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## RESEARCH ARTICLE

### CONSIDERING COMPUTER GAMES AS A LEARNING TOOL IN BASIC DESIGN EDUCATION

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#### Abstract

The information technologies that have become widespread since the end of the 20th century have changed the ways of thinking process of today's learners. In parallel with the developing technology, the changing needs have made computer games as an important media tool. The attractive features of computer games and their potentials have led to different approaches in the field of education as well as other disciplines. Researches and studies based on the possibility that computer games can create a new learning culture in the field of education aims to provide an active and dynamic learning environment for the students who become passive and indifferent because of traditional forms of education. This paper aims that computer games can offer new possibilities in the context of design education. To reveal the usage of computer games in design education, a comparative and evaluation method is tested and analyzed.

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#### Introduction:-

The developing use of computer technologies affects design education as well as other disciplines. Computer-aided design and related technologies make it possible to talk about different approaches and evaluations in the design process. The integration of information and communication technologies with design education requires knowledge and techniques about how these new technologies will support the design process.

Computer games are taking place in the developing media and as a result they caught the attention of many disciplines. Recently, computer games have become a research tool in the academic environment as well as being a means of entertainment. Many of the studies emphasize the use of information technology as a tool for learning, and

these studies specifically target computer games designed for educational purposes. Therefore, how to use the best-selling games on the market in the field of education (inside or outside the classroom) has begun to attract attention. The main point of this emergence is to consider the possibility of educational effects of computer games (Prensky, 2005). It is important to remember that although computer games are often thought of as recreational purposes, they can be a very powerful learning tool. Thinking computer games as a learning tool can lead to many opportunities and research fields. A comparative evaluation method is needed to measure this. It is essential to analyze the cognitive effects of computer games and their direct effects on the users and to be aware of them in every way in terms of method and process.

Today's design education makes it possible to evaluate the instructor and student in the same level in terms of designing and producing. The only distinguishing difference is that one has more experience than the other and The design studio is an environment in which experienced and less experienced individuals taking part in the process of addressing, discussing and solving specific problems. The features that the design studio possesses are also important in terms of understanding how today's design education should be considered. Design studio does not have to reflect the real world and the features it possesses. Thought can be argued that the design studio should connect with real world, its reflections should be perceived only as one of the features. Another important point is that the design studio has its own reality which can be considered as an interactive and sharing environment. Thus, students should feel free to experience flexible thinking while they deal with the design process. Instructor should be in position of guiding not the controller. Instructor controlling the entire process will not allow the student to progress dynamically. This will lead to the disappearance of ideas throughout the process before the design studio reaches its actual potency.

The main purpose of this paper is to examine different aspects of the organizational structure of the basic design studio and its contribution to creativity in the different processes. The aim is not to create an alternative model for the basic design studio, but to reveal the validity and efficiency of the alternative modules as complementary. The study is based on field studies and observations carried out within the scope of the basic design studio course. In this context, certain questions related to the basic design course are discussed:

- How can the basic design studio lead students in the context of creative thinking?
- In addition to the basic design studio environment, what can be the concept of a versatile studio organization and the general modules to discover creativity in the process?
- What are the roles of studio instructors to pioneer and execute creative education and to raise awareness of students in design education?

We intend to develop an integrated design module by using computer games along with basic design course to discover emerging design activity as a game and to identify its applicability and effectiveness in the design studio. Concept of game and its components are important to establish a bridge between basic design course and computer games. It is important to be aware of the effects of the game on the individuals and the consequences of these effects to be able to do the evaluations correctly.

### **Basic Design and Computer Games**

It is important to talk about the basic design and the processes of the studios before moving on to the study to better establish the connection. Instead of bringing a new proposal to the basic design education we believe that considering games in the process as a module for each subject covered in basic design education will contribute positively to design studio. Being aware of the processes of basic design education has a critical point in case of integrating computer games as a module. Within this section, the similarities between the games and the basic design will be mentioned. Design studio processes are all related with the organization of the project studio, the creativity, and the success of the students.

The transformation that takes place parallel to social, economic, cultural, environmental and technological developments has made the creative and innovative approach the most fundamental theme of the 21st century. Educational attitudes have also been challenged depending on the transformation and strategies that prioritize learning rather than teaching. It is also possible to adopt the same view for design education. The design studios undergo a transformation in which the ways of accessing information are taught instead of passing information directly to students. In this process, students will be able to improve their awareness levels, their ability to understand and perform, their creative thinking and their ability to interrogate. As a process-based approach discovering the techniques and applications for creative thinking and experiencing the design process are critical to develop problem solving skills of the students. In the field of education, it is seen that creativity is one of the basic components of innovation and innovation is defined as applied creativity (Kahvecioğlu, 2007). Parallel to this, it is emphasized that you do not need innovation to have creativity, but you cannot have innovation without creativity (Hargreaves, 2000). Considering the concepts of creativity and innovation, a module search for use of computer games in basic design education is discussed to produce new knowledge and concepts in the design studio environment and to take up innovative approaches.

According to Schön, design education is a discipline focusing on learning by making and experiencing different situations. As a result, it differs from other fields. Creativity can be experienced both individually and in groups (Kahvecioğlu, 2007). It is necessary to determine what is the collective interaction and what organizational creativity is aimed (Wolfe, 2002). When the concept of creativity is discussed, complexities may arise in terms of products, processes and users. The complex, ambiguous and multi-faceted structure of design, particularly the basic design, requires the use of creative process strategies or organizational strategy processes both individually and as a group. Due to cultural, economic and technological developments, researchers and educators seek to expand the scope of design education and create a process for presenting new perspectives to students.

As a concept, the game preserved its daily significance and showed its presence in different forms throughout history. The game can be described as a voluntary free act that is known to be fictional and takes place outside of everyday life, which in turn attracts the player. The game can also be defined as a collection of activities involving one or more users. It is an activity with its objectives, constraints, results. From here, we can define the computer games as a structure in which the user has feedback and interactive relationship with the definitions given above. According to Huizinga, known for his theoretical work on the concept of game, "Game; a kind of action or activity accompanied by the consciousness of being 'other kind' from a 'habitual life' with a sense of thriller and joy, having an intention of itself, carried out within the bounds of certain time and space in accordance with freely agreed but totally imperative rules." (1995). Huizinga talks about the concept of "magic circle". According to Huizinga, the magical circle represents spaces that appear when games are played. Even physical and sporting games that are not played in imaginary world form a space of their own and form their own reality. This reality created by the games becomes a focal point for the players.

The triggering and progressive nature of games not only improves problem solving and but also show similarities from the perspective of pedagogy. It is possible to see that games represent all stages of "Nine Instructional Events" by Gagne (1985) (Van Eck, 2006). These steps can be defined as Gain attention; Inform learners of objectives; Stimulate recall of prior learning; Present the content; Provide "learning guidance"; Elicit performance (practice); Provide feedback; Assess performance; Enhance retention and transfer to the job.

Games are becoming active in a context where traditional education environments (offline) and digital-based education (online) are combined. The most important point to consider is the fact that games provide an effective environment for influencing students and making them active participants. In an active learning environment student use their own knowledge and experience to learn by doing instead of passive learning (acquiring knowledge only) (Petty, 2004). Based on these findings benefits of integrating games into classroom environment can be listed as Lieberman discussed: 1) The games provide an active experience for the players. 2) Games encourage learning by making. 3) Games are a social media that offer player interactions and emotional reactions. 4) Increases

participation by providing quick personalized feedback to the players. 5) The games are interesting. Participating in the game, makes the player careful. Thinking strategies is necessary to progress. Players need to learn and adapt to be successful in the game (if you do not learn, you cannot succeed). 6) Games encourage behavioral learning. The game gives prizes for the player's behavior (score, power, ranking, etc.). This positive feedback can encourage desirable behaviors in real life. 7) Games suggest some results. They are not abstract or hypothetical; they are directly represented in the game. Success and failure are directly attributed to the actions of the player. 8) Games provide role models for the player. The player can learn from the game characters and understand his behavioral experiences. (2006).

The game module frame that is core of the study can benefit from these findings from two points of views: Instructor and student. It is important to consider both instructor's and player's perspectives to observe how changes in one-layer affect others. Also thinking about the player has an important place in terms of encouraging experiment-based design. It is necessary to find more detailed responses to the questions such as "What makes a game fun?" Or "How can we know when we see a particular type of entertainment?" rather than they are fun and playable (Table: 1)

Table 1:-Concepts of entertainment

Concepts		Concepts	
(Sensation)	(Game as a sense pleasure)	(Fellowship)	(Game as social framework)
(Fantasy)	(Game as a make-believe)	(Discovery)	(Game as uncharted territory)
(Narrate)	(Game as drama)	(Expression)	(Game as self-discovery)
(Challenge)	(Game as obstacle course)	(Submission)	(Game as Pastime)

To be aware of what we are dealing and to understand the game module, it is necessary to define the connection between game and basic design as well. According to Woodbury, it is necessary to know the concepts to better understand the relationship between play and design (2001):

- **Games:** The game is a systematized scenario in which the play occurs. The games reveal their actions and their effects with possible game play actions. Games affect the decisions and activities that players make and let us to observe what are the impacts of these activities on the play of the game. Playing can be viewed as an investigation of ways of decisions and activities from each one of those accessible to the players. Designers also conduct their own chosen operations within the boundaries of an existing design framework and over time face the consequences.
- **Exploration (Discovery):** Games enable players to make choices but are constrained in terms of time and space. When designing, there happens to be a clear discovery within the existing framework, and these discoveries become designs.
- **Balance of Forces:** The attraction of a game is based on the existence of the balance that it hosts. The design process also requires many parameters to be balanced. If the forms are placed according to their predominant features and frame, a balanced composition will emerge.
- **Tactility:** Many games are played with their own equipment. Like play the design is also a tactile process. Design process itself is directly related with the medium. Design abilities are learned through drawing, model-making and computing etc.
- **Intrinsic Rewards:** In both playing games and designing, the satisfaction lies in the action itself. In games players voluntarily break their ties with the outside world. The same can be discussed for design activity. If a design activity is interesting enough, then students will be satisfied as they would voluntarily play games.

- **Embodiment:** Game play always offer player an identity which can be both abstract and concrete while participating in the game. If player embody himself with that identity, game is enjoyed. Design process also consists of many different identities. Besides designer identity, designer also take the identity of the profile whom they are designing for. In case of basic design course both the instructor and students take the identity of each other during the process.
- **Rules:** Games have rules that explains how to interact with the game. According to the rules game is shaped. Unexpected conditions arise when the rules are ignored or violated. When designing, designers take into consideration many parameters, but they can manipulate these parameters to reveal new and different designs.

Structure of the game shows similarities with design process in terms of problem solving and cognitive behaviors exhibited by players (Table 2). Since there is a strong correlation between game and design process it is important to analyze the structural characteristics of the game concept from perspective of design education. These can be summarized as follows (Wang and Chien, 2003):

- **Rules:** Design can be considered as a creative action that takes place within a set of constraints. The rules define boundaries and encourage students to think in a certain context. The rules are important as they let students be aware what's inside the boundaries or what's outside.
- **Objectives:** Games and design process are both goal-based activities. Motivation is a critical factor for students to be able to fulfill the goals of a design process or game. Thus, objectives should be directly related to design process.
- **Feedback:** Game modules and design process should provide immediate feedback to make students realize what they are doing guides them to the goal or not. A feedback after a bad move encourages the student to retry or ask for help so that learning takes place.
- **Competition:** Competition is related with creativity as it excites students in sense of play and support. Two ways of competition can be seen in games. Competition in an intrinsic way (i.e. competition with oneself) or competition in an external way (i.e. students competing). A design process and game modules must have both types of competition.
- **Interaction:** Interaction socialize game by transforming the nature of competition from passive (internal) to external (external). Design process is also a social activity among students. That is why a design process and a game should have a social interaction that supports learning.
- **Representation:** Design process and game modules should let students to gain abstraction and representation skills to manipulate the space and form. It is important for game modules to provide a platform to explore and debate metaphors of design.

Table 2:Parallel features between computer games and basic design course

Computer Games and Basic Design
Goals - Assignments
Inventory - Material
Interface – Design Frame
Rules - Principle
Items - Elements
Scores - Notes
Levels - Subjects
Scenario - Curriculum
Experience - Knowledge

We can infer that similar features take place in basic design course depending on the structure of games. It is based on the concepts such as shape, form, color, texture, material, scale, space etc. Basic design studio can be defined as stated by focusing on these concepts:

- an environment in which editing, modification and composition are actively involved;
- an environment which emphasize on making two- and three-dimensional compositions;
- an environment that enables students to develop abstract thinking for design process;
- an environment which helps raise awareness;
- the studio to improve student's interpreting skills;
- a studio environment that allows students to acquire and develop new skills;
- an environment that allows students to experience abstraction and conceptualization of the environment they live in;

Main goal is to help students gain the skills they can use when encountering design problem and to help them to construct a design language that they can use effectively while handling the process.

### Design As a Game:-

In this section we will mention what should be needed in terms of defining computer games as a module in basic design education. Therefore, the name of this section is defined as "Design as a Game". To understand the transitions between the games and the instructors "Design as a Game" can be handled in four parts: design frame, interface, interaction and narrative. These elements are important for integrating computer game-based learning into the studio. Within the scope of the paper, an experimental study is made to provide a framework to show the effects of using computer games in education. The goal is to be able to respond to studio needs and to create an active learning environment.

When dealing with design as a game, it is important to determine the role of the instructor (Henderson, 2000). Role of the instructor is important to determine the output to be achieved at the end of the studio. The computer game-based approach should position the instructor as a good process manager for integrating the studio activities, identifying and directing the activities of the students in the classroom, and providing a discussion environment after the game module. A well-organized computer game-based approach can have a flexible and complex structure that can offer many training opportunities. In this context, it is important to be able to ensure that the instructor and the student meet on a common ground.

If the game definition is to be revisited, the game can be defined as a set of activities that define competition between players under certain rules for a goal (win) (Gredler, 1992). Considering games only as a competitive approach is not enough to represent the nature of the activity. In addition to the competition it is necessary to add a set of rules and conclusions that are not reflective of real life. The acquisition of the game requires the use of predefined tools that allow players to take any action as the rules allow. It is important to note that both the rules and game strategies at the beginning of the game can prevent the exploratory action (Sawyer, 2002). The pace of the game and the speed of the player's finishing and consuming the game is another factor to watch out for. It is possible to find many games used in computer gaming-based learning. These environments can be simulated games, war games and medical games. (Prensky, 2001). It is important to be aware of which content can be acquired more effectively with which type of game (Table 3).

Table 3: Effects of computer games on players' skills

Adventure Games	Survival skills - Inventory Supply and demand - Probability Consequences - Problem solving Navigating - History Purchasing - Budgeting Higher order thinking skills Learning – Verbs/Nouns Spelling/Writing	Word games	Vocabulary Spelling Problem solving Remediation Verbal information Drill and practice Reinforcement
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Puzzle Games	Planning strategies - Thinking ahead Spatial orientation - Map reading Architectural design - Problem solving Hand-eyecoordination - Patternrecognition Matching - Assembly/disassembly	Board games	Budget - Logic strategy Counting - Planning Problemsolving Critical thinking - Coordination Navigation
Arcade Games	Hand-eye coordination -Reflexive action Motor skills - Speed simulations Multiple problems/priorities - Timing Angles, trajectories - Air current Planning - Decision making	Simulations	Writing fiction Developing framing strategies Tactical and strategic planning Coordinates Velocity, speed, wind, angles Decision making Consequences Economics Stock projections
Miscellaneous games	Logic Pattern recognition Short-term memory Learning alphabet Probabilities Pattern matching Audio/visual discrimination	Card games	Probabilities - Calculating risks Developing strategies - Addition Pattern

When this chart is looked at, role-playing games come to the forefront for behavior-based learning outputs; the use of concentration-based games is more beneficial for the development of observation skills. However, it is important to keep in mind that the more the learning output, the more likely the results obtained are not positive (Kirriemuir, 2002). When combining game-based entertainment and educational material, it is possible not to get the desired results. To provide the most effective learning in the studio environment and to prevent negative effects it is important to establish a common language. It is necessary to provide the environment that will bring together the techniques developed by the game designers and the learning techniques developed by instructors for establishing common language.

The fact that games are still accepted as a new media and that it has a fluid structure offer many possibilities for educators and researchers to think about. Computer games have no accepted rules or expectations. This means that interaction with each new game will change and exploration will be open-ended. While trying to adapt this strong aspect of computer games to education, it is important for games to be well established. Games that are used in the studio environment should be simpler, but at the same time they should allow good playing experience and interaction. The elements that offer good playing experience are listed as interface, game framework, interaction and narrative elements.

The first of the factors that will make a good playing experience is the interface. In parallel with the development of computer technology, gaming industries also benefit from technological advances to offer gamers different experiences. Whether it looks like a game or it can create a feeling of playing in the game is a point to pay attention to. How is the game represented graphically and what are the effects of that representation on players? The visual and auditory power that computer games have, can bring the competitive and fun structure of games to a completely new level. In this sense what kind of interface an educational game module should have an important value. The main approach is to provide a better learning environment while enjoying and experiencing the learning process (Prensky, 2001). One of the phenomena to consider about the interface is the concept of realism. Powerful graphics, sound, and physical models bring forth realistic environments (Low, 2001). Although realistic environments have potential to increase the attractiveness of the game, at the same time, this realism also includes the risk of distracting the students. Distraction during the interaction may prevent achievement of the desired results in terms of

outputs. Computer games cannot create the desired effect when they do not make sense to the player. But main reason is not the fact that they do not have a realistic structure (Low, 2001). It is important to consider that game module establishes its interaction with through its interface (the realistic graphics do not have to have etc.). Within the scope of the study, the interaction of the students with the different modules are observed and according to feedback given by the students an ideal game module is tried to be achieved.

The frame of the game is the part of the magical circle that is also the heart of the game. In response to the player's actions reactions of the game may be random or very organized (Woodcock, 2001). Instructor should organize process well enough to provide the most effective experience for the student. The purpose of the game framework is to provide environment to attract the player into the magical circle and at the same time allow them to gain skills and mastery to experience the process (Rouse, 2001). Students' choices and interaction levels have a critical role in terms of gaining skills. The most common way of achieving this is through game frameworks with return systems.

Interaction is relevant because player has a certain amount of control over the game and game results. Interaction can be regarded as gameplay (Rouse, 2001). Interaction emerges as an element that defines how the player interacts with the game environment, the amount of interaction the game has and how the game environment will react to decisions made by the player. Interaction is an important part of the learning environment because it contains the elements that determine the game's tempo (Kim, 2001). Since the game's tempo is related to the focus, it plays a critical role in terms of providing the learning environment. Games with a fast pace or gaming environments with a slow process cannot provide a consistent environment for effective learning (Prensky, 2001). At this point what kind of learning experience is desired is important for determining the game play. In addition to that player profiles, experiences that the players have acquired etc. are among the elements that must be taken into consideration. Gameplay and interaction constitute a very important part for evaluating the processes of the students.

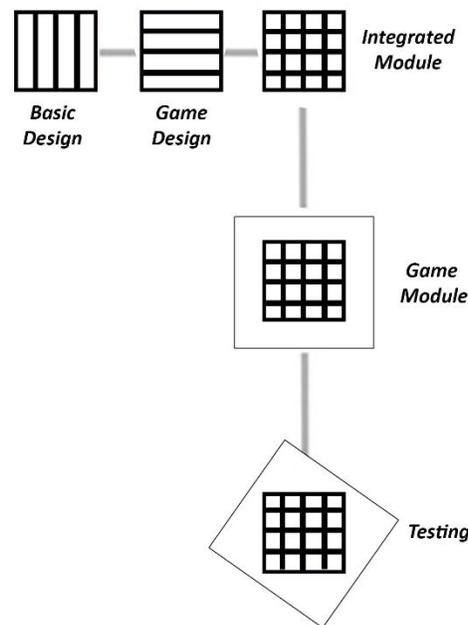
The reason why interaction and play are important for a game lies in the fact that the games have a fun, attractive and engaging (participatory) structure. If interaction with the game can create these feelings for the player, the rest are only used tools. This interaction is also a decision that players can make within the gaming environment (Shelley, 2001). Game-based environments seem to play an effective role in enhancing the level of participation and the internal motivation of students with little or no previous experience (Bisso and Lucker, 1996). A game-based approach module may become an effective method for students who will encounter with basic design discipline for the first time. Being aware of students' previous experiences has a critical value for the instructors. How the student interacts with the information in the gaming environment is critical to ensure a reliable and robust knowledge and integration (Winn, 2009). It is necessary to adjust the elements of the game to the process as well. An interactive gaming environment provides both amusing and distinctive experience, if the game has a structure that allows the players to make different choices and allows them to reflect on their own experience. Struggle and failure, risk and reward are necessary for an effective gaming environment to accommodate different experiences (Mount, 2002). According to Mann and Smith, highly interactive gaming environments can be achieved in different ways. Scenario-based approach where success and failure can be tracked in the process of solving the problem faced by the student; (2002) or gaming environments that incorporate an immersive entertainment space by providing students to re-create the scenes they are playing and to develop their narrative understandings. Game module covered in the basic design course is considered not just as a tool integrated with the curriculum, but as a medium for hosting the different ways to bring the interaction to the top level.

The other element that plays an active role in gaming environments is narrative or story. The narrative or story is an important element to influence the player. The narrative concept show similarity with the design process (Bates, 2001). In general sense a linear approach can be mentioned in terms of the beginning, the turning points and the final. From the beginning to the end, increasing tensions, excitement and achieving the results are considered as elements of the narrative. This process is in fact valuable for the development of the players. Decisions of the players and the game environments that change according to those choices, have potential to influence the progress of players by increasing the tension or excitement in the game (Murtagh, 2001). Game modules should allow players to

make choices that will create alternative game processes in order to provide a good narrative. The role of the narrative in the game module, which is covered in the basic design lesson, has been tried to be considered in the formation of the interaction.

### A Basic Design Experience in Computer Game Environment:-

In this study, it is aimed to take an integrated approach by taking the design thinking into consideration with the game discipline and to transform the outputs of these approach into a questioning method for the basic design process (Figure 1). It is anticipated that an evaluation system will be needed to examine different processes with the participants who have just started to design education. The process will include analysis, design, development, control and evaluation. Throughout the process, it is possible to talk about components that are in a dynamic relationship with each other, such as understanding, interpreting, and developing in terms of both the instructor and the student.



**Figure 1:-**Basic Design Experience Framework

The study is organized in two parts and performed with first year students of architecture faculty who take basic design as a compulsory course. The first part is the test phase to establish the structure of the study. According to feedbacks and observations, necessary corrections are made for the second part which forms the main part of study. The aim is to increase the awareness of the students who will meet with digital media for the first time and to create an effective design process by using the mechanisms that the game concept itself has. In this context, questionnaires are given to the students before and after each exercise in order to support and better evaluate the study.

The second part of the study consists two stages. First stage takes place in an offline environment (traditional design module/classroom environment) (Figure 2). Second stage takes place in an online environment (computer game-based module/digital environment). In both stages students are asked to organize and produce design compositions according to concepts that are based on basic design course curriculum(Figure 3). For the students who encounter basic design studio for the first time, considering the process as a game and transforming the ideas into a design mindset constitutes two basic points that are intertwined. The game part is more about design activities in which trial and error processes are experienced. It is then possible to discuss about the choices that are made by the students

through game module. In this sense, we prefer to use elements which are simple to understand and easy to control in terms of game thinking and expressing the design ideas more easily. The following principles are considered while we choose design elements that are used by the students:

1. Considering that the participants have just begun to design education, geometric objects which are easy to define have been chosen.
2. Using 3 different colors, participants are expected to assign different meanings to each element.



Figure 2: Classroom environment (offline environment)

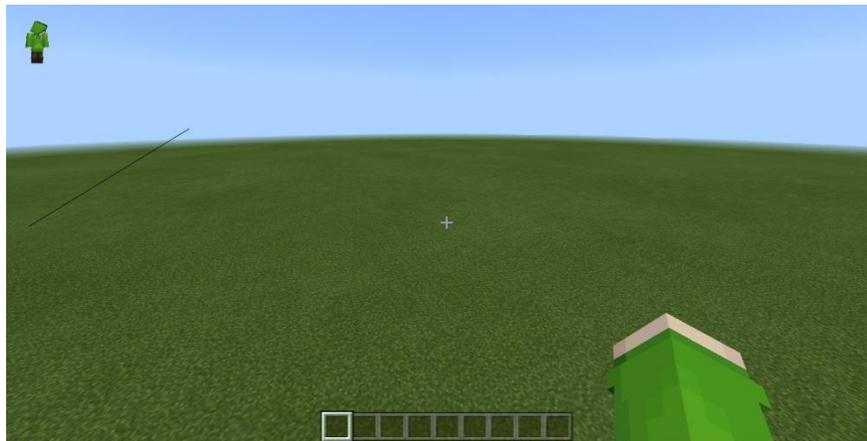


Figure 3: Computer game environment (online environment)

Elements that are given for the first stage of study are cubes (in  $2 \times 2 \times 2$  unit dimensions), rectangles prisms (in  $1 \times 2 \times 2$  unit dimensions), T-shaped elements (that consists of rectangle prism in  $2 \times 1 \times 2$  unit dimensions and rectangle prism in  $1 \times 1 \times 2$  unit dimensions) and L-shaped elements (that consists of rectangle prism in  $2 \times 1 \times 2$  unit dimensions and rectangle prism in  $1 \times 1 \times 2$  unit dimensions)(Figure 4).



Figure 4: Elements used in basic design exercise

In the offline part of the study, students are asked to form a design composition about concepts given to them in the context of basic design course curriculum. What is asked from the students is expressed as follows:

- Create a composition with the given design elements.
- Write about the moves and rules you make while forming the composition.
- Express the composition in your own words.

In the online part of the study, same students are asked to create compositions in computer game environment. "Minecraft: Education Edition" is selected as the gaming environment and students' processes are evaluated. The evaluation of offline (traditional) and online (computer game) environments can be considered as:

- **Learning objectives:** 1) It is aimed that students relate design elements and express different ways to make sense of these relations. 2) Students are expected to describe the design process and integrate it with what they do. 3) It is aimed to observe the effects of different environments on the students.
- **Determining students' level of gaming experience:** 1) Introducing students to the gaming environment and specifying rules. 2) For beginners; limited number of design elements and single material. For average players (students who get used to play); limited number of design elements and different materials. For advanced players; limited number of design elements, different materials, different sizes and shapes.
- **Process:** 1) To define relations among design elements. 2) To establish different relations between design elements. 3) To create a composition with a limited number of units and determine whether or not it is possible to do this with the objects in hand. 4) To recreate the design composition with new design elements and new materials after gaining experience
- **Activity:** 1) Students play the game module individually. 2) The game must be set to multiplayer mode so that each student can play at the same time. The "Classroom Mode" version of "Minecraft" allows this. 3) Comparing the performances of students in the same game environment and providing them with a different perspective on their own design composition. 4) Questioning design composition and activity. What are the features of design composition? or Does the student know that?

Game module and rules have an important part to define meaning through relations between design elements for the first design compositions. Meaning in design has a structure that is created, then decomposed and reconstructed. Also we can say that meaning emerges with every design decision and changes at the same time. In this respect, it is important for the students who have recently met with design environment to realize that design process has different meanings that can be changed constantly. Questionnaires are carried out before and after each stage to evaluate the process better. At the same time sound and video recordings are recorded at each stage. Recording the

processes of the students provide important data not only to find out which move they make or why they prefer to make that move but also to evaluate it for future works.

The study is based on the curriculum of the basic design course of architecture faculty of (X) university and is related with concepts regarding basic design discipline (Table 4). Because the target group is the students who have recently met with the design environment, the topics covered in the study have been selected according to basic design concepts that will not be difficult for students to comprehend (Table 5). This study in which different design compositions reveal different relations, has turned into a personal narration created by the student's choices. We believe that the study is important for students to meet with computer game module and leave their personal traces in the game environment.

Table 4: Basic Design Course Curriculum

Course Name	Basic Design Studio
Course Description	Basic elements of design: Line, form, color, texture, shade; basic and complex geometries, object geometry; relationship of human-environment-object; isometric and artistic perspective, visualization, basic graphical elements; composition, collage
Course Objective	<ul style="list-style-type: none"> <li>- To inform students about conceptual and practice-based knowledge on creativity, design principles, design elements</li> <li>- Make the student gain the ability to express what they think visually and understand this process and systematic approach.</li> </ul>
Course Learning Outcomes	<p>Students will be able to,</p> <ul style="list-style-type: none"> <li>- have a presentation maturity where they can express themselves visually and ideologically.</li> <li>- have a sensitivity of visualization and a unique technique of their own.</li> <li>- develop their creative and critical thinking skills.</li> <li>- develop their way of expressing their ideas in two and three-dimensional ways</li> </ul>
Course Plan	<p>Week 1: Introduction to Basic Design: Basic elements of design: Line, form, color, texture, shade</p> <p>Week 2: Basic and complex geometries</p> <p>Week 3: Object/product geometry, relationship of human-environment-object</p> <p>Week 4: Design principles; repetition, rhythm, ratio, scale, balance, harmony, contrast, union of contrast, continuity, hegemony</p> <p>Week 5: Design principles; repetition, rhythm, ratio, scale, balance, harmony, contrast, union of contrast, continuity, hegemony</p> <p>Week 6: Composition, collage, hands-on practices</p> <p>Week 7: Form and its meaning, Decomposition of Forms</p> <p>Week 8: Texture and Composition, Texture and Space</p> <p>Week 9: Theories of color</p> <p>Week 10: Design principles and two-dimensional studies</p> <p>Week 11: Design principles and three-dimensional studies</p> <p>Week 12: 2 and 3-Dimensional compositions and abstractions</p> <p>Week 13: 2 and 3-Dimensional compositions and abstractions</p> <p>Week 14: Assemblage</p>

Table 5:-Concepts of basic design experience

Concepts Used In Basic Design Course	
<b>Solid/Void</b>	...
<b>Ratio/Proportion</b>	...
<b>Rhythm</b>	...
<b>Balance</b>	...

## Design Processes

Students are asked to organize and create compositions for the design exercises. Narrative which helps to form design as a game is about creating design strategies and rules for a more sophisticated sense to bear ideas for the game module. These sub-processes of design emerge as relative and complementary moments of process and continually shape each other. Students could choose different ways to establish relationships and to make sense of these relations. Same relations can be related to different meanings or different relations can be related to similar meanings. This ambiguity, in a way, constitutes the core of the game module and triggers the establishment of new relations as well as the interpretive nature of the design process.

In the first stage, students are asked to make compositions according to selected concepts (Table 6). Students are asked to fill out a questionnaire before and after the practice. Because what is aimed to experience is the design process rather than final products. So, questionnaires have been prepared considering the basic design process.

Table 6:Level informations

Level	Key Word	Number of Design Elements	Rule
1	<b>Solid/Void</b>	8	No Rule for Level 1
2	<b>Rhythm</b>	12	(*) Rule Sets Are Defined for Each Level
3	<b>Balance</b>	16	(*) Rule Sets Are Defined for Each Level
4	<b>Proportion</b>	20	(*) Rule Sets Are Defined for Each Level

Level \ Number of Elements	2	3	4	5
1				
2	2	3	3	3
3	3	4	4	4
4	4	5	5	5
5				
6				

Questionnaires and interviews show that students are having difficulty while they try to express themselves, to understand the design problem and to generate solutions. Therefore, students are asked to write their expressions and design decisions about what they are making(Figure 5). In addition, specific interviews are made with each student related to their design process. While they are making compositions, students are observed to find out how they build relations between design elements and what they experience. Each student's different ways of building relationships and giving meaning to these relationships allow different solutions to be formed.

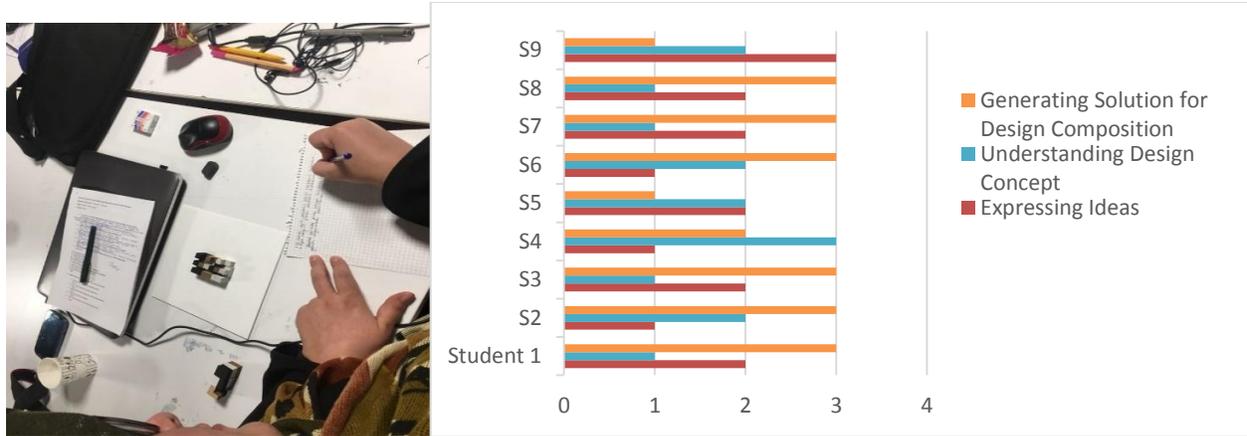


Figure 5:-Processes that students experience difficulties while making compositions

It is important for students to express themselves better by providing them elements that are defined and self-contained. While students try to understand a conceptual design problem, it is found out that they first demonstrate a functionally concrete approach. But they tend to develop abstract references to concepts through process. In this context, the traditional exercise has two phases. The first is the functional meaning that the students try to express for design elements. The second is the abstract and conceptual meaning that students give to design elements. The cyclical system of play is important in basic design education in terms of re-interpretation of rules, reconstruction of fiction, discussion and evaluation of new fiction (Figure 6).

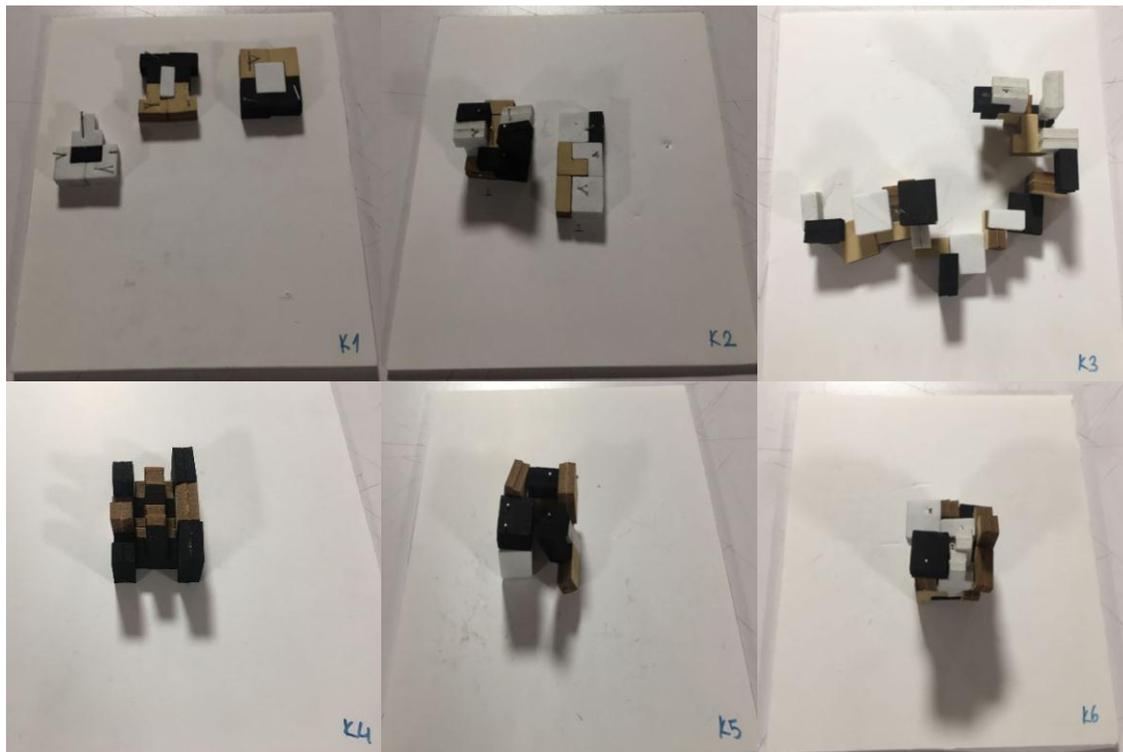


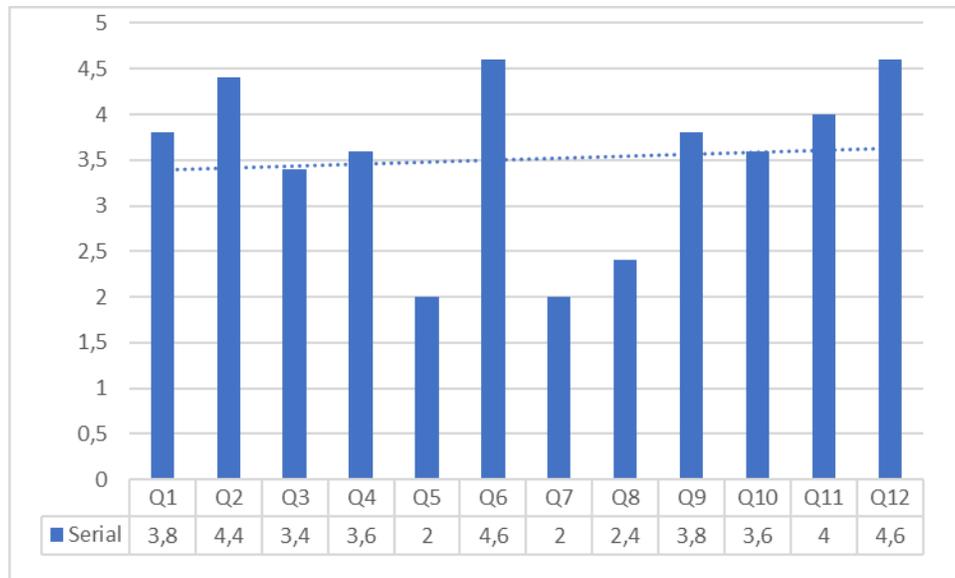


Figure 6: Cyclical system of play and design compositions

Getting students' ideas about computer games constitutes important data for computer game module exercise. Second stage has been developed considering the survey results according to Likert scale. (Table 7).

Table 7: Average of students' responses to computer games in Likert scale

	Questions	Likert Scores
Q1	Do you think you learn something new while you play?	1-2-3-4-5
Q2	Do you enjoy playing games?	1-2-3-4-5
Q3	Is it fun for you to increase the level of competition in your gaming environment?	1-2-3-4-5
Q4	Could you adapt yourself to the game world when you play?	1-2-3-4-5
Q5	Is winning your first priority when you play games?	1-2-3-4-5
Q6	Is interaction an important part of the game?	1-2-3-4-5
Q7	Do you think playing games have bad effects on you?	1-2-3-4-5
Q8	Does playing a game come to you as a waste of time?	1-2-3-4-5
Q9	Do you think playing games is a relaxing activity?	1-2-3-4-5
Q10	Do you agree playing games trigger learning?	1-2-3-4-5
Q11	Do you think you develop yourself while you play games?	1-2-3-4-5
Q12	Do you think that your ability to generate solutions improves while you play games?	1-2-3-4-5



Second stage consists of computer game module in which students are asked to go through same design process that they experienced in the first stage. The aim is to find out whether students show progress when the characteristics of the games are considered. When we consider the students' level of game experience and the design elements which are used in the first stage, computer game module plays an important role to provide an active learning environment. In order to provide this environment computer game module should be easy to play as well as let the students play simultaneously. Thus, Minecraft: Education Edition, which is also used in the field of education is chosen for computer game module (Figure 7).



**Figure 7:-**Computer game module-Minecraft Education Edition

One of the points observed while experiencing computer game module is that students reconsider the compositions which they do not need to change during traditional exercise. This is important in terms of basic design course and design process. Especially for triggering discoveries, computer game environment becomes more productive. At the beginning of the game module, students are generally inspired by the compositions they make in the first stage of the study. But the process quickly changes and develops. The fact that the returns are very easy and fastenable students to experience process more effectively. Changes of rules and concepts with each level that are the foundation of compositions influence students and have a striking on the game environment. We observe that when students play computer game module, they tend to develop behavioral strategies such as trial and error, evaluation of rules, acting previous experiences, developing personal gaming strategies. The trial and error emerge in absence of a systematic strategy within the game. This strategy becomes important because of the interactive nature of actions and conditions related with reactions, conclusions, and feedback within the game framework. Mastering the rules and

game play as well as developing new strategies to reach their goal enable students to gain integrated knowledge with active participation. The fact that game module that has a structure to provide an active learning environment by exploring, have an important role place in basic design course. The motivation of the students will be high in an environment where learning is occurred by discovery.

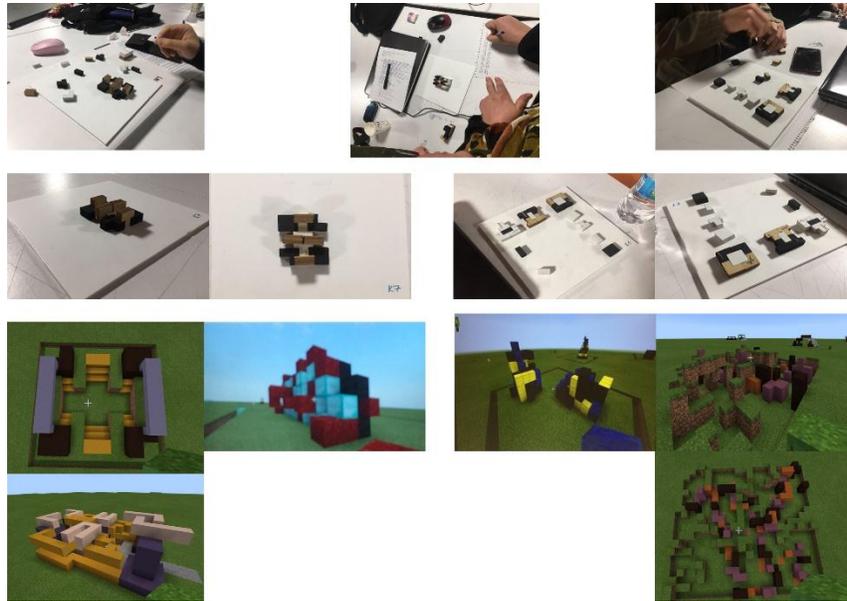


Figure 8: Process of design compositions

### Conclusion:-

The game modules and game environments are made into an interactive platform, thus giving the user an ability to respond more quickly to interactive atmosphere. Students gain a more effective understanding and a more responsive structure. There is a more meaningful relationship between the process and act of discovery. Use of expanded and enriched design environment is at the forefront as study outcomes can be summarized as stated:

- Game modules are designed experiences with a strong potential to allow emergent behaviors.
- Game modules provide distributed experiences. Many media tools offer scattered experience through platforms, space and time. Game module structure will improve perception and problem-solving skills of the students and their interactivity with digital media rather than just learning and doing.
- In-game and out-of-play experience is an important component for students to develop problem solving skills.
- Game modules provide a structure in which all data are connected and can give immediate feedback. All data may be associated with students
- Game modules provide multi-user environment for both instructors and students.
- Game modules has the potential to form a community that can create a sense of belonging for students.
- Game modules develop communication skills.
- Game modules provide continuous experience.
- Game modules support abstract thinking and conceptualization of the design process.

Along with evolving technology, playing digital games expands the experience and playing environment into a new level. Physical world becomes the interface of this new experience. It is important for students to discover environments using digital tools, to be in an interactive relationship with the media, to be able to instantly collect information from the environment and to experience them. Time dimension is changing. This allows us to talk about an evolutionary process that contributes to the creation of hybrid interfaces both in terms of design and everyday

life. If the experience provided by these hybrid interfaces can be taken to the top level, it will be possible to achieve satisfying learning environments for education.

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