Integrating 'Outer Space Design' into Design Curriculum

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Abstract

The imagination of human beings and the exploration of novel ideas have always contributed to developments in science. These developments lead us to re-examine the existing structures in our environment and society so that they can be further improved. The review of literature regarding science fiction and its place in education also highlights the need for novel topics in design education. Thus, integrating a course in the curriculum of design education that aims to explore futuristic and visionary oriented environments like Mars Colonies, Orbital Space Colonies or Orbital Space Hotels would seem crucial. Such topics would probably not only stimulate the students in their design process, but also develop their imagination, as they require research and synectic thinking. As to whether stimulating imagination should be among the priorities in teaching, in fact, it is the dreams, imagination and creativity that has shaped and will shape human development and social-cultural contexts.

Introduction

Probably designing Mars Colonies, Orbital Space Colonies or Orbital Space Hotels in a design studio, even giving lectures on their history, philosophy, technical know-how, might seem to be too fictitious, but if it was not dreaming, what else could have stimulated mankind to invent and construct ships, cars, planes, rockets, computers, etc. or to go to the moon? Nowadays, it can be easily observed that the genre of dreams, fantasies and science fiction has expanded into daily activities through movies, television, comic strips, and advertisements. Our common everyday thoughts have become science fictional since the borderline between art and reality is often blurred [1]. In fact, we are now living in a world that so often reminds us of science fiction. In the same way, Disch indicated the effect of Science Fiction as follows:

In media, it is increasingly difficult to distinguish between science fiction and assorted neighboring realities. The dinosaurs in the movies look as real as the elephants or camels; toddlers' toys morph into weapons; grown-ups on talk shows discuss their UFO abduction, while on the next channel a dull documentary recounts the history of Space exploration. One has to be sent to school to begin to sort out what's real and what's Hollywood [2].

What once looked like fiction or a dream is now a part of our daily life. Even by dreaming of magical solutions, people from time to time worked out how to put right certain things in reality [3]. Who would have thought when the English novelist, journalist, sociologist, and historian Herbert George Wells in 1901 wrote the scientific romance, *The First Men In The Moon*, in which the heroes invade the moon, it would come true? However, 68 years later, on July 20, 1969 Neil A. Armstrong and Edwin E. Aldrin Jr. landed on the Moon, while Michael Collins continued in lunar orbit. So, are Mars Colonies or Space Hotels fictitious? Or are they fiction that might be the reality one day? Brainbridge [4] even sees science fiction as a resource that presents ideas about promising courses of action and interpretations of reality.

The idea of space travel is also one that has been most spread by science fiction. However, the Space Travel and Tourism Division of the U.S. Space Transportation Association lends credence to suggestions that space tourism may be just years rather than decades away [5]. In fact, over the past few years, a large quantity of research has been carried out in this area and it can be said that space settlement and tourism are realistic targets. Even the technical know-how to launch passengers into space or other planets, and creating necessary accommodation is available.

Wilson [6], on the other hand, declares that we should forget about building deep space telescopes, mining helium-3 for fusion reactors or any of the other practical reasons for establishing a lunar colony. Earthlings just want to have fun, and there is no place here that can match the excitement out there. Beardsley [7] also pointed to the same issue. He said that space enthusiasts look forward to the day when ordinary people, as well as professional astronauts and members of congress can leave Earth behind and head for a space station resort, or maybe a base on the moon or Mars. This indicates that people are not willing to read about space any more in science fiction novels, or watching films and comics about it. They want to live it.

After all, on April 28, 2001, the 60-year-old California millionaire Dennis Tito became the first paying tourist to take off from Earth for a 10-day holiday on the International Space Station, ISS. From that day on, space tourism was not a fiction but a reality that opened the gates for new business and research areas. As was stated by Wilson [8], already two major hotel chains and major Japanese construction companies have announced plans for fixed and flying lunar hotels. Among these futuristic enterprises, on March 9, 1999, it could be read in the online news by Science editor Dr David Whitehouse that the hotel group Hilton International is planning within an optimistic schedule of six years to build with private funds a space station out of empty Space Shuttle

fuel tanks in the project called Space Island.

It is obvious that the success of space tourism or business will depend on extensive and rigorous research of the space tourism market [9]. It needs more professionals from different branches that are familiar with the subject and that do not perceive it any more as fiction. It requires several applied studies on possible interiors and industrial design products, materials and technologies that can be used in zero or low gravity environments, as well as research on the design of new infrastructures or businesses, the psychological and physical effects that the space tourists could face and how they might cope with them.

Supporting this process, universities should see Space or other futuristic studies not only as an engineering oriented branch, but a branch that should involve each faculty. Until now, only few engineering-oriented universities like the International Space University in Strasbourg, France, the University of Tokyo, Japan, the University of Technology in Munich, Germany, and, as it is mentioned in Wilson [10], the Rochester Institute of Technology in New York, and the George Washington University in Washington, D.C. have set up programs to train future space tourism experts. Students at the University of Southern California in Los Angeles can learn the fine points of building lunar habitations from world-renowned space architect Madhu Thangavelu.

It might be agreed nowadays that science fiction might stimulate the imagination of learners and help them become more creative during a design or planning process. In the end, at societal level, creativity can lead to new scientific findings, new movements in art, new inventions, and new social programmes [11]. As Kristler [12] indicated, the exploration of new lands and conquest of new frontiers have always been creative forces throughout the history of humanity and have promoted the advancement of knowledge and culture.

From the educationalist point of view, science fiction might contribute to the success of instructors and learners. Among the many results in a research study about teachers who won teaching excellence awards, [13] found that teachers feel they are successful when they are setting up projects that have non-linear problem-solving structures. Craft [14] also mentioned that the actual process of accessing non-linear information offers plenty more opportunities for learners for creative thinking than information which is presented in linear form. Candy and Edmonds [15] focused on the issue that creative people are notorious for resisting rigid, formulaic approaches, and are not afraid to choose pathways fraught with risk and potential pitfalls. Experimentation with concepts, materials, and tools may initially lead to failure, but those failures are fertile ground for learning quickly how to move the conventional space of possibilities. Such traits mean the creative person will not be easily deflected from a chosen route and, if it involves a hard struggle such as learning a difficult technique, they do it.

From these aspects, conventional and repetitive structures or problems seem not to motivate students to get to original and innovative outcomes. Instead of conventional projects, holistic structures or non-conventional projects like Mars Colonies, Orbital Space Colonies or Orbital Space Hotels can stimulate more often the imagination of students. Iannone [16] while discussing how to stimulate students' imagination suggested that the instructors should select curriculum and teaching materials that come from extraordinary rather than the experience of contemporary life. Thus, in curriculum design, there is the need to find materials that have unusual power to appeal to students so that the learners can work to give them meanings in their lives.

Another aspect is that students need to learn to explore, trust and express their dreams and fantasy. Franck [17] discussing some reasons for teaching Architecture of Utopia, underlines that an architect while planning draws intimately and unavoidable upon the own and their clients' imaginary worlds, but it can be observed students are not given much opportunity to explore and understand this realm in architecture schools. All in all,

science fiction seems to be an ideal field, which is non-linear, experimental, which stimulates imagination, innovation, and research, which looks at a problem from various dimensions, and is a field where nothing is taken for granted.

A vision and challenge for design education

For all of the above-mentioned reasons, a one-semester undergraduate elective seminar *Visionary and Future Environments* is offered at Bilkent University, Faculty of Art, Design and Architecture. The primary aim of the seminar is to let students question how their future might look and how they might respond to it. In addition, the seminar aims to endow the students with the ability to conduct research and create visionary and futuristic environments like space or planetary colonies with an emphasis on innovative, alternative, and divergent conceptual problem solving models.

The seminar expects the learners to design a futuristic project with its concept, logo, name, general constellation, interior environments, and materials and technologies which should be followed by a computer presentation, a CD with its designed cover and a poster that represents the main features of the project.

To carry out this work, the learners should do individual research on any visionary news or futuristic applications to be considered in the projects in addition to the basic information presented by the instructor. This brings about the need for synectic thinking which implies the merging of different and sometimes incompatible things into cohesive and unified forms or structures. In all the projects and applied technologies, the students are asked not to break any laws of nature, as we understand them today. In this way, it is thought that not only are the students stimulated for conducting realistic research on their topics using a high level of imagination, but it also gives additional motivation to conceptualise, plan, and design new environments. The final result might in the end be not only fiction but can also useful in earth-like conditions.

Furthermore, group work and collaboration are integral processes while learning new skills or techniques since they improve problem-solving processes and promote creativity and originality [18]. With respect to the points raised in the literature, the seminar assigns the semester projects to groups of 4-5 students, which is not only seen as a preparative stage for future work conditions and an incentive for the students' creative process, but also as sources of multiple-knowledge that stimulates the design and research activities. The given projects are presented and discussed twice by all seminar members during the semester in class. In this way, it is thought that they share the information with their peers thoroughly and elaborate the information gathered through collaborative discourse and reflection, and design their projects accordingly.

As a final step, the projects are presented to an audience of students, instructors and sometimes to people from the field via computer programs since in our existing world, computers and electronic communication networks have an important role in the private and public sector. Thus, the seminar tries to encourage the students to operate and explore within these systems as much as possible during the semester. Also, practical knowledge is acquired through experiential learning and it is in the involvement with expressive media that ideas and feelings are realized in visual form [19].

Concerning assessment, the instructor tries to involve the students so as to help them learn how to evaluate their own and others' projects, a situation they might face in their future professional work. To achieve this, peer-evaluation and self-evaluation processes are employed during group presentations. First of all, when students are giving their group presentations, the rest of the class is asked to write down their comments on the projects of their colleagues and to assign a possible grade. The grade and comments should be based on evolution and realisation of the design concept and application of future technologies in the presented project. After the
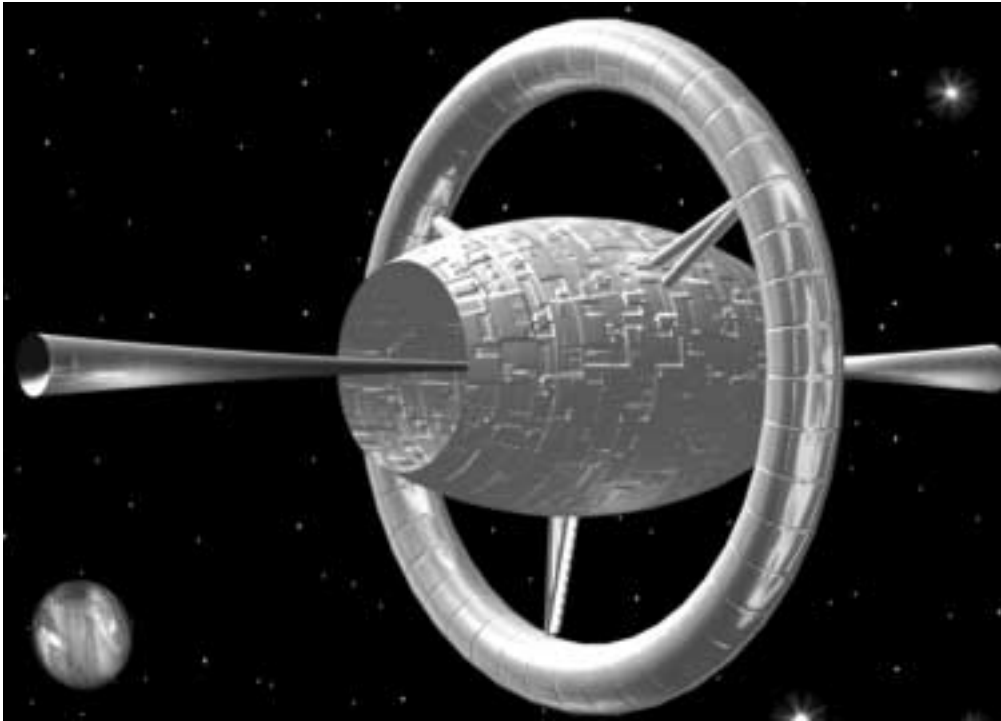
presentations, they are also requested to reflect on their own work as a whole and carry out the same evaluation for their own group.

In all assignments, students are given major control over their work and have the opportunity to structure it in the way they want, which is additionally thought to inspire their imagination and motivation during their design process and research. Such autonomy is also seen as an important aspect in a design process by Howard Jones [20].

Example projects
Until now the challenging projects that have been studied by the students were an Orbital Space Colony, an Orbital Space Hotel, and the design of a Mars Colony.

Analyses of some of the projects in the seminar reflect that the learners were not involved in projects that were rigid and completely rational, as is the case in most design studio projects. They create utopian living environments that reflect new social and cultural structures that would help overcome the contemporary disasters, plagues, fears, ideologies, beliefs, rules and regulations. Thus, the psychological aspect of living, the unconscious and the feelings of human beings appear to be more crucial in the design process. In fact, the designs suggest a new way of being, living and development, not another form that features present standards.

For instance, the Orbital Space Colony *Newalla* group [Figure 1] focused their concept and forms on the idea that having inhabited the planet earth for millions of years, humanity will come to the stage that they will have consumed its resources to satisfy their ego. The cosmos is seen for them as a virgin phenomenon and has been mysterious for human beings ever since. With this thought they want to continue spreading their existence into the cosmos, searching for new sources, trying to overcome their situation and trying to dominate the cosmos step by step. But under such conditions for the *Newalla* group, humanity should first learn to combine spiritual and physical existence. The new environment in

Above:

Figure 1

the orbital settlement *Newalla* should teach new way of living. For this reason human beings need surroundings where they could relax and reflect. *Newalla* should provide an environment that does not refer to old living structures like consumerism and competition. And the interior of this settlement should not challenge or force humans to adapt. The interior should be a spiritual and physical home. In this respect, the exterior of the settlement is formed and affected by the interior system. The form reflects the idea of smooth integration and a flow of forms that do not disturb each other while expanding.

Another example that reflected a general tendency to approach the project was the Orbital Space Colony project *Armada* [Figures 2-3]. This group questioned the feeling of security in our society. In their concept, terrorism has taken over the earth. People do not feel safe in any place any more. Some of them are even afraid of leaving their houses. However, they saw the orbital space colonisation as a safe solution. The main concept that shaped the forms and the structure was the security aspect. As a metaphorical reference, they took insects and animals which used a kind of shielding whenever there was a sign of danger. In fact, they planned a settlement where the solar panels and the cities have been covered with moving shields. The shields open and close in case of an emergency like a terror attack or asteroids directing onto the settlements. The general structure of the city consists of five cities, which are connected with a vacuum travelling tube.
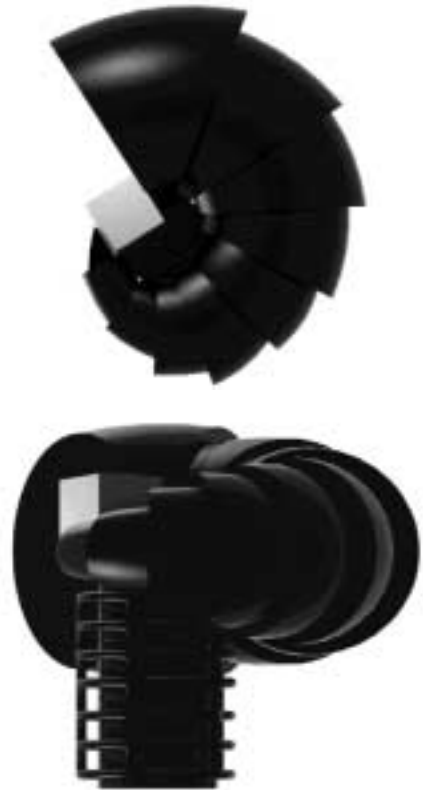
In the Mars colony projects, the group *Exile* [Figures 4-5] questioned the institutions of our society and their ideologies on certain aspects, like molecular biology. They thought nobody could stop the evolution and use of science. Because of this after the prohibition of cloning on the surface of the earth, a group of scientists decided to do cloning procedure beyond the border of prohibition. Some corporation approached this idea positively and decided to give financial support to these scientists. For this reason, they imagine the year 2016 as a possible time when the foundation will start the project *Exile*. After two years of preparation, a group of scientists, technicians, corporations and volunteers will be launched to the Mars cloning themselves and growing by generations by the help of molecular biology and genetics. In fact, the form they created represented a shape that starts with a coupe and continues and grows by time. The shape is reminiscent of a shell that represents the first life form of a new generation.

Another Project for Mars was the *Asylum* project [Figure 6]. *Asylum* wanted to create a new space for psychologically disturbed people. A place where they do not feel ignored, separated from the rest of the society, or as a minority. The project tried to offer new opportunities and a life style to celebrate insanity. *Asylum* was designed as a place where their needs are taken more seriously. The construction was designed by various parts of the Space Shuttle. Materials imported from earth will produce the first dome: pneumatic membrane, plastic kevlars plexiglass, FRP, and so on. Later, it was thought that materials produced on Mars such as Glass, Martian bricks and Martian concrete would extend the construction. The glass they propose is produced from lunar and asteroidean materials, which has even better mechanical properties than ones produced on earth, for items such as walls, pipes and some kind of structural elements..

In general, it is observed that students are attracted and stimulated by novel topics in the design studios since the learners submitted extra

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work consisting of : animations, films, design of accessories that the inhabitants will wear and sometimes even the design of a group T-shirt carrying the logo of the project. Thus, a holistic design topic might influence the enthusiasm of the students towards the design topic and it's development and maturation.

In conclusion it is argues therefore that there is a challenging research and teaching ground out there for a design curriculum, which should not only be limited to a certain engineering elite, as tend to be the present case. Furthemore in this context, it has to be considered that design studios are important structures in the architectural and design curricula. However, while a range of aspects of design studio processes has been investigated, studies that consider the impact of a design topic on the performance and enthusiasm of the learners in developing their projects should not be neglected.

Opposite From Left:

Figure 2, 3, 4 & 5

Above:

Figure 6

References

1. Alkon, P. K (1994) *Science Fiction Before 1900, Imagination Discovers Technology,* Twayne Publishers, New York.

2. Disch, T. M. (1998) *The Dreams Our Stuff Is Made Of, How Science Fiction Conquered the World,* The Free Press, New York, p.1.

3. Broderick, D (2000) *Transrealist Fiction, Writing in the Slipstream of Science,* Greenwood Press, Westport.

4. Brainbridge, W. S (1986) *Dimensions of Science Fiction,* Harvard University Press, Cambridge.

5. Geoffrey, I. C. (2001) 'The Market for Space Tourism: Early Indications', *Journal of Travel Research* 40[2], pp.213-220.

6. Wilson, J. (2000) 'Postcard from the Moon', *Popular Mechanics* 177[6], pp.96-99.

7. Beardsley, T. (1999) 'The way to go in space', *Scientific American* 280[2], pp.80-97.

8. Ibid.

9. Ibid.

10. Ibid.

11. Sternberg, R. J. & Lubart, T. I. (1999) 'The concept of creativity: prospects and paradigms', in Sternberg, R.J. [Ed.], *Handbook of Creativity,* Cambridge Press, Cambridge, pp.3-15.

12. Kristler, W.P. (1999) 'Humanity's future in space', *Futurist* 33 [1], pp.43-46.

13. Attoe, W &. Mugerauer, R. (1991) 'Excellent studio teaching in architecture', *Studies in Higher Education* 16 [1], pp.41-50.

14. Craft, A. (2000) *Creativity Across the Primary Curriculum, Framing and Developing Practice,* Routledge, London.

15. Candy, L. & Edmonds, E. (2000) 'Creativity enhancement with emerging technologies', *Communications of the ACM* 43[8], pp 62-65.

16. Ianonne, R. (2001) 'Imagination: the missing link in curriculum and teaching', *Education,* 112 [2], pp 307-309.

17. Frank, K. A. (1998) 'Imagining as a way of knowing: some reasons for teaching 'architecture of utopia'', *Utopian Studies,* 9[1], pp 120-141.

18. Barak, M. & Maymon, T. & Harel, G. (1999) 'Teamwork in modern organizations: implications for technology education', *International Journal of Technology and Design Education* 9[1], pp 85-101.

19. Prentice, R. (2000) 'The place of practical knowledge in research in art and design', *Teaching in Higher Education* 5[4], pp 521-534.

20. Howard-Jones, P. A. (2002) 'A dual-state model of creative cognition for supporting strategies that foster creativity in classroom', *International Journal of Technology and Design Education* 12 [3], pp 215-226.