# Influences of Multimedia Lesson Contents On Effective Learning

**Tuncay Yavuz Ozdemir, Mukadder Boydak Ozan and Ismail Aydogan**

**Tuncay Yavuz Ozdemir**, Firat University, Turkey. (e-mail: tyozdemir@gmail.com)

**Mukadder Boydak Ozan**, Firat University, Turkey. (e-mail: mboydak@fırat.edu.tr)

**Ismail Aydogan**, Erciyes University, Turkey. (e-mail: aydogani@erciyes.edu.tr)

# Influences of Multimedia Lesson Contents On Effective Learning

Tuncay Yavuz OZDEMIR, Mukadder BOYDAK OZAN and Ismail AYDOGAN

## Abstract

In the information era that we experience today, there is a rapid change in the methods, techniques and materials used for education and teaching. The usage of information and communication technology-assisted teaching materials are becoming more commonplace. Parallel to these developments, the Ministry of National Education took steps to develop IT substructures of all schools in the country and implemented many projects. The purpose of this study is to determine whether or not the multimedia lesson content used by teachers affect effective learning. This study is a qualitative study, conducted with 45 teachers working in primary schools during the 2011-2012 academic year. According to the study findings, participants believe that using multimedia lesson content during lectures increases student motivation, makes students more curious and interested, and think that using multimedia lesson content has positive effects.

**Keywords:** information technology, multimedia lesson content, teachers, effective learning.

……………………………………………………………………………………

**Introduction**

Before the invention of printery, there were not many materials or opportunities to technologically support people's desire to learn. The amount of information produced at that time was much less when compared to today, and people did not have sufficient opportunity to access this information (Parsa, 2004). Thus, even if it was generated, the information could not be disseminated, and learning and teaching activities were considered to be in the hands of the privileged elite. The invention of the printing machine was in this sense, a breakthrough for the expansion of learning and education, and learning and teaching then started to become more commonplace (Sarpkaya, Karasekreter, & Dogan, 2007). With the emergence and expansion of computer technology, learning became more easily accessible and a more immediate activity. Technology is becoming popular not only in commercial enterprise, but also in the education sector. New education programs created with computers and the improvements in multimedia tools have led to the emergence of new education methods (Cavas, 2000, Cetin & Gunay, 2010).

Ozden (1998) stated that: "If we do not furnish our new generation with skills on analyzing, debugging and creating new ideas while knowledge of the information era pours down on us, we will remain behind and be defeated by communities who achieve these...". The most effective tool at this point is education. Bringing new technologies into education provides new learning opportunities, along with helping organizations to rebuild their current structures (Atici, 2007).

In today's world, there have been significant changes in the traditional view on education. Koper (2003) lists the reasons which have brought about this period of change:

- The need for more individualistic approaches for learning; each individual structures information in their long-term memory based on their cognitive structure;
- The need for producing output, discussing and cooperating collaboratively;
- The need to analyze information stacks rather than transferring them and to focus on teaching more complex skills such as the critical approach;
- Accreditation of pre-acquired competences and the need for lifelong learning.

With the IT that has developed after the 1980's, there have been many innovations and changes in education, along with many other fields (Ors & Tetik, 2010). Today, IT and teaching materials prepared with IT have become crucial tools for teachers. Together with its contribution to the diversity of teaching materials, the number of online learning environments created with IT has increased, and many universities and private education institutions started offering distant teaching programs (Yamamoto, Demiray, & Kesim, 2010).

Together with the developments in IT, the word multimedia became a word often used in daily life. As a concept, the word multimedia has entered many fields. Many initiatives, qualitatively insufficient but prepared mainly with commercial concerns, have emerged since the latter part of the 1980's. However, studies within this context have been observed to be educationally lacking (Aldag & Sezgin, 2002).

Multimedia content instruments that teachers use can also be used as learning materials in the form of teaching instruments, demonstration instruments and even individual learning instruments (Wissick, 1996). Using multimedia content materials as learning materials can

increase productivity and effectiveness of the teaching activity. Visual education sets that are prepared with multimedia content are examples of individual learning instruments. Animations, slides, videos and sounds that are used in such teaching materials can help students to learn through exploring.

Forcier and Descy (2002) listed the advantages of using learning materials with multimedia content as:

- Active learning
- Creativity
- Cooperation
- Building communication skills
- Constructiveness
- Control
- Feedback
- Flexibility

- Making learning entertaining
- Individual learning
- Motivating
- Addressing to more than one sense
- Giving reinforcement
- Facilitator
- Technologic practices
- Thinking skills

In other words, multimedia facilitates the learning activities of individuals through interaction. The individual who will use multimedia content should be able to interactively access content consisting of plain text, graphics, animation, pictures, videos, and sounds. Studies have shown that in preparing multimedia content; for individuals who are able to actively interact with information, when necessary and according to their own decision, makes the learning process more effective, rather than just watching preset images and sounds presented on the screen without the need to do anything (Sari, 1993).

The teaching designer can better structure his or her learning process material by using multimedia content. Updates and content organization in computer-assisted educational software are carried out much more easily than for traditional teaching materials (Najjar, 1996). In addition, plain expression is prevalent in expressions carried out using classical technology devices (tape recorder, overhead projector, slide projector etc.). Thus, student interest and motivation for the course decreases over time. Regaining the attention of students who are distracted is very difficult in lessons carried out using classical technology methods. On the other hand, by using multimedia content assisted with sound, images and animation, students effectively participate in lessons, and a richer learning environment between teacher and student emerges (Sari, 1993).

According to Najjar (1996), if multimedia content is addressed to more than one sense, when the content is prepared with visual and verbal aids and when it is arranged from simple to complex, it can support the learning experience of the individual. Further back, in 1994, Mayer and Sims said that while visual and audio learning process appeals to two different sense organs, with multimedia content, verbal expression refers to two different presentation models. More recent research concur, stating that learning through multimedia lesson content is more effective when the content is aided with visual and verbal expressions (Isman, 2008; Yalin, 2004; Celik, 2010).

Using teaching materials within the learning environment facilitates student perception, attracts their attention, decreases the duration of learning and promotes permanent learning. It increases student participation in class and inspires them to conduct research. (Aslan & Dogdu, 1993). Learning can be more effective and persisting based on the number of sense organs that the educational materials appeal to. Educational materials increase the effectiveness of education and training activities and support teachers. On the other hand, no matter how well-prepared the materials, if not used appropriately it will offer no benefit. According to Dale (1969, p. 108) students permanently learn 10% of what they read, 20% of what they hear, 30% of what they see, 50% of what they both see and hear, 80% of what they see, hear and say, and 90% of what they see, hear, touch and say, and thereby have a low chance of forgetting them (Demirel, 2003).

In order to increase effectiveness, many educational institutions have been observed to embrace new approaches, employing the developing technologies. For instance, by using various technology; the learning environment can be prepared according to the desires and needs of the individuals and offered to the individual, rather than having to bring them to the learning environment. On this issue, there is a need for a structure that will contribute to organizing education settings which support approaches such as lifelong education and individualized education, and which aim to promote rapid and effective learning. With these requirements, structures known as 'education-training materials' in the traditional education model have changed shape and expanded to a wider area of use (Toprak & Erdogan, 2012).

This study has aimed at determining the influence of using multimedia content in primary school institutions on effective learning. The following research questions were considered in order to achieve the purpose of the study.

- Does using multimedia within the classroom affect student attention?
- Is multimedia content is applicable for all lessons?
- Does using multimedia content within the classroom affect the teacher's position?
- What are the difficulties of using multimedia content within lessons for teachers?

**Methodology**

This research study employed the 'content analysis' method, one of the noted qualitative research methods. Researchers are known to embrace their topics in more detail when utilizing the qualitative research method. The study topic is examined in its natural, social and cultural environment. The question "Why?" is the focus. Qualitative research can be defined as questioning issues of social life and human with unique methods and giving meaning to them (Cresswell, 1998; Rothe, 2000; Glesne, 2006; Neuman, 2007). The significant features of qualitative studies are:

- They are carried out in the natural environment;
- They focus on making sense of participant viewpoints;
- Data are collected by the researchers themselves;
- Meanings underlying social processes are explored;
- Issues are approached through an integrated approach;

- They have a flexible and changeable structure depending on the conduct of the research (Hatch, 2002; Bogdan & Biklen, 2003).

For the above mentioned features, the qualitative research method was preferred for this research study in order to be able to collect and interpret information more deeply.

The study group consisted of teachers who worked in primary school institutions in the city center of Elazig, Turkey. For the study sample, pre-interviews were made with the potential participants in the study group and according to the results of pre-interviews, teachers who were detected as not hesitating in expressing their opinions were selected as the final participants of this research. Interview forms collected from a total of 45 teachers were analyzed by the researchers. It is common in qualitative research to create small study groups with a lower number of individuals. The reason for this is to more deeply explore and analyze the collected data (Johnson & Onwuegbuzie, 2004).

A draft interview form was prepared by the researchers following a literature review and consultation with experts in the field. The draft interview form was reshaped according to opinion gathered from expert faculty members, before taking its final shape. Content and face validity of the interview form was ensured through consultation with expert faculty members (n=3). To ensure study reliability, participants should be treated equally and accurate and large amounts of data should be collected (Denzin & Lincoln, 2000). For this purpose, the interview form was distributed to the participants, some necessary explanations were provided, and participants were then asked to hand the completed forms back the following day.

For this study, which aimed at determining the influence of using multimedia content in primary school institutions on effective learning based on teacher opinions, interview forms collected from the participants were examined by the researches and any that lacked the required level of data were deemed invalid.

The data were transferred onto electronic forms and analyzed with qualitative data analysis computer software (QSR Nvivo9). The data were coded as "G1, G2, G3,..., G45" in free code lists after categories were listed and excerpts of participants' opinions were added to exemplify them. Finally, connections were made and the transfer process for the findings was completed. Concepts which emerged after analyses based on the findings, were modeled so as to reflect relationships between them. Outstanding excerpts of participants' opinions were presented without making major changes.

**Findings**

The opinions of 45 teachers were examined one-by-one for each question on the interview form. Opinions for each question were classified as valid or invalid and then analyzed for their content. Some of the participant opinions regarding the interview questions were considered invalid as they were not related to the research purposes. Some of the participant opinions were placed in more than one theme because of their content and meaning, therefore total number participant opinions are different from the total number of participants.

The interview forms distributed to the teachers were analyzed and the opinions were gathered under five categories in terms of whether they; increase student motivation, have advantages or disadvantages, are a method which require attention, and have no effect on classroom management. Teacher opinions were examined by the researchers one-by-one and

which category the opinions related to were determined. Participant opinions were coded as G1, G2, G3, through to G45, and the most outstanding opinion or opinions were quoted by the researchers by keeping their original form.

Within the scope of the study, first, whether or not using multimedia tools in the classroom has an effect on the students and teachers were determined. The thematic demonstration of the figure which resulted from analyzing participant opinions for the related question is presented in Figure 1.
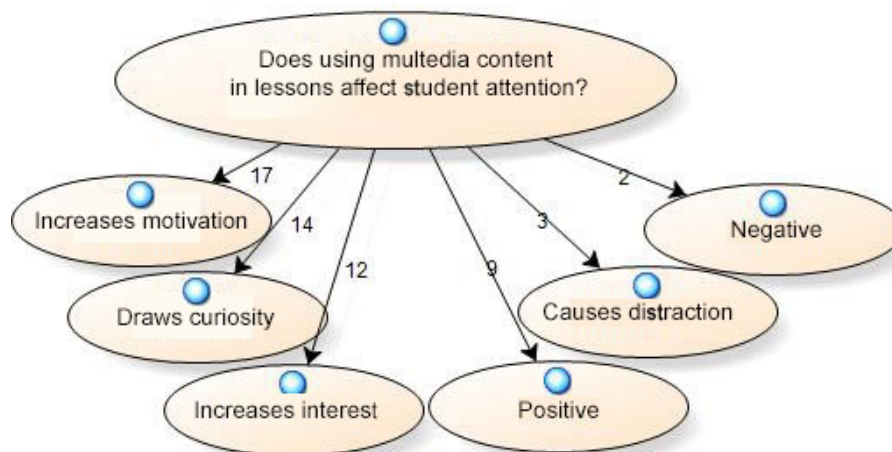


**Figure 1.** Does using multimedia within the classroom affect student attention?

Participants stated that by using multimedia lesson content, students' interest in the course increased; and after this increase, they came to lessons better prepared and that their motivation and attention increased. They stated that students listened to the lesson carefully and this positively affected their classroom participation. Participants who stressed that using multimedia content independent from the type of the course makes lessons more entertaining, also stated that it could positively affect permanent learning by appealing to more than one sense and by allowing students of varying intelligence to better follow the course. With different point of views, some participants underlined that when using multimedia content, teachers have to be more careful and even better prepared compared to when they use traditional teaching methods. Otherwise, according to Bloom taxonomy, especially for practice-based lessons, student acquisitions regarding these lessons will remain at the knowledge level, and without repetition and practice, permanent learning will not be achieved. Some of the participant opinions in this area are given below.

*G1: Using multimedia in classrooms increases student attention, increases their interest in the course, learning is permanent because references are made to daily life, and they make lessons more entertaining. One of the most important things in learning is visual quality.*

*G22: Using multimedia in the classroom can be identified as tools that motivate the children. Learning becomes more permanent and forgetting is delayed even more depending on the number of senses that the teaching activity is focused upon. The student gets distracted quickly when he or she reads a book or follows the blackboard. But a picture or a video is equal to thousands of words, and because they appeal to more than one sense, attention, interest and curiosity increases.*

*G32: Electronic screens make learning difficult. Televisions promote understanding but prevent this understanding from turning into an action. Students understand but can't practice. It causes a significant lack of attention. That which is not known should be displayed. If required, materials and opportunities are made available, then it can be productive. If they are used in some lessons and not used in others, then problems occur in those lessons in which they are not used.*

Based on participant opinion, after determining the effects of using multimedia content in lessons on the interest and attentions of students, whether the contents are appropriate for other lesson types was examined. With this respect, whether or not multimedia lesson content is applicable for each course was asked of the participants. The thematic demonstration of the findings is shown in Figure 2.
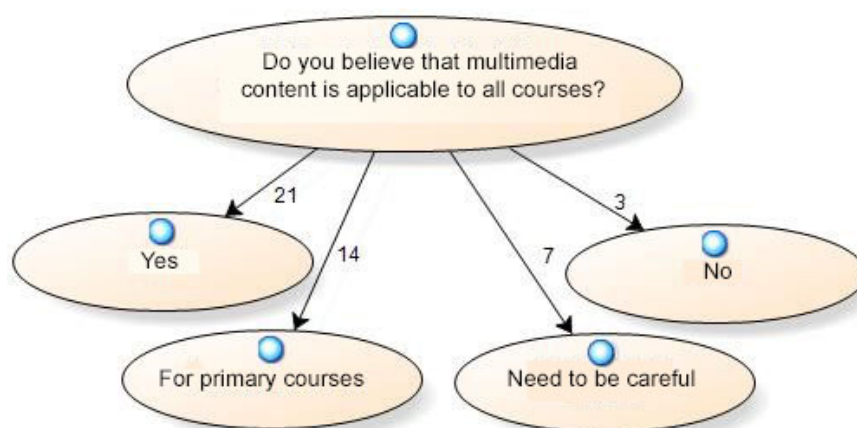


**Figure 2**. Do you believe that multimedia content is applicable for all lessons?

The majority of participants stated that in general, multimedia content is convenient for every course. Participants underlined that multimedia content should be used in every course because they increase student interest and motivation for the lesson, and they positively affect permanent learning (n=21). In addition, they also stated that using multimedia content in Science and Technology, Turkish, and Social Science courses was almost a necessity (n=14). Seven participants asserted that because multimedia content can result in a degree of inaction in both teachers and students, that teachers should be more careful when applying them, when compared with the traditional methods (n=7). Three participants stated that they are not that necessary for courses that do not require practice. Some of the participant opinions in this area are shown below.

*G20: I believe they can be used generally in all lessons. But it's a fact that some lessons apply them more frequently than others. For instance I believe that, in the Social Sciences course, there is a serious difference in verbally explaining "the conquer of Istanbul" or allowing students to watch it through an animation.*

*G24: They can be used in all courses based on the subject. Because these tools positively support learning, they are very necessary.*

*G34: Definitely. They facilitate student perception and learning in Science, Turkish and Social Sciences courses. It is more difficult to forget activities conducted by seeing.*

*G40: I believe they are convenient because they appeal to all sense organs and therefore learning is rapid and forgetting is slow. I believe that this method would be more effective in courses that are based on explanation, question and answer, and when there is no opportunity to learn through practice.*

The participants were asked whether or not using multimedia content in lessons would affect the teachers' position in the eyes of the students and in terms of the classroom. Valid opinions were analyzed and the categories they were placed under are shown in Figure 3.
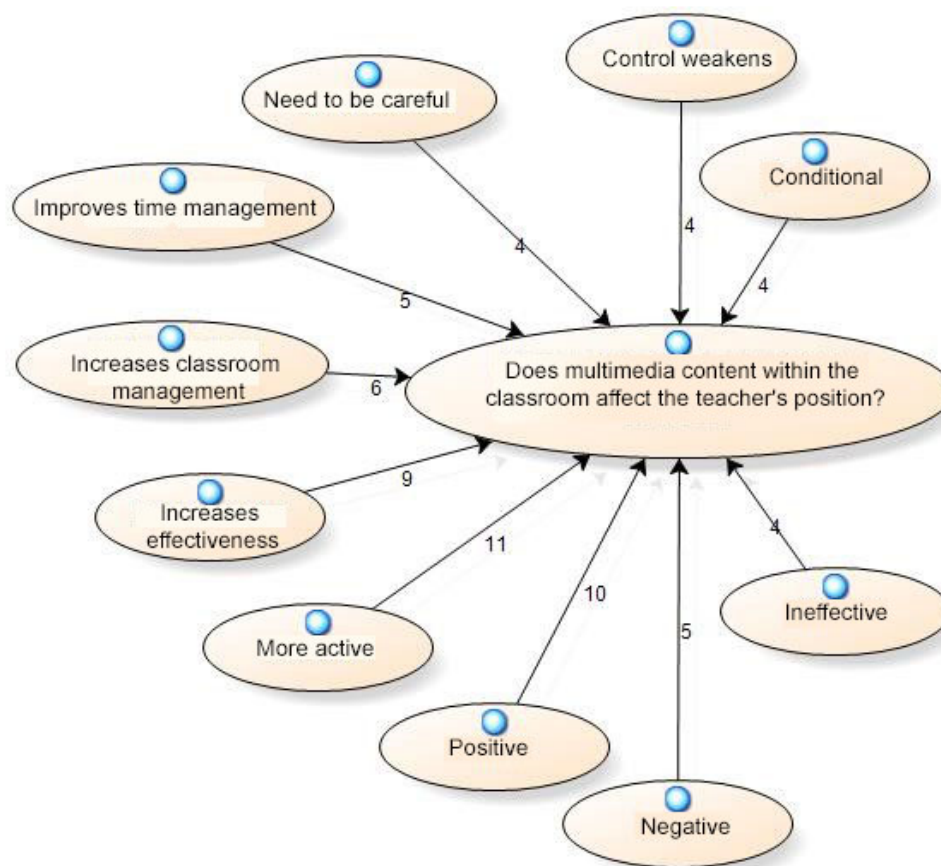


**Figure 3.** Does using multimedia content within the classroom affect the teacher's position?

Participants stated that using multimedia content offers more time for teachers and they get the opportunity to carry out different activities, and because student participation increases, effective learning is performed. It was stated that students, who are the core of the structural approach, are placed at the center and lessons become more entertaining and effective. Due to the fact that using multimedia content in lessons has a wide area of influence, it was asserted that teachers must be careful in using technologies and have technological backgrounds. It was stated that such content displaces the teacher from the center and source of information during lessons, and helps them gain an alternative identity as a guide and director. Some of the outstanding participant opinions in this area are shown below.

*G22: The explainer, knowledge transferor teacher of the old teacher-oriented education system is pushed aside. The teacher can convey his or her message with a picture, a video or an image, rather than by explaining pages full of subject matter.*

*G26: They positively affect the position of the teacher. They facilitate the duty of teachers. Because classroom management and subject explanations are supported with visual aids, the student will get the chance to follow the lesson without being distracted. Subjects will be understood more quickly.*

*G29: They provide convenience for teachers. They enable the lesson to be active, fun and colorful. Explaining the subject is made easier. Providing an avant-garde education positively affects the teacher.*

*G35: Because getting the computer ready takes too much time, it negatively affects classroom management at the beginning of the lesson. Students start making noise while the teacher gets the presentation ready. However, using multimedia content in lessons reduces the burden of teachers and facilitates explaining the subject.*

*G41: If teachers are furnished with the equipment required for multimedia content and when they have coping skills, their lessons will be more efficient.*

At the final stage of the study, the difficulties which teachers encounter in using multimedia content in lessons were detected. The thematic demonstration of the findings resulting from the analyzed participant opinions are shown in Figure 4.
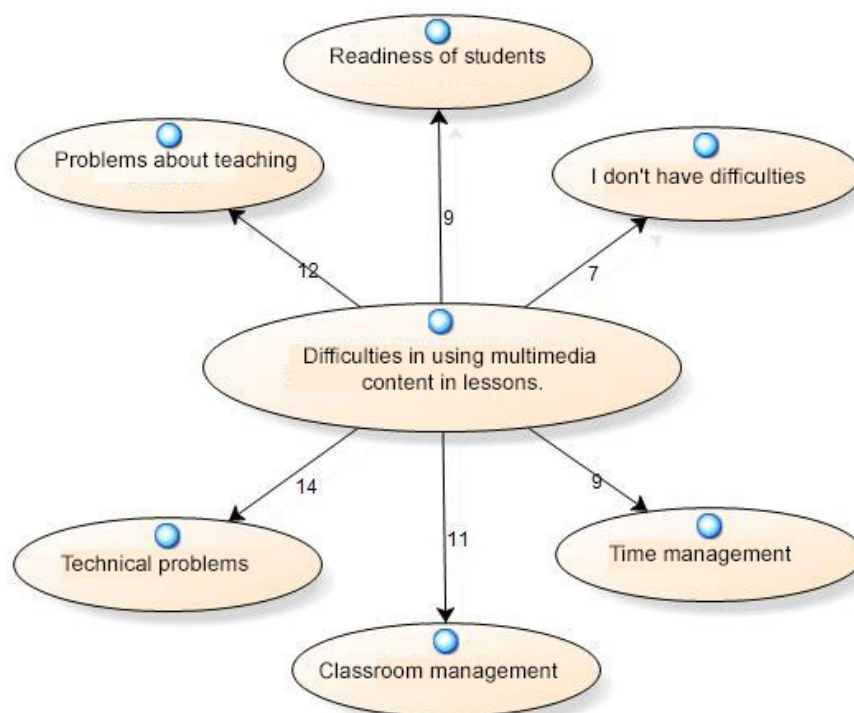


**Figure 4.** Difficulties in using multimedia content in lessons.

After determining the importance of using multimedia content based on participant opinions, it was found necessary to identify problems and suggest solutions for the effectiveness of the process. With participant opinion on the related research question, participants underlined that, in terms of using multimedia content in lessons, the technologic background of teachers should be improved, because a lack of experience and knowledge in using technology can cause a loss of teaching time. They stated that a student-oriented teaching environment can be provided by using multimedia content in lessons, but problems of

time management and classroom management also arose out of this. Some participants stressed that technologic opportunities in schools, or the physical structures of classroom or laboratories were inconvenient. Several participants stated that the preparation stage can be time consuming when trying to make multimedia content original to the course and subject, and that the goals may not be achieved if students come to the lesson unprepared.

Some of the opinions regarding the difficulties that teachers encounter in lessons conducted with multimedia content are shown below.

*G9: Firstly, students need to be well-prepared. Teachers should be more careful for the students to develop positive behaviors.*

*G32: Lack of technological devices and not being able to switch to the classroom system based on branches puts teachers in a difficult situation.*

*G33: I believe managing a primary stage classroom in primary schools is more difficult. I hope that problems will lessen as students get used to this system. The facilities required for using multimedia content are not the same level at every school. While there are devices such as projector computers in each classroom at some schools, these opportunities are limited at other schools.*

*G36: It takes time while getting prepared for the class. An appropriate settings is not always available (sound system, the seating of students), and sometimes students' interest in these tools can inhibit the subject being taught.*

## Conclusion and Discussion

This study was conducted with 45 teachers working in primary schools in the city center of Elazig, Turkey. The study aimed at determining whether or not using multimedia lesson content in primary schools influences effective learning. Participant opinions were gathered through interview forms developed by the researchers. Opinions were analyzed through the content analysis method.

Keeping learners' attention and motivation focused on the lesson is a crucial determinant in effective learning. This issue was examined within the scope of the study. According to participant opinion, using multimedia content during lessons increases student motivation, makes students curious and interested, and has positive effects. The level of student interest, curiosity and motivation to the lesson is highly important in achieving the expected productivity in education. Foricer and Descy (2002) underlined this issue with a similar expression. It is known that student motivation decreases in traditional methods where teachers preferred plain explanation techniques (Aladag & Sezgin, 2002). However, as Sari (1993) stated, effective learning is positively affected because a rich learning environment is provided by using multimedia content in the classroom. Some participants stated that using multimedia content in lessons distracted students (n=3) and that they had negative effects (n=2). This may be due to the level of technological abilities of the teachers.

It was stated that multimedia content can be used in many courses, especially in practice-based courses. Based on the positive affect that using multimedia content would impose on students, and on the condition of an appropriate level of technologic background of teachers, it was stated that classroom management of teachers would increase, and teachers would be more effective and active. Along with the wide range of effects of using multimedia content in

lessons, it is crucial for the effectiveness of the process to determine the difficulties encountered during practice.

Just like in formal teaching activities, considering the individual differences of students while designing multimedia content will help students in learning the subject. It can be said that teachers consider the teaching method appropriate for themselves in face-to-face teaching. The negative outcomes of this can be reduced by organizing classroom activities and through the instant decision-making skills of teachers. However, presenting the subject to the students through materials that interact with each other in various ways in learning environments based on multimedia content will have positive effects on students who have different learning skills. This is thought to affect the level of success aimed by the course.

Using multimedia content in lessons is thought to provide a flexible learning environment for students. In addition, enriching the teaching activity with multimedia content can have positive effects on the learning process, and can help resolve problems encountered in the classroom. When the benefits of multimedia lesson content are considered, student success may be favorably affected if they are used effectively for every course. The Ministry of National Education should therefore take the necessary measures to increase the use of multimedia content in lessons. At this point, all physical classrooms should be improved in order to offer multimedia content and it is crucial to meet the educational needs of teachers on this issue.

**Notes**

Corresponding author: Tuncay Yavuz OZDEMIR

The initial version of this study was an oral presentation submitted to 10. National Classroom Teaching Symposium, 5-7 May 2011, Cumhuriyet University, Faculty of Education, Sivas, Turkey.

**References**

Aldag, H., & Sezgin, E. (2002). Dual Coding Theory In Multimedia Applications Summary, *M.U. Ataturk Egitim Fakultesi Egitim Bilimleri Dergisi*, *15,* 29-44.

Aslan, Z., & Dogdu, S. (1993). *Egitim teknolojisi uygulamalari ve egitim arac-gerecleri*. Ankara: Tekisik Ofset.

Atici, B. (2007). The Efficiency of Virtual Learning Environments Based on Social Knowledge Construction on Learners' Achievement And Attitudes. *Egitim ve Bilim*, *32,* 143.

Bogdan, R. C., & Biklen, S. K. (2003). *Qualitative Research for Education: An introduction to Theories and Methods (4th ed.).* New York: Pearson Education Group.

Cavas, B. (2000). The Use of the Computer Technology in Seventh Grade Science Topics Which Contain Mathematics. International Special Education Congress ISEC-2000 July, 24-26th 2000, Manchester, UK.

Celik, L. (2010). Ogretim materyallerinin hazirlanmasi ve secimi. In O. Demirel, & E. Altun (Eds), *Ogretim Teknolojileri ve Materyal Tasarimi* (pp.145-169). (4th ed.). Ankara: Pegem Yayinlari.

Cetin, O., & Gunay, Y. (2010). Fen Egitiminde Web Tabanli Ogretimin Ogrencilerin Akademik Basarilarina ve Tutumlarina Etkisi, *Cukurova Universitesi Egitim Fakultesi Dergisi*, *3*(38), 19-34.

Creswell, J. W. (1998). *Qualitative inquiry and research design: Choosing among five traditions.* Thousand Oaks, CA: Sage Publications.

Dale, E. (1969). *Audiovisual Methods in Teaching*, New York: Dryden Press.

Demirel, O. (2003). *Ogretme sanati*. Ankara: Pegem Akademi Yayinlari.

Denzin, N. K., and Y. S. Lincoln. (2000). *Handbook of Qualitative Research*. London: Sage.

Forcier, C. R., & Descy, E. D. (2002). *The Computer as An Educational Tool: Productivity and Problem Solving*. Ohio: Merrill Prentice Hall.

Glesne, C. (2006). *Becoming qualitative researchers: An introduction.* Boston: Pearson Education.

Hatch, J.A. (2002). *Doing qualitative research in education settings*. Albany: State University of New York Press.

Isman, A. (2008). *Ogretim teknolojileri ve materyal gelistirme*. Ankara: Pegem Yayinlari.

Johnson, R. B., & Onwuegbuzie, A. J. (2004). *Mixed methods research: A research paradigm whose time has come.* Educational Researcher, *33*(7), 14-26.

Koper, E. J. R. (2003). Combining reusable learning resources and services to pedagogical purposeful units of learning. In A. Littlejohn (Ed), *Reusing online resources: A sustainable approach to eLearning* (pp.46-59). London: Kogan Page.

Mayer, R. E., & Sims, V. K. (1994). For whom is a picture worth a thousand words? Extensions of a Dual- Coding Theory of multimedia learning. *Journal of Educational Psychology*, *86*(3), 389-401.

Neuman, W. L. (2007). *Social research methods: Qualitative and quantitative approaches.* Boston: Pearson.

Najjar, L. J. (1996). Multimedia information and learning. *Journal of Educational Multimedia and Hypermedia, 5,* 129-150.

Ors, F., & Tetik, S. (2010). New Management Paradigms In Globalizing World: Change And Communication. *Cukurova Universitesi Sosyal Bilimler Enstitusu Dergisi, 19*(3), 439-456.

Ozden, Y. (1998). Egitimde Donusum, Yeni Degerler ve Olusumlar. Onder Matbaacilik, Ankara.

Parsa, A. F. (2004). Imgenin Gucu ve Gorsel Kulturun Yukselisi, *Anadili Dergisi, 33,* Izmir: Ankara Universitesi TOMER Izmir Subesi Yayinlari, 59-71.

Rothe, J. P. (2000). *Undertaking qualitative research: Concepts and cases in injury, health and social life*. Alberta: The University of Alberta Press.

Sari, I. F. (1993). Interaktif Multimedya. *Macintosh Dunyasi*, 34-39.

Sarpkaya, Y., Karasekreter, N., & Dogan, M. (2007). Effect of Distant Education Software Substructure at Information Permanence and Validity, Akademik Bilisim'07 - IX. Akademik Bilisim Konferansi Bildirileri 31 Ocak - 2 Subat, Dumlupinar Universitesi, Kutahya.

Toprak, M., & Erdogan, A. (2012). Lifelong Learning: Concept, Policy, Instruments and Implementation. *Journal of Higher Education and Science*, *2*(2), 69-91.

Wissick, C. A. (1996). Multimedia: Enhancing instruction for students with learning disabilities, *Journal of Learning Disabilities*, *29*(5), 494-503.

Yalin, H. I. (2004). *Ogretim teknolojileri ve materyal gelistirme*. Ankara: Nobel Yayin Dagitim.

Yamamoto, G. T., Demiray, U., & Kesim, M. (2010). *Turkiye'de E-Ogrenme-Gelismeler ve Uygulamalar.* Ankara: Cem Web Ofset.