is important to explain how our architectural culture was shaped due to the common social needs of our society and how these needs affect the architectural product. The problem here is the different educational effect of "To Tell" rather than "To Practice". As Confucius said *"Tell me, and I will forget. Show me, and I may remember. Involve me, and I will understand"* [1]. Hence, there is a great difference between "To be told" and "To experience", but how can architectural educators make students "Learn" such a thing like the architectural social needs of a society by "Self-Gained Experience" instead of by lecturing?

This paper starts an analytical investigation to:

- Investigate, by a literature review, the contemporary educational needs in the architectural field from the point of view of education theorists and architectural educators.
- State the guidelines of an innovative tool for making students understand the importance of architectural culture of societies through a self-gained experience.

Conference Topic: Techniques and technologies; their cultural implications.
Keywords: edutainment, games, architectural education.

1. INTRODUCTION

For almost the entirety of its past history, the architecture field used diffusion of knowledge and learning through chains of masters and pupils, webs of personal contacts, to reproduce itself. Starting from about the 12th century the processes of learning and building were integrated and strongly implanted in the fabric of society and it was controlled and guided by the guild system [2]. According to this model of architectural education, those who wanted to learn had to join the guild and serve under the supervision of a master builder. Learners acquired their knowledge through a long period of experience and apprenticeship and their position in the hierarchy of the system indicates their degrees of specialization [3]. This educational model had been called "The Guild System" model.

Starting from the mid of the 17th century a new form of architectural education has been evolved, the institutionalized education system. Due to this model of architectural education, those who want to be architects have to join a form of educational institute. Therefore, a staff of educators starts to teach them theoretical principals of architecture and many other issues related to the architectural field. This model of architectural education is called the "Design Studio" educational model.

Comparing between the "Guild System" model and the "Design studio" model points out many advantages and disadvantages in each of them. One of the most disadvantages of the "Design Studio" model is its disjunction stigmas from the real life context. In the past, many practitioners criticized and described the "Beaux Arts" teaching model, which was the first form of the "Design Studio" educational model, as:

"A fantasy world in which incompetent professors who are the centre of petty personality cults encourage bizarrely unrealistic expectations in students, while avoiding the teaching of anything actually to do with the hard realities of life."[4]

Nowadays also, educators of architecture find the conventional "Design studio" model incapable of making students competent to deal with real life situations. They point out that the conventional "Design studio" model oversimplifies, and some times neutralizes, essential issues that are supposed to play a major role in shaping any architectural solution [5]. Issues like economical factors, social impact of the design, urban context, client needs and interferences and others, all of them have been jumped over and margined in conventional "Design studio" model. Therefore, many voices call for a substantive change in the architectural education

2. HOW IS THE CONTEMPORARY ARCHITECTURAL EDUCATION SUPPOSED TO BE?

Literature review points out many issues pertaining to the teaching of current architectural education. These issues may be categorized into "What to teach", "Where to teach", and "How to teach".

2. 1. What to teach:

According to theoreticians, Educators teach others not only as a mere transformation of knowledge but also to implement changes in the patterns of behavior of a social group in the desired direction [6]. Consequently, architectural education should not only prepare students for the profession with necessary abilities and skills but it also should educate them as people aware of social realities, being able to see the problems, to find solutions, to have critical thinking, to have their own values, and so on. Therefore, any architectural curriculum should make a balance between three aims: "Knowing What", "Knowing How", and "Knowing Why".

2. 1. 1. Knowing What:

This addresses all issues related to: mere data and theories. Here, taught issues are like: architectural language, presentation and rendering methods, drafting tools and techniques, color theories, building materials, construction systems and methods, architectural styles, modern technologies in architecture, environmental control elements and theories, architectural styles principals, and so on.

2. 1. 2. Knowing How:

This addresses all issues related to "Process" and "Theory Application". Students have to be trained "How to operate" processes such as: problem definition, program composing, analyzing and developing, multi solutions compromising, making researches, evaluating concepts, leadership, management, team-building, communication, decision-making, negotiation and collaborative abilities, and so on. In addition, they have to "Apply" those general theories they have been taught in lectures. This knowledge is what (Peter G. Rowe) calls as "Actionable Knowledge". According to him "Actionable Knowledge" is not simply a matter of theory and practice, but it's a matter of weaved "Knowing That" and "Knowing How" [7]. Moreover, he states that, professional education in design is fundamentally about providing or, more properly, conveying actionable knowledge.

2. 1. 3. Knowing Why:

This addresses all issues that can be classified under "Awareness", "Perception" or "Appreciation". These issues are such as personal attitudes, understanding community inclination, psychological impact of spaces and forms, appreciating others' values, emotional sets or biases, suitability of particular patterns for particular human groups or geographical positions and so on. The aim here is not to "Build up" student's values but it is to "Coach" their process of shaping their own values.

2. 2. Where to teach:

Where here does not refer to the physical place but it refers to psychological environment within which students are educated, and this is what is called "Studio Culture" [8].

According to the Report of the AIAS* Studio Culture Task Force a lot of concepts that are resident deep into the conventional studio culture need to be changed**. One of the most influencing myths that should be changed is the one describing

* The **American Institute of Architecture Students**

** For example, competition attitude should be replaced with cooperation, and focusing on end products quality should be alternated to be on design process and problem definition

architecture as a one-man show, and it should be transformed to think of architecture as a social activity, involving countless voices and agendas.

2.3. How to teach

How to teach and what to teach are interdependent. One cannot ask for a curriculum encouraging the personal abilities and skills of students through a "Teacher-Centered"[9] model of education. In addition, it is impossible to provide students with real life experience with totally hypothetical situations.

Consequently, "Student-Centered"[9] teaching models becomes the main models that forms the new teaching models that have been used to fulfill the contemporary needs of architecture education [10]. These models, in a way or another, may be described as "Experiential Learning" techniques. However, is "Experiential Learning" suitable for all educational issues? Is it suitable to be used in case of "Knowing What", "Knowing How" and "Knowing Why" issues?

In a previous research [11], it has been investigated how much "Experiential Learning" is suitable for "Knowing How" issues. Moreover, the research proposed using digital games as an educational tool that depends upon the "Experiential Learning" techniques to make students learn "Knowing How" issues by self-gained experience. In the coming section, this research will try to investigate to what extent digital games may be counted as a suitable experiential educational tool for "Knowing Why" issues.

3. EXPERIENTIAL LEARNING CONCEPT

Experiential learning is a process for drawing learning from experience and practice. Around 450 B.C, Confucius said: *"Tell me, and I will forget. Show me, and I may remember. Involve me, and I will understand"* [12]. In general, "Experiential Learning" may be defined as a process by which change and understanding can be pursued at the same time. It is usually described as cyclic (fig. 1), with action and critical reflection taking place in turn. The reflection is used to review the previous action and plan the next one [13].

Therefore, the most important concept in the "Experiential Learning" methodology is that no one tells what is right or wrong. There are no previously told instructions nor guides. The Learning Process here depends on "Trial & Error". The instructor's role is only to coach the students through the "Results Analysis" phase. In this phase students point out their own remarks and analyze them to plan their future actions. Through the "Action → Reaction → Analysis → Plan → Action" cycle the students gain experience from their accumulated activities.

* "Teacher Centered" models imply that knowledge is separate to the human mind and it must be transferred to the learner in a teacher centered approach which is called (Behaviorist learning theory).

** "Student-Centered" models imply that all humans have the ability to construct knowledge in their own minds through a process of discovery and problem-solving which is called Constructivist learning theory.

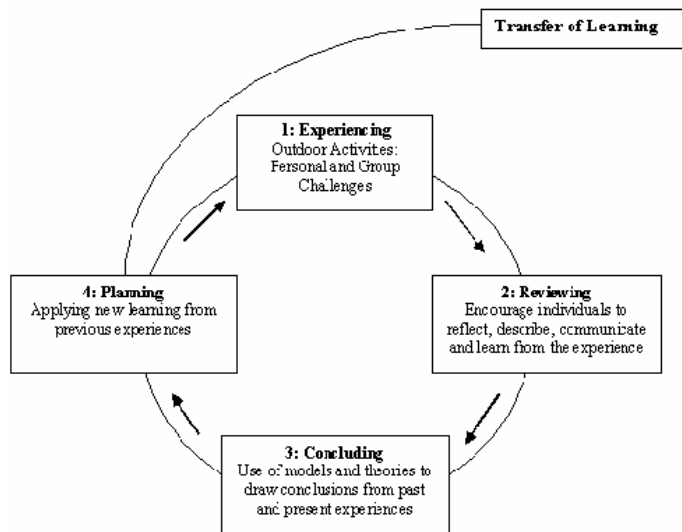


Figure 1: The Experiential Learning Cycle (from Exeter, 2001, adapted from Kolb, 1984).
Extracted from James Neill, Experiential Learning Cycles

4. THE PROBLEM OF THE "KNOWING WHY" ISSUES

As mentioned earlier, "Knowing Why" issues are those related to awareness, perception and appreciation. Therefore, it is not only a matter of knowledge but it is also a matter of self-inclination and believes that need to be built up through a long period of self-gained experiences. If educators try to depend on the "Experiential Learning" methodology to teach students "Knowing Why" issues, they, the educators, need to put students into real life situations and let students take decisions and see what these decisions lead to.

For example, if instructors need to make students appreciate, not only know, the need for a certain type of architecture for a farm community; they either "Tell" them why this society adopts this architecture, or they have them make design decisions then ask them to observe and analyze how community/individuals will react with these decisions. Then, students start to do modifications to their previously made design decisions based on their observations and analysis and so on until they themselves find out why the community adopts this architecture. This is how the learning cycle goes according to the "Experiential Learning" cycle. The problem here is who will be the client who represents his society, for how long is he/she going to be available, and how much is he/she ready for accepting students' errors? In other words, there is a need for a "Virtual" client who represents his/her society as much as possible.

5. WHAT DIGITAL TECHNOLOGY OFFERS

The need for a "Virtual" client leads one to search about him/her in the virtual world, in other words to check the digital technology and what it offers nowadays. In

general, digital technology nowadays is so involved into our everyday life. It is now a very important part of our work life as much as it is in our entertainment life.

5. 1. Work/profession life

Digital technology is used so widely into many fields such as education, military, medicine, commerce, and many others. Particularly, in the architectural field, computers and digital technology became main important elements of the design quality assurance matrix. For example, technical simulation programs are used to simulate different technical architectural issues like acoustics, thermal performance, daylight simulation, sun path analysis, HVAC installations, construction systems, and others. No one can deny the great importance of these programs and how much they improve the performance of any design quality. However, they cannot offer the needed "Virtual" client, and neither of them can be used as an "Experiential Learning" educational tool [11].

5. 2. Fun/Entertainment life

Digital technology nowadays may be considered as the main element of the entertainment life. Most of young people nowadays spend thousands of hours sitting in front of a monitor for chatting, playing, watching movies, or even navigating through the internet for non educational purposes[14]. One of the most important components of the digital entertainment life is the "Digital Games". In most cases, player of a digital game deals with a "Virtual" representative/character(s) to win the game. However, can these virtual characters fulfill educators' needs of the "Virtual" client?

6. USING GAMES AS EDUCATIONAL TOOLS

Before investigating the suitability of games' virtual characters to fulfill educators' needs of the "virtual" client, the suitability of using games, in general, as educational tools should be investigated firstly.

6. 1. Game definition

"Game" is, in the everyday sense, *"a competitive activity . . . in which players contend with each other according to a set of rules"* [15]. Games have been used as educational tools in many ways from the past. For example, the "Game Theory" has been introduced in 1921 [16]. It has applications in a variety of fields, including economics, evolutionary biology, political science, and military strategy. Game theorists study the predicted and actual behavior of individuals in games, as well as optimal strategies. Thus, it aims to help learners to understand situations in which decision-makers interact.

6. 2. Using games in education

The approach of using games in education spread widely because of their great effect on not only children but also adults. Many educators mentioned the success of using games as educational tools [17], and they related this to:

- The funny nature of games spreads an enjoyment spirit between learners/players, which attracts their full attention.
- Involving the learning process into a game session encourages learners/players to cooperate/challenge with/each other, which creates a sort of community interaction.
- Any game is based on a set of rules which makes a sort of order and organization for players/students interaction.

- Games always have an aim, "To Win". This motivates students/players to work hard and to think creatively to reach the "winning state" which sparks students'/players' creativity, stimulates their adrenaline, gratifies them and fulfills their ego.
- Games are an interactive dynamic form of human activity which suits a lot of youngsters rather than reading or studying.
- In most cases, playing games depends on observing and analyzing the game outcomes and other players' moves. This builds up the player/student ability to observe, analyze and plan his future actions on his observations and analysis in a process that may be termed a "Learning" process.
- Most of the modern digital games have the ability to be modified and changed by plugging in new patches, which guarantees the game continuity and lasting for a longer time.

Because of their wide usage, in the start of the 20th century a new term has been coined which is "Edutainment" which refers to the combination between "Education" and "Entertainment" [18].

Recently, the wide spread of the digital technology helped in finding a new form of technology usage, which is simulation and digital games.

Although games and simulations both are strategies that put a course's principles and ideas into action within an engaging, interactive context, they still differ from each other [15]. Simulations are typically mock-ups of real-life situations in which students are asked to play various roles, engage in dialogues with others, and observe decision-making constraints. On the other hand, games, by contrast, do not strive to mirror reality accurately, and they tend to occur within a generally playful atmosphere. Many games and training simulation programs are used nowadays to train and educate either undergraduates or postgraduates. A short list* of some simulation programs and games that are used in this field is represented in table [1].

Table [1]: A short list of some simulation programs and games that are used as educational tools.

Field	Game	Field	Game
Organizational Behavior	<ul style="list-style-type: none"> • Change Management • The Innovation Diffusion Game • Organizational Behavior (Change Management) 	Team Cooperation skills	<ul style="list-style-type: none"> • Multi Interactive Multi Media Simulator • STORM (Simulation Training on Recovery and Mitigation)
Politics	<ul style="list-style-type: none"> • Middle East Politics • Inter-institutional Policy Simulator 	General Management	<ul style="list-style-type: none"> • Sigma • Airline
Urban, Societies and Civilizations development	<ul style="list-style-type: none"> • Community Land Use Game (CLUG) • Community Land Use and Economic Simulation (CLUES) 	Economics	<ul style="list-style-type: none"> • Institute for Fiscal Studies • "Be Your Own Chancellor" • SimCity - Multi Player Version

* for more information about these programs visit: CALT, The Centre for Advanced Learning Technologies, **Simulation & Games for Education**, under the title (The Games in the different areas) <http://www.insead.fr/CALT/Encyclopedia/Education/Advances/games.html> accessed 12/8/2004

7. THE VIRTUAL CLIENT

This section of the paper introduces the main characteristics of the virtual client.

7. 1. The "Virtual" client characteristics:

These characteristics are supposed to be:

- Representative of different communities/societies: The virtual client should not stick to a certain community forever. He/She has to represent a different community/society every time according to the instructor's goals. This insures the instructor's ability to differentiate the self- gained experiences the students get every time.
- Honest representative of his/her society: The virtual client should bear, as much as possible, all the main characteristics, behaviorally and visually, that indicate his/her society.
- Expressive: He/she has to have a good ability to express his/her needs
- Interactive: Two things are important here. The first is to give the player a chance to take design decisions freely as much as possible. The second is that the virtual client has to deal interactively with these design decisions and with the student/player to guarantee providing the personal interaction between the student/player and the game.
- Criticizing: He/she should have the ability of showing what he/she dislikes, in the design, and to represent his/her happiness for good design decisions. This is to offer a sort of challenge in the game to guarantee student's attraction and ego gratification in the winning state.

7. 2. Is it possible?

To find out if it is possible or not this section will analytically investigate a digital game; Sims II, that is already available in the market. This game mainly depends on a virtual character that represents the player, deals with other characters to build up a human family life within a community. Investigation will be based on the needs that have been discussed earlier to indicate how much it is convenient to be used as an educational tool. The chosen game, Sims II, is not categorized as an educational game but it is classified as a simulation game for entertainment [19]. Two main reasons are the cause of choosing this game to be an example of the digital games abilities:

- Its scenario is about a family life within a community.
- It may be considered as a good representative of what simulation games are capable of nowadays.

8. Sims II

Sims II^(*) is the newest version of a community building game released by Maxis Co. The game is about moderating a male/female life within a neighborhood community. The player has the responsibility of satisfying the physical and psychological human needs of the character he/she controls. The player also plans the character's career and how his character can progress to achieve the maximum success.

* MAXIS™, <http://www.thesims2.ea.com>



Figure (2): The game gives the player a chance to choose between three communities to play within and it states a brief description about the community and its characteristics.



Figure (3): The player has the ability to make changes in the physical environment of the neighborhood, the families that are living within the community and finally to choose between either buying a ready-made house or a vacant lot.

8. 1.Changeability:

The game offers the players two levels of changeability; the ability of choosing and changing the community (fig. 2), and the character to control. For the community, the player has the ability to make changes in the physical environment of the neighborhood. He/she can design the lots distribution, the neighborhood's landscape and add new families to live in the neighborhood, (fig. 3). On the other hand, the player has the ability to design his/her own character he/she will control or to choose a ready-made one, (fig. 5). The player may change the visual appearance, the behavioral and psychological characteristics of his/her character.

8. 2.Honest representative of society:

One of the most important advantages of the game is that the player may use "Patches" or "Plug Ins" to have certain, pre-made, characters and/or neighborhoods. This means the ability to have certain characters or neighborhoods with special characteristics to be plugged into the game and play with.

8. 3.Expressive

When the player plays with his/her representative character, he has many windows that tell him about his/her character's needs whether they are physical or psychological (fig. 6).

8. 4.Interactivity

The player at first has the ability of either to do his/her own design decisions or to deal with a ready-made design. He/she also has the ability of making modifications in his/her design any time he/she needs to, (fig. 7). Moreover, the player interacts with his/her representative character and guides it through a set of menus that differ according to many factors such as; the character mood, the time, the relation between the character and its peers ...etc. (fig. 4)



Figure (4): an example showing the interactive menu that pops up when the character starts dealing with a computer.

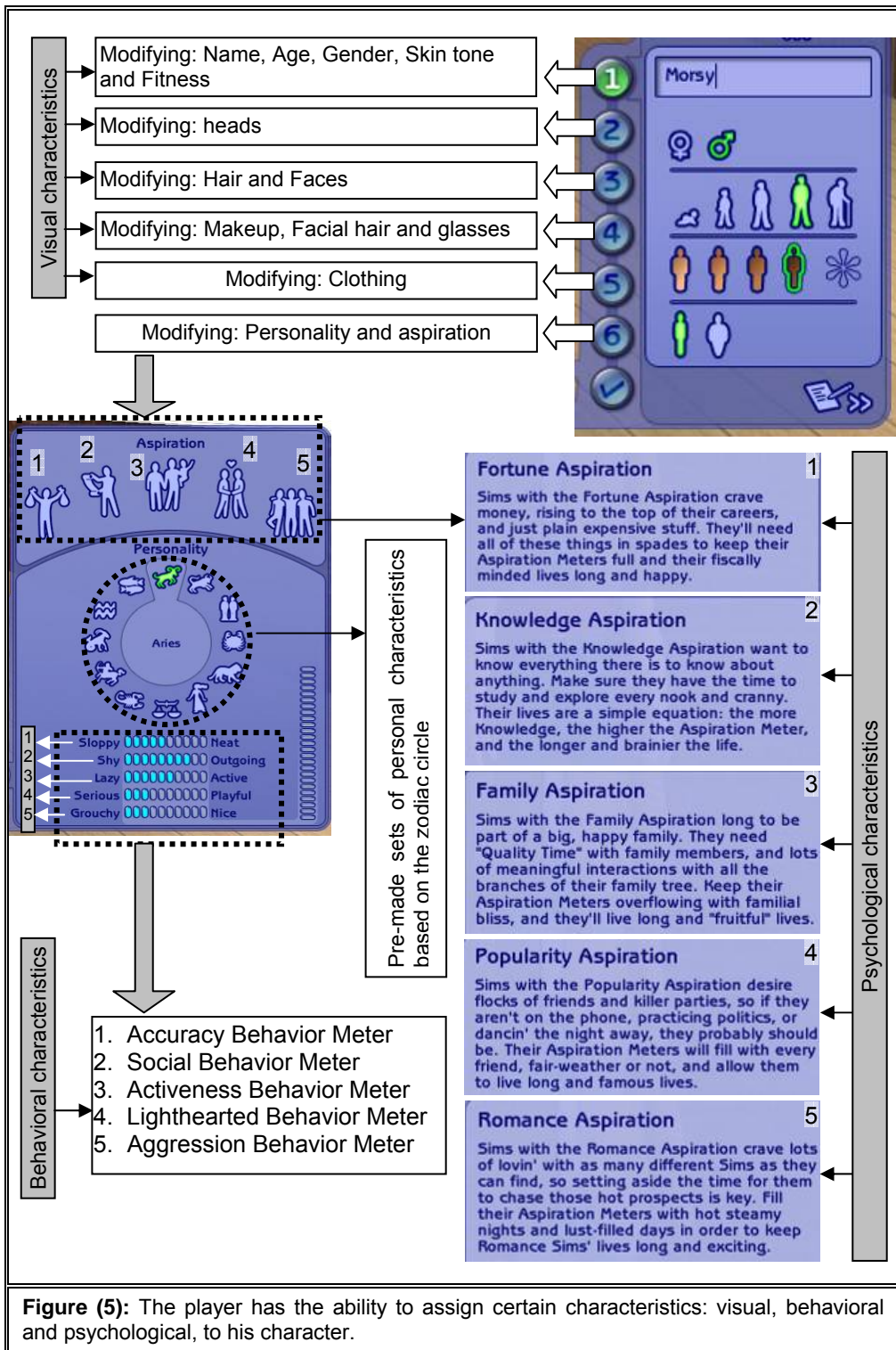




Figure (6): The character has many meters to express his needs, mood, dreams and fears.

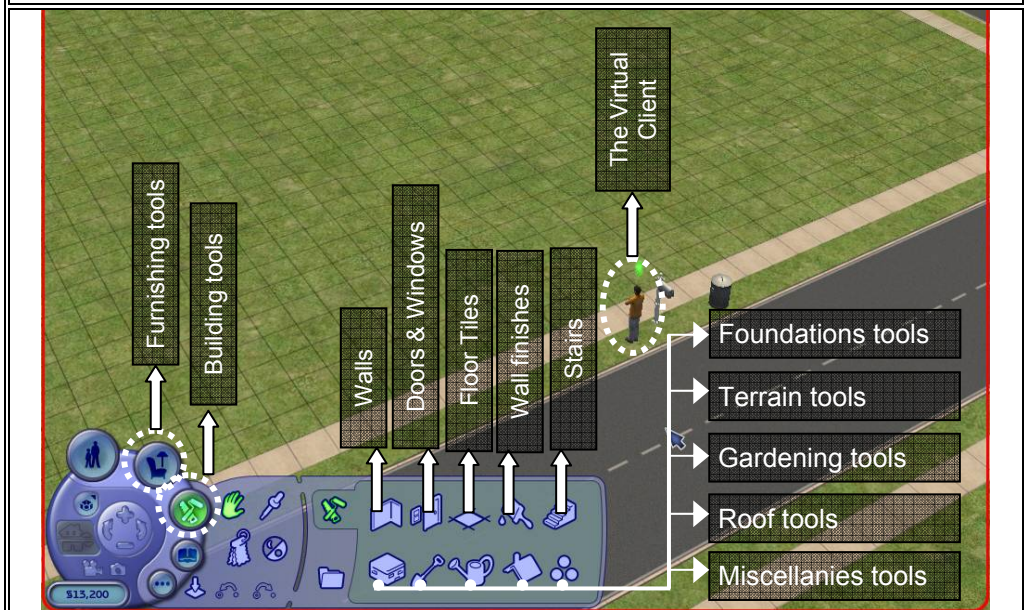


Figure (7a): Design decision tools through which the player can do his/her own design. The figure shows a case of an empty lot that the virtual client stands in front of waiting for the player to do his/her own design to start interaction with.



Figure (7b) The figure shows the same lot after the player finished his/her own design.

8. 5.Criticizing

The character has the ability of showing up its happiness and anger through two ways. One of them is the mood meter that changes its color according to how much the character is happy or feeling sad. The other is a pop up cloud that comes out of the character to show what it thinks of or talks about (fig. 8).



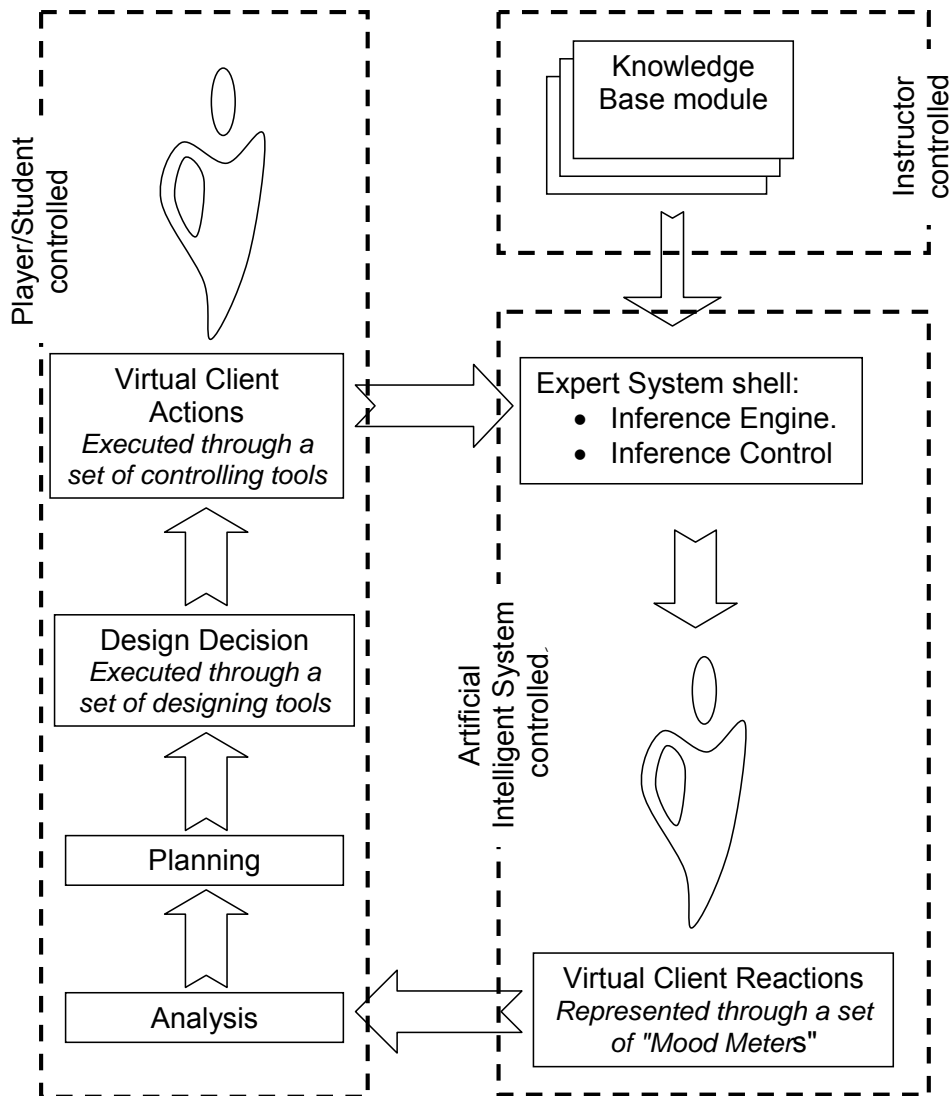


Figure (9): A diagram of the suggested framework

9. THE SUGGESTED FRAMEWORK

As illustrated through the previous section, already a game has what educators are searching for in the virtual client. Fig. (9) shows a framework that consists of:

- Knowledge base plug-in: a pluggable patch, which contains facts and rules of a certain community.
- An expert system shell which provides:
 - Inference engine: to infer explanations and facts.
 - Inference control: to provide control of data entry and its validity in relation to domain.

- An interface that is a modified version of this game provides four main elements:
 - Virtual client character.
 - Design decision tools.
 - Evaluation meters.
 - Explanation facilities

Therefore, Player/Student uses this interface to execute his design decisions, control his virtual character actions, and observe a set of "Mood Meters" that represents the virtual character's reactions.

Now, think of this scenario, an instructor asks his/her students to design a farm community without any pre-made design program, and asks every student to write down his/her remarks. Therefore, students do various designs and then observe their virtual clients interactions with these designs. Students note, write down and analyze the virtual clients' reactions towards the designs, and then they start modifying their designs according to their analysis. Once again, they observe their clients' interactions with their modified designs and repeat the cycle. Finally, through this cycle of action → review → analysis → planning → action, and based on their remarks and self-gained experiences, students themselves start to point out what is the architectural typology of the farm community.

In the same way, while playing a funny game and challenging his opponents, the player/student may have a self-gained experience about country architecture, desert architecture, buildings for the poor and others.

10. CONCLUSION:

This paper has pointed out that there is a great potentiality in computer games, represented by the Sims II, to be used as architectural educational tools. However, to explore their full potential and make full use of it in architectural education, these games still need many modifications according to the architectural educators' point of view and this is still an ongoing research by the same authors.

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