



## EFFECT OF NTSE VIRTUAL LABORATORY ON IMAGE OF SCIENTISTS WITHIN THE SCOPE OF BIOLOGY COURSE

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### INTRODUCTION AND DEFINITIONS:

In current education system, it is important for students to perceive the concept of scientist accurately in order to develop a positive attitude towards science. Students often visualize the scientists as seen on science-fiction shows, books and TV programs. For this reason, students develop an established idea about the image of scientists.

Therefore, the image of scientists should develop in students' minds in an accurate way (Erkorkmaz, 2009). Scientists pursue intellectual and actual processes while staying committed to scientific methods. It is not sufficient to be a successful student at school or have an accomplished academic career to be a scientist. Scientists gain the necessary qualities primarily from the educational perspective of their families, secondly from the schools they attend to. (Erkorkmaz, 2009).

Bay and France (2010) pointed out that it is efficient for students to have physical, cognitive and face-to-face interaction with scientists in order to discover that they have common grounds and to identify themselves with them. It was also mentioned that meeting with scientists and listening to their life stories first-hand will be a tremendous experience for students who are being taught the process of scientific method.

Kavak (2008), states that as sources of scientists' images, female students are influenced by the biographies of scientists, text books, Internet and movies respectively; while male students are respectively influenced by Internet, movies and biographies. According to grades, it is stated that 5th grade students are influenced by movies the most, while other grades are influenced by biographies the most. As to physical image, female and male students described the scientists as messy and electrified haired people who wear glasses and lab coat. According to Kavak, this stems from the messages about the looks of scientists given through aforementioned sources such as Internet, text books and movies which shape the image of scientists in students' minds. At the end of the study, it is emphasized that the scientist figures in those sources should be rearranged and retold in accordance with the current life conditions in order to develop and positively improve the image of scientists in students' minds.



Scientists are not arrogant, but modest and even shy people, as they often define themselves. They possess many humane qualities such as precision, observation, reasoning, power, intellectual curiosity and tolerance. The idea that the scientists are all smart is not true. Hilarie Belloc stated that science was negatively affected after being popular. Nowadays, as the number of scientists at schools increases, average and ordinary people also start to claim this title. To think that scientists have a special brain shows that we have an established point of view (Öcal, 2007).

Scientists use scientific methods to figure out the problems they encounter in the research process. Research is defined as a process in which data is gathered, analyzed, interpreted, evaluated and reported in a planned and systematic way in order to provide reliable solutions to problems. In order to apply the scientific method in the research process, researchers should develop the skills suitable for the scientific method steps stated by John Dewey (Karapınar, 2011).

As a result of scientific studies, there have been radical changes in perspectives of countries towards learning, teaching and evaluation particularly in the last 20 years. Therefore, curriculums of several courses have been renewed in our country. In this context, 4th-8th grade Science and Technology Course Education Program was developed along with other courses in primary education level based on constructivist approach in 2004. Information, skills, approach, values and mentality gain in this Program have also constituted a basis for biology courses in middle school (Ministry of National Education, 2007).

Upon reviewing the studies about scientific process skills, International Evaluation Program PISA results showed that the students in our country have difficulty in skills such as utilizing scientific information in complex situations, clear and consistent scientific thinking and reasoning in an ultimate level (Karapınar, 2011).

The fact that the students in our country have difficulty in scientific area and that new approaches are needed reminds us that our curriculum needs to be updated according to the developing and changing technology. NTSE Virtual Laboratory which was developed by Doğa College constitutes a platform to introduce interesting nano-technology experiments by giving virtual support to science education through experiments.

Softwares of Sezer (1989:17) and Güneş (1987:150) seem more interesting to students because of their visual appeal. It is believed that appeal and pedagogic efficiency of the course softwares can be easily increased with supports of programmed education, sound, color, graphics and animations. Findings from the studies in this area support this result (Arslan, 2003).

Internet can be defined as the net of nets, the web of the webs; a network which connects hundreds of thousand computer networks in order to access information. Internet is a technology which allows for people in different computer networks, no matter where they are in the world, to communicate and share information as efficient as possible as they are on the same network. In history of humanity, there has been no technology in education and communication area other than Internet which facilitates globalization in this level. Starting from the use of Internet in education, traditional



student and teacher concepts have changed and they were renamed as learners and facilitators. Now, students' role is not just accepting the information offered to them, but looking for and finding it, optimizing it for daily use and utilizing it. Therefore, "lifelong learning" concept have made a powerful friend. In this way, an extensive part of the society will be able to become lifelong learners in a short time. Thanks to Internet, "location" is no more a factor which affects the utilization of education services. Because on the Internet, "somewhere" is "everywhere." While curriculums used to be strictly attached to "locality", they now started to adopt "globality" or "universality" instead (Karasar, 2004).

While some inventions and innovations should be incorporated to the culture, some should inevitably be excluded. It is not easy to determine which inventions should be incorporated and what their potential use will be. Basalla shows Edison's invention "phonograph" as an example in this context. "When Thomas Edison invented phonograph in 1877, it was not his priority to use this device for creating new timbres for music boxes and musical toys. When first music boxes were released in 1891 and started to serve entertainment industry, Edison was not eager to accept this." While the rightful reason of widespread use of technology is given as the fact that technology facilitates human life and occasionally exhibits educational qualities, opposite reviews should also be taken into consideration. First criticism against information and technology is that if information technology is a good denominator which connects the society. It is also discussed to what degree the information technology affects and facilitates not only a particular class, but the whole society. Also transfer and circulation of information technologies have a negative effect on people and creates a technological addiction (Aktaş, Alioğlu, Vardar, 2007).

The fact that there are different opinions about the use of information technologies constitutes a reason for the requirement of this study.

#### **PURPOSE:**

The purpose of this study is looking for an answer to the following question: "Within the scope of biology class, does NTSE Virtual Lab have an effect on the image of scientists?"

#### **METHOD:**

In this research, practical applications were carried out with 9th grade students of Private Cevizlibağ Doğa College and Private Şişli-Bomonti Doğa College. Thirty 9th grade students were applied a pretest called "Scientist Image Scale" developed by researchers. The data obtained was evaluated by SPSS.

The empirical research went on for two weeks (4 course hours). During practical applications, nano-technology science was explained using the virtual laboratory called NTSE Virtual Lab developed by Doğa College. The scientists who work in this particular area were introduced. After providing the theoretical information, workshops related to nano-materials were held. Following these workshops, "Scientists' Image Scale" was applied as a posttest.



#### *Scientists' Qualities Test:*

*The test was developed by researchers in order to determine the image related to the qualities of scientists in students' minds. This scale was prepared to be used as a pretest and a posttest. Before practical applications, it was implemented as a pretest to determine the amount of knowledge of students related to the subject of research. After practical applications, it was applied to all groups as a posttest to measure the intended gain in experimental and control groups.*

*The test about the scientists' image was prepared by researchers as a 20-article Likert-type scale. Effectiveness and reliability study was applied to 100 people. Cronbach's Alpha reliability coefficient of the scale was found to be as high as 0,831. The articles which have a negative influence on reliability in the scale were reviewed and removed by researchers and final number of articles was set as 17. As a result of construct validity analysis, the scale was determined to be accordant with factor analysis.*

#### **FINDINGS AND INTERPRETATIONS:**

As to the pretest and posttest, the result of the pretest about the image of scientists according to the groups was 36,89 while it was 32,57 in the posttest. According to the t test, the result was not statistically significant ( $p>0,05$ ).

Regarding the article "Scientist is isolated from society", the average point for female students was 2,11 and for male students was 1,50. According to average points, it was observed that female students agree with this idea **more** than male students; however, no statistical significance was found as a result of the t test conducted ( $p>0,05$ ).

Regarding the article "Scientists are lonely and unhappy people", the average point for female students was 1,33 and for male students was 2,10. According to average points, it was observed that female students agree with this idea **less** than male students and also a statistical significance was found as a result of the t test conducted ( $p<0,05$ ). While male students agree with this idea in a higher level, female students do not.

Regarding the article "Scientists are educated in good schools", the average point for female students was 2,61 and for male students was 3,10. According to average points, it was observed that female students agree with this idea **less** than male students; however, no statistical significance was found as a result of the t test conducted ( $p>0,05$ ).



Regarding the article “Scientists are not interested in art”, the average point for female students was 1,78 and for male students was 2,15. According to average points, it was observed that female students agree with this idea **less** than male students; however, no statistical significance was found as a result of the t test conducted ( $p>,05$ ).

Regarding the article “Scientists need to be wealthy”, the average point for female students was 1,44 and for male students was 2,05. According to average points, it was observed that female students agree with this idea **less** than male students; however, no statistical significance was found as a result of the t test conducted ( $p>,05$ ).

Regarding the article “The most important scientific studies are carried out by men”, the average point for female students was 1,56 and for male students was 2,20. According to average points, it was observed that female students agree with this idea **less** than male students; however, no statistical significance was found as a result of the t test conducted ( $p>,05$ ).

Regarding the article “Scientists are not married”, the average point for female students was 2,06 and for male students was 1,80. According to average points, it was observed that female students agree with this idea **more** than male students; however, no statistical significance was found as a result of the t test conducted ( $p>,05$ ).

Regarding the article “Scientists do not go on vacation”, the average point for female students was 2,17 and for male students was 2,00. According to average points, it was observed that female students agree with this idea **more** than male students; however, no statistical significance was found as a result of the t test conducted ( $p>,05$ ).

Regarding the article “Scientists have messy hair”, the average point for female students was 2,11 and for male students was 1,95. According to average points, it was observed that female students agree with this idea **more** than male students; however, no statistical significance was found as a result of the t test conducted ( $p>,05$ ).

Regarding the article “Scientists wear glasses”, the average point for female students was 2,28 and for male students was 2,25. According to average points, it was observed that female students agree



with this idea **more** than male students; however, no statistical significance was found as a result of the t test conducted ( $p > ,05$ ).

Regarding the article “Scientists are quick-tempered”, the average point for female students was 2,00 and for male students was 1,40. According to average points, it was observed that female students agree with this idea **more** than male students; however, no statistical significance was found as a result of the t test conducted ( $p > ,05$ ).

Regarding the article “Scientists do not play sports”, the average point for female students was 1,72 and for male students was 1,70. According to average points, it was observed that female students agree with this idea **more** than male students; however, no statistical significance was found as a result of the t test conducted ( $p > ,05$ ).

Regarding the article “Scientists wear sloppy clothes”, the average point for female students was 1,83 and for male students was 2,15. According to average points, it was observed that female students agree with this idea **less** than male students; however, no statistical significance was found as a result of the t test conducted ( $p > ,05$ ).

Regarding the article “Scientists work only in laboratories”, the average point for female students was 1,94 and for male students was 2,95. According to average points, it was observed that female students agree with this idea **less** than male students; however, no statistical significance was found as a result of the t test conducted ( $p > ,05$ ).

Regarding the article “Scientists do not deal with daily chores”, the average point for female students was 2,06 and for male students was 2,30. According to average points, it was observed that female students agree with this idea **less** than male students; however, no statistical significance was found as a result of the t test conducted ( $p > ,05$ ).

Regarding the article “Scientists do not like to talk”, the average point for female students was 2,11 and for male students was 2,50. According to average points, it was observed that female students agree with this idea **less** than male students; however, no statistical significance was found as a result of the t test conducted ( $p > ,05$ ).



## CONCLUSION

According to literature, it was concluded that use of informatics tools have a negative influence on the success of students. The result of the study shows that students use their computers for listening to music, playing games, watching movies and chatting instead of doing homework and research. It was concluded that ÇOMÜ Biga İİBF students spend so much time on informatics that their education is affected in a negative way. Therefore, this study proved that information technologies have more negative than positive influence on students' education while the opposite is expected. (Aktaş, Alioğlu, Vardar, 2007).

Internet-based education is offered as an alternative to traditional school education. However, in many researches which compare these two education systems, no results weighing in favor of Internet-based education have been obtained. Some issues are encountered in planning and application phases of Internet-based education. There are also many concerns about the acknowledgment and quality of online education as well as the identity of students, teachers and institutions involved. In the light of this information, following suggestions are offered:

- Researches should be conducted on usability of Internet in education and its prominent advantages compared to current systems.
- The fact that Internet is used as a propaganda tool calls for its supervision. Such tendencies have emerged in many countries. Our country also needs some planning in this area.
- As much as being useful tools, computers and Internet may also be threatening to human health. Various briefing events should be planned regarding health and workforce loss resulting from these tools.
- Especially in underdeveloped countries, computers and Internet are used for purposes other than reaching scientific platforms. Encouraging approaches should be adopted about importance and functions of computers and Internet.
- Use of computers and Internet in our country gradually increases. However, the high cost makes it difficult for all regions to have access. In order to fix this, service provider public corporations should be reconstructed.
- Following questions should be pursued in researches to be conducted regarding computer and Internet-based technologies:
  - ◆ Is there an issue of monopoly of information on the Internet?
  - ◆ Is establishing domination one of the purposes of developed countries with regard to the use of computer and Internet?
  - ◆ What can be done against the issue of monopoly of information? (Tuncer, Taşpınar, 2008).



This research concluded that using information technologies in the application of nano-technology experiments makes no positive difference on the image of scientists.

### SUGGESTIONS:

Information is the most important tool of development and change in our time. Using information technologies is offered as an alternative to traditional science education. However, the result of this research was not in favor of applying nano-technology experiments using a virtual laboratory. The most important factor is that the time allocated to applications is restricted to 4 course hours. Study should be applied again by spreading it to a more extensive time. Also, the fact that the videos in the virtual lab are in English proved a disadvantage for 9th graders who are given Turkish education.

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