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Message from the Editor-in-Chief

TOJET would like to thank you for your online educational interest. We are delighted that more than 23000 educators, teachers, parents, and students from around the world had visited the sixteenth issue between September 01 and December 31 2006. It means that TOJET has continued to educate academic people on new developments on educational technology around the world since October, 2002. We hope that the volume six, issue one will also successfully accomplish our global educational goal.

TOJET, Near east University, Eastern Mediterranean University, Sakarya University, Governor State University, Ohio University, and Louisiana State University will organize the Seventh International Educational Technology Conference (IETC 2007) in May 2007 in Turkish Republic of Northern Cyprus.

The guest editor of this issue was Prof. Dr. Servet Bayram. TOJET thanks the editor and the editorial board of this issue.

Editorial Board of this Issue

Prof. Dr. Aytakin İşman, Prof. Dr. Uğur Demiray, Prof. Dr. Ali Şimşek, Prof. Dr. Servet Bayram, Prof. Dr. Halil İbrahim Yalın, Prof. Dr. Buket Akkoyunlu, Prof. Dr. Ferhan Odabaşı, Prof. Dr. Hasan Amca, Prof. Dr. Alipaşa Ayas, Prof. Dr. Mehmet Gürol, , Assoc. Prof. Dr. Yavuz Akpınar, Assoc. Prof. Dr. Salih Usun, Assoc. Prof. Dr. Eralp Altun, Assoc. Prof. Dr. Rozhan Hj. Mohammed Idrus, Assist. Prof. Dr. Muhammet Demirbilek, Dr. İsmail İpek, and Dr. Yavuz Erdoğan.

For any suggestions and comments on the international online journal TOJET, please do not hesitate to fill out the comments & suggestion form.

Prof. Dr. Aytakin İŞMAN
Sakarya University

Message from the Guest Editor

Greetings Dear readers of TOJET,

I am pleased to present you this issue of the TOJET. No undertaking of this magnitude comes to fruition without the contributions of many persons. Very much thanks to all of you and editorial board of this issue; Prof. Dr. Uğur Demiray, Prof. Dr. Ali Şimşek, Prof. Dr. Servet Bayram, Prof. Dr. Halil İbrahim Yalın, Prof. Dr. Buket Akkoyunlu, Prof. Dr. Ferhan Odabaşı, Prof. Dr. Hasan Amca, Prof. Dr. Alipaşa Ayas, Prof. Dr. Mehmet Gürol, Prof. Dr. Aytekin İşman, Assoc. Prof. Dr. Yavuz Akpınar, Assoc. Prof. Dr. Salih Usun, Assoc. Prof. Dr. Eralp Altun, Assoc. Prof. Dr. Rozhan Hj. Mohammed Idrus, Assist. Prof. Dr. Muhammet Demirbilek, Dr. İsmail İpek, and Dr. Yavuz Erdoğan.

Among the many studies, we decided to publish only five articles for our readers. The editorial board members were so selected for this volume, 6(1).

The first article of this issue was coming from Marmara University which is written by Alev Önder and Asude Balaban Dağal. The title of the article was “Turkish parents’ views on quality standards for children’s television programs”. The main purpose of the study was to evaluate the opinions of parents of pre-school children about children’s programs on TV. The study had two phases: In the first step “The Evaluation Scale for Children’s Programs” was translated into Turkish, the reliability and validity of the scale was tested through analyzing of the data collected from parents of preschool children. In the second step of the study, 189 parents were asked to evaluate the Turkish TV programs for children education on the basis of 9 quality criteria of the scale. The results were discussed in terms of the suitability and the importance of quality criteria.

The second paper namely, “Foreign language reading through hypermedia: Predictors of vocabulary learning and reading comprehension”, written by Yavuz Akbulut from Anadolu University. Factors predicting vocabulary learning and reading comprehension of advanced language learners of English in a linear multimedia text were investigated in this study. Predictor variables of interest were multimedia type, reading proficiency, learning styles, and background knowledge about the topic. The outcome variables of interest were vocabulary and reading comprehension scores. Findings suggest that annotation type, reading ability and prior topical knowledge are important variables contributing to vocabulary learning while reading ability and learning styles are important variables contributing to reading comprehension in a hypermedia environment.

The major purpose of the third study was to examine the information seeking behaviour of university students in Botswana. This article was written by Josiah O. Ajiboye and Adeyinka Tella from University of Botswana. Specifically, the study made effort to determine the sources consulted and the general pattern of information gathering system by the students: the impact of students’ gender, level of study and course of study on the students’ information seeking behaviour. The study adopted a descriptive survey design and data was collected using a questionnaire administered to two thousand respondents randomly selected from six faculties in the University of Botswana, Gaborone, Botswana, Africa.

The forth paper namely, “Integrating new technology to commerce curriculum: How to overcome teachers’ resistance”, written by Sureshramana Maya from MGM College, Udipi District, India. This study explores the apprehensions of teacher in the implementation of technology and offers suggestions to integrate technology in the classrooms. Though the study is confined to Udipi District, the findings may be relevant to the entire commerce education. For the scope of the further studies, Dr. Maya said: “There is ample opportunity for undertaking research on impediments and barriers and factors conducive specific to individual technologies, such as the internet, file sharing, e-contents or digital video. Such work could help in increasing the use of these technologies in the classroom”.

The final study namely, “To compare the effects of computer based learning and the laboratory based learning on students’ achievement regarding electric circuits” was conducted by Bekir Bayrak, Uygur Kanlı and Şebnem Kandil İngeç from Ankara. In this study, the research problem was: “Is the computer based physics instruction as effective as laboratory intensive physics instruction with regards to academic success

on electric circuits 9th grade students?” At the end of the study, it can be concluded that the computer based learning is as effective as the laboratory based learning on students’ achievement.

Cordially,

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INTEGRATING NEW TECHNOLOGY TO COMMERCE CURRICULUM: HOW TO OVERCOME TEACHERS' RESISTANCE?

Prof. Dr. Sureshramana MAYYA, MGM College, Udupi

ABSTRACT

The electronic frontier is not something that education has embraced with open arms. There is a natural tendency to resist new ways of doing things. Our commerce teacher's attitude is responsible for the slow acceptance of modern technology in the educational environment. The paper explores the apprehensions of teacher in the implementation of technology and offers suggestions to integrate technology in the classrooms. Though the study is confined to Udupi District, the findings may be relevant to the entire commerce education.

INTRODUCTION

Change is the need for the day. The rapid pace at which technology is transforming the process of learning in many countries is almost unbelievable. The imperceptible momentum gathered by the engines of technology while at work in education will change the entire learning scenario like nothing else during the next few years. What is really amazing is that the developments are being telescoped into shorter and shorter time spans and this is the crux of the matter. As a result, the learning tools at the command of the children are getting more effective and sophisticated. At the root of this revolution is the personal computer, the television set, video cassettes, the satellite network and what not. And there is no stopping this avalanche of change as the world approaches the 21st century. Our commerce teachers cannot keep away from these changes.

The pressure for colleges to reform and faculty to change the method of instruction have intensified during the last decade. Until teachers use the computer and become comfortable and confident using the computer, the computer may remain an isolated tool with either the potential to increase student learning, or the potential to increase the amount of dust it collects (Deborah, 2000). When teachers do not use computers, the likelihood of students using and becoming computer literate is drastically affected. One must ask, "What can be done to encourage teachers to use computers in order to bring about change in the methods in which teachers instruct?" Therein lies the problem.

This paper brings about the actual and perceived difficulties faced by teachers in implementing new technology in the commerce classroom. The use of technology at colleges has left many teachers feeling rather perplexed.

The problem consists of five parts:

1. What are the factors that motivate a commerce teacher to use a computer?
2. What are the factors that impede a commerce teacher's use of a computer?
3. What are the personal needs that motivate a commerce teacher to use a computer?
4. Is there a significant difference between "new", "experienced" and "senior" commerce teachers' years of experience and the factors that motivate a teacher to use a computer? and
5. Is there a significant difference between "new", "experienced" and "senior" commerce teachers' years of experience and the personal needs that motivate a teacher to use a computer?

"You can be given computers, but if you don't have the capacity and ability to use them, it can be disappointing," said KK Pai, educational administrator and former Chairman of Syndicate Bank. Teachers are teaching students in the same way they have done for years. How can businesses, the community, and parents expect teachers to teach students how to use the computer, when faculties, themselves, do not use a computer? What will it take to get faculties to become computer literate? From previous studies, much has been written regarding factors that encourage and impede teachers to integrate technology into the curriculum. Very little has been researched regarding what it takes to get faculties, themselves, to use a computer.

Does the blame really lie with the teachers who think a mouse is something you don't want to find in the kitchen? Getting computers into colleges is not the answer. Our biggest stumbling block is getting teachers to recognize how technology can serve education and provide access to training. An attempt is made to probe this aspect by conducting a survey in selected colleges of Udupi district.

SIGNIFICANCE OF STUDY

It was anticipated that information gained from above questions would yield data presently not available to colleges and educators. This information would also be helpful to faculty developers to determine the training teachers need in order to use a computer. With more teachers using the computer, teachers' proficiency levels would increase and more students would have the opportunity to become computer literate. The goal to transform our commerce colleges into the twenty-first century with effective teaching and learning strategies using computers would be achieved.

REVIEW OF LITERATURE

There are many studies conducted on ICT and applications of computer technology. Much work has already been carried out by researchers who themselves evaluated and analysed the existing research into ICT barriers and related topics. Albaugh, (1997) suggested that the factors that influence teachers' use of technology include: accessibility of hardware and software, administrative expectations and support for the implementation, and adaptability of classroom and work settings. As practical professionals, teachers are often suspicious of new claims and the implementation of new ideas without proof of effectiveness. Teachers tend to adopt a new technology when that technology helps them do what they are currently doing better; thus, they be seen as reinforcing the status quo.

Bosley and Moon (2003), Fabry and Higgs (1997), Mumtaz (2000) and Wild (1996)) and many other researchers, in addition to carrying out their own literature reviews, undertook studies to obtain primary evidence of the barriers to teachers' use of ICT, using a range of qualitative and quantitative methods and instruments. For example, much of the literature is based on surveys of practitioners, with questionnaires being completed by varying numbers of individuals. Studies ranged in size, from those with samples of as few as 22 practitioners (Snoeyink and Ertmer, 2001) to surveys of as many as 350 teachers. Other studies used interviews of practitioners to gain information (Butler and Sellbom, 2002; Granger et al., 2002; Guha, 2000).

Wild (1996) comments that while some research highlights poor access to technology and lack of opportunity as major causes, other reports suggest poor support in schools, lack of personal confidence in using learning technologies, and the nature of pre-service teacher education courses.

In an extensive literature review, (Cotton, 1992) found that computer-assisted instruction results in improved student attitudes in a variety of areas. These areas included improved attitudes towards themselves as learners, the use of computers in education, and towards computers in general, course subject matter, quality of instruction, and school in general. Studies cited by Cotton also indicate that computer-assisted learning results in higher levels of self-efficacy, higher school attendance rates, increased time on-task, and increased pro-social behavior.

Bianchi (1996) presented research identifying factors motivating teachers to integrate technology into the curriculum. These factors included staff development, availability of technology, district and school site support, student interest, and motivation.

Judged by the efforts done by those authors, it is pertinent that the barriers are still obvious, but these obstacles are slowly decreasing their magnitude and significance, teachers have started recognizing the importance and effectiveness of new technology in the classroom. This study is undertaken by keeping in view of the difficulties and institutional constraints faced by the teaching faculty of Udupi district.

OBJECTIVES

There are two fold objectives of this study. They are (i) To find out the opinion of Commerce Teaching College teachers about their inability to use modern technology in their classrooms and (ii) To offer suggestions and methods to overcome these constraints to use modern technology in their classrooms.

METHODOLOGY

The sample consisted of 76 Commerce Teaching College lecturers from 20 colleges belonging to Udupi District. The sample is based on random sampling method. The sample consisted of 46 male (60.53%) and 30 female (39.47%) Only first grade colleges imparting arts, science and commerce and computer science were being covered. Both Government and Private Colleges were selected.

We interviewed commerce teachers regarding their beliefs about adopting technology in their classroom. To prompt a discussion of this topic, the teachers answered an open-ended questionnaire. This survey asked questions about availability of computers and modern technology in colleges used for teaching, and the amount of use of these computers and modern technology, the factors that motivate a teacher to use a computer, the factors that impede a commerce faculty's use of a computer, the needs that motivate a teacher to use a computer, and the like. Questions on e-mail, power point, internet, computer graphics, LCD Projector, OHP, computer literacy, different applications were asked. Questionnaire items were written to elicit teachers' personal beliefs about technology adoption. Results from these questionnaires and interviews were transcribed.

Three-fourth of teachers (57 or 75%) did not have any formal training in computer usage. However, 19(25%) of the teachers had some computer experience. This suggests that those teachers are proactive in that they did not wait to take required computer courses; instead, they learned to use computers informally. Computer ownership among the teachers was low. Only one-third of the teachers owned a computer. Most of them (62, or 81.57%) believed that college management as being not supportive toward efforts to improve their staff's computer literacy.

RESEARCH QUESTIONS

Research Question One

What are the factors that motivate a commerce faculty to use a computer?

First, there were four factors that proved to be conducive for commerce faculty to use computers. Faculty wanted a computer located in the classroom. Every time bringing the computer and LCD to the classroom discourages the teachers. Secondly, they believed that computers saved time. Thirdly, faculty are interested in computers and finally, they want to know that they will receive help (technical support) when needed. Continuous training and support for teachers is necessary for teachers who are beginning to use a computer. The second research question examined the factors that negatively impact computer use.

Research Question Two

What are the factors that impede a commerce teacher's use of a computer?

The factors that impede a teacher's use of a computer totaled four within this study. The factors found to impede a teacher's computer use were:

1. The college did not organize any training to the commerce lecturers on how to use computers.
2. The teacher does not have required time to use the computers.
3. There are no financial incentive like additional pay to learn how to use a computer.
4. The teacher does not need a computer to complete his tasks. Some teachers teaching language felt that chalk and talk method is the best method of teaching.

Research Question Three

What are the personal needs that motivate a teacher to use a computer?

Teachers are motivated by personal and student interests before considering organizational goals. The location of the computer was a key to teachers' use of computers. Teachers want computers accessible to them in the classroom.

Research Question Four

Is there a significant difference between "new", "experienced" and "senior" teachers' years of experience and the factors that motivate a teacher to use a computer?

This research question investigated whether there was a significant difference in responses by any of the three groups, related to motivations and personal needs. The research findings suggest that there is

no significant difference between "new", "experienced" and "senior" teachers' years of experience for three of the four factors.

Research Question Five

Is there a significant difference between "new", "experienced" and "senior" teachers' years of experience and the personal needs that motivate a teacher to use a computer?

Only three of the ten motivating factors determined that there was a significant difference between "new," "experienced," and "senior" teachers' years of experience and the personal needs that motivated a teacher to use a computer. The answer to the research question is "yes" for these three factors. The three factors recognized significant difference between the groups were: (1) "I want to use the computer to assist with grading"; (2) "I like sharing my knowledge about computers with others"; and (3) "I like being recognized as someone who uses computers." The factor with the strongest agreement among the three groups of teachers was "the ability to use a computer is an essential skill for the twenty-first century."

OTHER FINDINGS

1. Teachers are motivated to use a computer when a computer is available in their classroom.
2. An element of compulsion may speed up the process. There is, at present no compulsion on the part of commerce teachers of Udupi District to study and to use the modern technology in the classroom. "I get my salary without using modern technology in the classroom" a respondent remarked.
3. Many teachers believe that lack of adequate computers in the colleges is responsible for effective implementation of new technology. Even proper training facility is not available to teachers to acquire ICT. Two colleges are not having any computers in their college.
4. Computer access in colleges is also a determining factor in acquiring this knowledge. However, it is not necessarily the case that a college with low access does not have enough equipment; it may be that the amount of equipment is adequate but inappropriately organized in the college. Equipment should be organized in such a way to ensure maximum access for all users. There are lot of restrictions for the teachers to have access to those computers, a teacher felt.
5. Lack of internet access in colleges is a stumbling block in many colleges. Udupi District revealed that 70 per cent of the colleges are not having internet access, 80 per cent of the Government Colleges are not having adequate computers. There is no free internet access to teachers in any of the colleges of Udupi District. Out of the internet having college, majority of colleges are having slow dialup connection, which is used for computer department purposes. Teachers are not having free access, any motivation to use this access.
6. Teachers are not having training in the skill of power point presentation; still they use the chalk and talk method. Out of 76 respondents, only 23 are having their own e-mail access, many are not having knowledge about its effectiveness and utility.
7. 70 per cent of the teachers felt that modern technology has very litter scope in Indian Higher Education. They felt that unless teachers are trained, adequate numbers of modern equipments are provided; ICT has little scope in Udupi District.
8. Resistance to change is a factor which prevents the full integration of ICT in the classroom. This resistance can be seen in terms of teachers' unwillingness to change their teaching practices, and also in terms of institutions finding it difficult or being unable to re-organize in ways which facilitate innovative practices involving ICT. Out of 20 colleges surveyed in Udupi District only 8 colleges are having LCD Projectors. 13 colleges are having Overhead Projector.
9. Teachers who do not realize the advantages of using technology in their teaching are less likely to make use of ICT. Any training program needs to ensure that teachers are made aware of the benefits of using ICT. Such training programs are not being organized in Udupi District.
10. Little evidence was found to support the view that age affects levels of teachers' ICT use. There are some very senior teachers who are experts in ICT. Younger teachers are no more likely to make use of ICT in their work than their more experienced colleagues.
11. There are some evidences to suggest that male teachers belonging to sample population use more ICT than female teachers. One of the female lecturer remarked that the compelling conventional household responsibility was a constraint to prepare extensively ICT oriented class.
12. It is also observed that while students almost always have some contact with computers during their secondary schooling, the same is not true while they undertake PUC of Degree. It is probably true that

except Mangalore University every Indian University provides some type of computer facility for undergraduate students. However in Mangalore University courses there is no expectation or encouragement for students to use these computing facilities as an integral part of their course. Some faculty felt that this is one of the constraints for the development of modern technology in classroom in Udupi District.

13. Large classes may be a constraint in implanting new technology.

DISCUSSION AND SUGGESTIONS

Training

ICT training can help overcome barriers, yet it is also observed that there are weaknesses in the design and delivery of many courses. By focusing on basic ICT skills, training fails to prepare teachers to integrate ICT in their pedagogy on the other hand, found that computer novices preferred to be taught basic skills before addressing pedagogical integration of technology. This illustrates the need for differentiated training, taking into account teachers' varying levels of computer experience and learning styles. Within institutions offering initial teacher training, access to ICT can be problematic but a perhaps more serious barrier lies in the fact that tutors often have little experience of using technology to deliver the curriculum. A lack of encouragement to use ICT during teaching practice is another barrier.

External and internal barriers

Problems such as lack of equipment, unreliability, lack of technical support and other resource-related issues; organizational culture and teacher-level factors such as beliefs about teaching and technology, and openness to change are also obvious in the study.

Attitudes

Basically, the problem lies in attitude, awareness, application, access, and accomplishments. The electronic frontier is not something that education has embraced with open arms. There is a natural tendency to resist new ways of doing things. Our commerce teacher's attitude is responsible for the slow acceptance of modern technology in the educational environment. Some respondents felt that it was less effort to keep on doing things the way they have always been done than to learn new ways of doing those things. Most of these people held the belief that the textbook should be focal point of instruction and the primary learning tool.

Some other commerce teachers were not exactly excited to use modern technology. They had the let's wait, and wait, and wait, and see attitude.

In most of the colleges the leadership tended to be traditional and hierarchical, and the commonest view of commerce teachers was that the principal was responsible for bringing about change. Any perceived 'backwardness' in ICT was put down to lack of infrastructure, support, or leadership from the management. Restrictive models of school administration, limited expertise, and no apparent stimulant to initiate ICT-related learning inhibited organizational learning in these schools. In seven of the colleges surveyed, every cheque pertaining to colleges were being signed by Chairman of the Managing Committee. The College Principal cannot take any financial decision.

Words like modem, email, upload, bps, ASCII, Internet, and file attaching are foreign and meaningless to some commerce teachers.. They are unaware that using electronic communications as a tool in the classroom can be very motivational to students as well as a medium for developing effective oral and written language skills, and geographical, cultural, and socio-political understanding on a global scale.

SUGGESTIONS

1. **Leadership:** The role of college leadership is clearly central in meeting several of these constraints. In those colleges which used modern technology, the leadership was collaborative, supported innovation and risk taking, and included others in decision-making experiences with others. An American case study (Dexter et al., 2002) paints a similar picture of successful schools and innovative schools. In six such schools Dexter and her colleagues found a strong commitment to, and support for, teachers' individual learning and widespread use of technology with a student - centered approach. "The presence of this need to learn and the supportive conditions to do so appeared to be reciprocal, or mutually supportive, of the development of professional community around technology use." (ibid.).

2. **College Planning and Implementation of Change:** All the stakeholders like classroom teachers, management, parents, students, educational experts must be involved in the planning and implementation of change. Only one college of Udupi district conducted “Developing Vision and Mission Workshop” which involved all the functionaries as noted above. Out of 20 colleges surveyed, 12 colleges are not having any formalized vision and mission statement, except some frequently changing statements written by some senior faculty without involving any stakeholders. These plans were seen as setting directions and priorities, as well as decisions about the deployment of learning support assistants, the hardware, software and infrastructure required (Evans, 2002).
3. **Whole College Use and Promotional of Resources:** There is considerable increase in the use of technology in the modern colleges. For instance, Manipal Academy of Higher Education is reported to have provided for senior teaching staff, personal notebook computers and email access and workspace. Video conferencing is available and the college has established its own intranet, placing all its resources on-line. The services of People soft have also been used. A striking feature in several of the studies is the move to viewing curriculum resources as something to be jointly developed by the staff. UGC has already initiated this kind of step through Consortium for Educational Communication (CEC). It has been planning in integration of theory of learning with modern technology. Many teachers are being trained in the development of e-content. CEC has been integrating in the development of teaching material which has been available to pupils on-line, for home or classroom use. The uses e-learning, satellite and video conferencing which allow pupils to present their questions, which are answered on-line are in the process of implementation.
4. **However a move to whole college access to shared resources creates a need for training in their production and classroom use.** The reluctance may be avoided by associating the training and acquisition of skills as part of a salary award. Teachers were expected to use the skills learned in creating online content, assessing students' work and collaborating with students, parents and colleagues. Appropriate resource analyzing and flexible, forward-looking planning, linked closely to what teachers actually want and need at any given stage, will be essential (Peter Scrimshaw, 2004)
5. **Sharing and Training:** There should be mutual confidence, mutual sharing of expertise and knowledge, then only imparting of educational technology in classroom and curricula can be developed. Willingness to learn and support each other may be kindled by this mutual confidence and trust. In study (McDermott & Murray, 2000) the authors felt that asking questions of each other, no matter how simplistic these seemed, and as they became more skilled they discovered more ways of integrating technology into the curriculum. At the same time their open-minded approach made it possible to accept researchers' suggestions about giving students more choice and freedom, and time to problem-solve independently.
6. **Roles of technical support staff:** It is absolutely necessary to have close cooperation between all parties concerned is required. College should work to convince computer staff that reliability is very important, especially concerning technology in classrooms. They have to encourage the purchase of highly reliable technologies. There should be adequate support staff to maintain and train the application of technology.

SCOPE FOR FURTHER RESEARCH

While the research on the barriers to effective use of modern technology in general is undoubtedly important, more focused research on the barriers relating to the use of specific technologies is increasingly necessary. The reasons behind teachers' attitudes and anxieties also craving further research. There is ample opportunity for undertaking research on impediments and barriers and factors conducive specific to individual technologies, such as the internet, file sharing, e-contents or digital video. Such work could help in increasing the use of these technologies in the classroom. Necessary interventions may be made to streamline the use of these technologies in the classroom.

REFERENCES

- Albaugh, P. (1997). The role of skepticism in preparing teachers for the use of technology. 'Education for community': a town and gown discussion panel, Westerville, OH, January 26, 1997.
- Avalanche of change in the world of learning: *The Hindu*. Chennai: Sep 16, 1997. pg. 1
- Bianchi, Pamela A. 1996. The identification of factors motivating teachers to integrate technology with the curriculum. Ed.D. diss.. University of La Verne, La Verne, CA.

- Bosley, C., Moon, S. (2003). Review of existing literature on the use of Information and Communication Technology within an educational context. Derby: Centre for Guidance Studies, University of Derby.
- Bosley, C., Moon, S. (2003). Review of existing literature on the use of Information and Communication Technology within an educational context. Derby: Centre for Guidance Studies, University of Derby.
- Butler, D., Sellbom, M. (2002). Barriers to adopting technology for teaching and learning. *Educase Quarterly*, 25 (2), pp.22-28.
- Cotton, K. (1992). *Computer-assisted instruction*. Northwest Regional Educational Laboratory. Retrieved October 26, 2001, from <http://www.nwrel.org/scpd/sirs/5/cu10.html>.
- Deborah Y. Roddey Meyers (2000), *The Factors That Motivate And Impede Computer Use By Teachers*, Dissertation, Proquest Dissertations.
- Dexter, S., Seashore, K.R. & Anderson, R.E. (2002) Contributions of Professional Community to Exemplary Use of ICT, *Journal of Computer Assisted Learning*, 18, pp. 489-497.
- Evans, M. (2002) Open windows: becoming an e-learning school. National College for School Leadership (NCSL).
- Fabry, D., Higgs, J. (1997). Barriers to the effective use of technology in education. *Journal of Educational Computing*, 17 (4), pp.385-395.
- Granger, C., et al.. (2002). Factors contributing to teachers' successful implementation of IT. *Journal of Computer Assisted Learning*, 18 pp.480-488.
- Guha, S. (2000). Are we all technically prepared? Teachers' perspectives on the causes of comfort or discomfort in using computers at elementary grade teaching. Paper presented at the Annual Meeting of the National Association for the Education of Young Children Atlanta, GA, November 8-11, 2000.
- Ingwerson, Donald W. 1996. Meeting the technology challenge. *Thrust for Educational Leadership* 25, no. 6 (April): 6-8.
- McDermott, L. & Murray, J. (2000) A study on the effective use and integration of technology into the primary curriculum. Saint Xavier University, Chicago.
- Mumtaz, S. (2000). Factors affecting teachers' use of information and communications technology: a review of the literature. *Journal of Information Technology for Teacher Education*, 9 (3), pp.319-341.
- Peter Scrimshaw. (2004). Enabling Teachers to Make Successful Use of ICT, Educational Resource Information Centre (ERIC) retrieved on October 2005 from <http://www.eric.ed.gov/>
- Snoeyink, R., Ertmer, P. (2001). Thrust into technology: how veteran teachers respond. *Journal of Educational Technology Systems*, 30 (1), pp.85-111.
- Susan Reimer* (1996) Don't forget to teach the teachers; [FINAL Edition]. The Sun. Baltimore, Md.: Sep 29, 1996. pg. 1.J
- Wild, M. (1996). Technology refusal: Rationalising the failure of student and beginning teachers to use computers. *British Journal of Educational Technology*, 27(2), 134-143.
- Wild, M. (1996). Technology refusal: rationalising the failure of student and beginning teachers to use computers. *British Journal of Educational Technology*, 27 (2), pp.134-143.

TO COMPARE THE EFFECTS OF COMPUTER BASED LEARNING AND THE LABORATORY BASED LEARNING ON STUDENTS' ACHIEVEMENT REGARDING ELECTRIC CIRCUITS

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ABSTRACT

In this study, the research problem was: “Is the computer based physics instruction as effective as laboratory intensive physics instruction with regards to academic success on electric circuits 9th grade students?” For this research of experimental quality the design of pre-test and post-test are applied with an experiment and a control group. The data are collected by “Computer Laboratory Interest Survey (CLIS)”, “Physics Laboratory Interest Survey (PLIS)”, “Electrical Circuits Success Test (ECST)”. For the analyses of the data, the arithmetic mean, the standard deviation, dependent and independent t-tests are used. At the end of the study it is seen that there does not exist a significant difference between the instruction in laboratory and the instruction with computer to influence the success of the students. Thereby, it can be concluded that the computer based learning is as effective as the laboratory based learning on students' achievement.

KEY-WORDS: Physics Instruction, Computer Based Learning, Laboratory Based Learning, Simulation Teaching Programs, Electrical Circuits.

ÖZET

Bu araştırmada, “9. sınıf öğrencilerinin elektrik devreleri konusundaki akademik başarısında, simülasyon programı kullanılarak yapılan bilgisayar destekli fizik öğretimi, laboratuvar destekli fizik öğretimi kadar etkili midir?” sorusuna cevap aranmıştır. Deneysel nitelikli bu araştırma için deney ve kontrol gruplu ön test-son test deney deseni uygulanmıştır. Araştırma verileri; “Bilgisayar Laboratuvarı İlgi Anketi”, “Fizik Laboratuvarı İlgi Anketi” ve “Elektrik Devreleri Başarı Testi” ile toplanmıştır. Verilerinin analizinde Aritmetik Ortalama, standart sapma, bağımlı ve bağımsız t-testi kullanılmıştır. Çalışma sonunda; laboratuvar destekli öğretimin öğrenci başarısına etkisi ile bilgisayar (simülasyon) destekli öğretimin öğrenci başarısına etkisi arasında anlamlı bir fark bulunamamıştır. Buna göre; araştırma sonucu olarak öğrencilerin akademik başarısında bilgisayar (simülasyon) destekli fizik öğretiminin laboratuvar destekli fizik öğretimi kadar etkili olduğu söylenebilir.

Anahtar Kelimeler: Bilgisayar Destekli Fizik Öğretimi, Laboratuvar Destekli Fizik Öğretimi, Elektrik Devreleri Simülasyon Öğretim Programları, Elektrik Devreleri.

INTRODUCTION

The subjects of science are usually complex and abstract. A number of students attending primary and secondary schools need experiences which they will be able to get through concrete materials in laboratories to comprehend the abstract subjects. The active participation of the student in the analyses of the real events and in the process of collecting data is the main element of the program which is depended on the philosophy of inquisitive approach. This provides ease for the student to understand the method and the essence of the science, to improve the ability of solving problems, to have ability of making inquisitions and generalizations, to get the scientific knowledge and to improve positive attitudes (Tamir,1978).

The students can learn the knowledge the most easily in real surroundings where they can observe the concepts and processes. But in these surroundings it can not always be possible to make observations. To teach this kind of knowledge simulated environments such as laboratories are widely used. In laboratories, studies can be done by means of concrete, real or artificial materials. The studies done in laboratories increase the interests and successes of the students for the subjects of science. Freedman (1997) reaches the following results:

The students who attend to the education of laboratory regularly,

- become more successful in the achievement test of science.
- there is a positive correlation between the students' interests and their successes at Science.
- the studies in laboratory make a positive influence on the interests of them over Science.

The researches that have been done for a long time show that the laboratory studies increase the interest and the abilities of the students for the science subjects (Bryant and Morek, 1987; Bekar, 1996; Algan, 1999; Bağcı, 1999).

Although the laboratory method has a very important place in science education, it has some limits and problems about its use. The main problems are as follows:

- The laboratory activities are expensive as they are carried out and arranged with equipment.
- It takes too much planning time for the teachers and to apply it.
- Loss of time in the studies of individual and group experiment is too much.
- Checking the students at a large class becomes difficult.

In the cases where the laboratory study isn't done to the extent that it is desired to be, technological devices like concrete materials and models used in the process of education instruction increase the interest and motivation of the students for the lessons and increase learning qualities. The first objects to remember are the computers when one mentions technological educational means. During the educational and instructional studies, the computers play very important roles nowadays. When we look at the forms of the use of computers in education, in perspective of our subject-matter computer based teaching is in demand.

Computer based teaching and learning is increasingly becoming widespread and it has been important especially at difficult subjects in science for over two decades. Computer based learning is a method, which uses computers in a learning media and strengthens students' motivation and educational processes. It gives opportunities to both students and teachers to learn and teach more quickly and to combine active learning with computer technology. Collette & Collette (1989) explains that using computers increases motivation and desire for the lectures and laboratory in the process of learning (Akçay et. al., 2005).

It has been shown through researches done so far that computer based learning influences the successes of the students much more positively than in any other traditional methods (Reed, 1986; McCoy, 1991; Geban and other, 1992 İbiş, 1999; Yiğit and Akdeniz, 2003). It has also been identified that the successes of the students increase in physics lessons taught by computers (Bennett, 1986; Yiğit and Akdeniz, 2003; Meyveci, 1997).

The teaching simulations prepared to be used in educational activities as one of the software types are able to create a teaching atmosphere like laboratories where students are active.

Various interference possibilities in simulation programs for example, the user giving different initial values in the experiment in computer medium give the possibility of "Learning through inventing" which is one of the different methods (Şen, 2001). Simulations are also simplified and abstracted parts of some real events and applications (Şengel et. al, 2002).

Simulations are the transfers of the events with specific limitations in daily life to the computer medium. Computer based learning is the closest one to the laboratory medium and offers a student interaction. Simulations help the students to form their own cognitive models about events and processes. Simulations also offer the opportunities for observing easily the events that occur too slowly or too fast in the lab and they are very dangerous to be tested in it and cost dearly.

The laboratories equipped with computers and especially with simulations (due to the reason that they are very productive in terms of time) give opportunities to the students to ask questions of changeable nature like "if X is. ..., then what Y is...." As the students feel free for asking questions in this manner and take feedbacks immediately, they enter a process that works well in terms of conceptual changes. Computer transforms difficult and boring activities into easy ones in Science subjects. For this reason, computers

encourage the students to be the part of science classes and participate in similar learning experiences (Riche, 200; Soylu and İbiş,1999; Gülçiçek and Güneş, 2004).

Jimoyiannis and Komis (2001) examined the effect of the computer simulations on students to understand the orbital movements, by using basic concepts related with kinematics, in a study made in physics teaching. As a result of this study, it is seen that teaching basic concepts of kinematics through simulations has brought about successful results and has contributed highly to learning process.

In a study in which the influence of computer based physics activities on students’ acquisitions is searched on the subject of Simple Harmonic Motion, it is concluded that the teaching realized by the simulation program with an applied dynamic system is more successful than the teaching implemented by traditional methods (Karamustafaoglu and the others, 2005). And also in this study it is stressed that a well-prepared simulation isn’t very adequate by itself and it is necessary to support the simulations considered to be used in order to be able to obtain good results from instruction with the instructive programs concerning related subjects and concepts .

The studies show that computer based learning by way of simulation programs makes the concepts and processes more concrete and causes the students to understand more easily the relationship between them and as a result of this, a more permanent learning is achieved.

Recently some studies have been performed about whether the computer simulation experiments or traditional laboratory experiments are effective on the students’ successes about Science subjects. Some parts of this studies show that the computer simulation experiments are more effective. (Geban and the other. 1992; Svec& Anderson, 1995; Redish and et al., 1997) But Miller (1986) Choi & Gennaro couldn’t find a meaningful difference between computer simulation experiments and traditional laboratory experiments (Şengel and et al., 2002).

The objective of this study is to compare the computer based learning implemented by using simulation programs and the lab based learning on the subject of “Electrical Circuits” in physics class of the 9th graders in terms of student success.

METHOD

The Process of Research Method

A design of pre and post tests is applied to the experiment and control groups as a research method. The process of the research method is shown in Table 1.

Table -1. The Process of Research Method

Group	Determining Groups	Groups	Measurement	Process	Measurement
Students	Physics Lab. Interest Survey (PLIS) and Computer Lab. Interest Survey (CLIS)	Physics Lab. Group (Control G.)	Pre-Test (ECST)	Lab Based Learning	Post-Test (ECST)
		Computer Lab. Group. (Experiment G.)		Computer Based Learning	

Forming the Research Groups

The research group is made up of a total of 28 students who are the 9th graders of a secondary school in a Azdavay district of Kastamonu province in Turkey. While forming the students’ groups, the results of PLIS and CLIS were taken into consideration. In the research students’ interests and curiosities for the computer and lab medium were quite significant. Therefore, surveys were conducted to determine the level of students’ interests and according to survey results, it was discovered that the experiment / control groups’ interests in computer and Physics Labs were the same.

Measurement Tools

To form two groups of students whose interests on Physics and Computer Labs are the same, a Computer Laboratory Interest Survey (CLIS) and a Physics Laboratory Interest Survey (PLIS), comprising Likert Scale Type of questions with five choices were developed. In this area, these surveys developed at the consequence of literature research were accepted to be proper by consulting to the experts. These surveys were applied to a different group of 40 students having the same properties with the study groups. As a result of the data obtained, it was established that the reliability of (PLIS) was .94 and the reliability of (CLIS) was 74.

To get the experimental data of this study first of all, considering the students' acquisitions provided by the Ministry of National Education regarding Electrical Circuits a multiple choice of an Electrical Circuit Achievement Test was prepared. For the validity and reliability first, this measurement tool was applied to a different group of 39 people having the same qualities with the study groups and according to the results obtained, making necessary arrangements and consulting to the experts the number of the questions was dropped by 33. The reliability coefficient of KR-20 of the formed ECST was found as .94 and the level of difficulty as .37.

Determining the lesson Software to be Used in Research

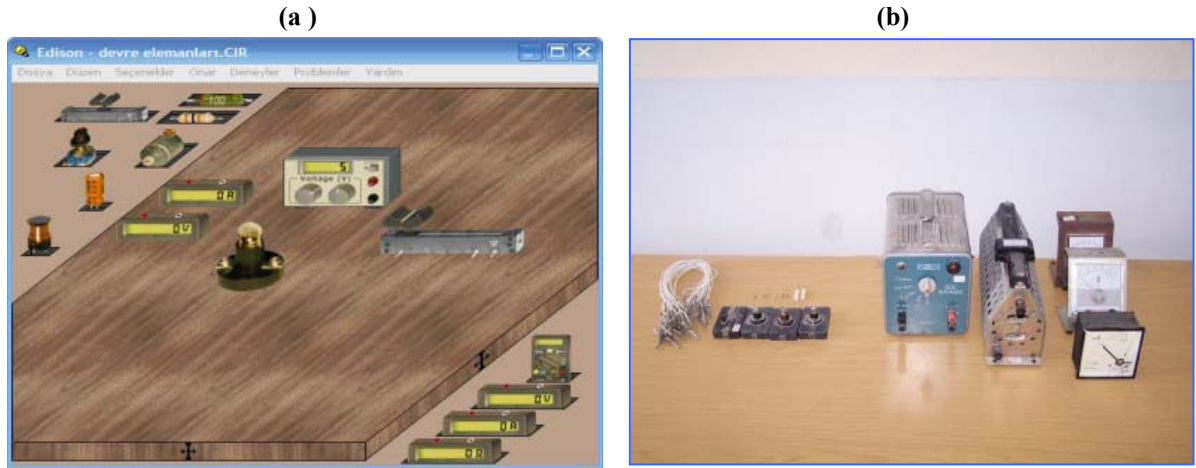
The simulation programs comprising the subjects of electricity to be used in the implementation of lab based physics learning were detected. Three programs as having suitable levels to be used in the study were determined. In order to evaluate and determine the suitability of the selected number of software two physics teachers and two academicians that are expert in their own fields were requested to examine such software. At the consequence of the examinations performed, the experts' comments and views were evaluated through Software Evaluation Form (Şahin and Yıldırım, 1999). At the consequence of the data obtained, the program of Edison 4.0 was chosen as a lesson software. Making contacts with the Turkish distributor of the software, negotiations were made with him regarding the supply of the lesson software and necessary support was provided for the Turkish version of the program.

Application and Analysis

First, for the experiment / control group of 14 students whose interests are the same for computer and physics labs an Electrical Circuits Achievement Test (ECST) as a pre-test was given. Later on, for a 4 - week period the computer lab of the school was changed into the Physics Lab one day in a week and was changed into the Computer lab another day in a week and the application was conducted this way. Each week the lesson software was reloaded into computers and was deleted at the end of each class session. Thus, the software of lessons loaded to the computers again every week and at the end of the lesson it is deleted from the computer. Thus, the probability of using the lesson software of the physics lab group students in their leisure time activities was eliminated.

First Week: The Edison Program was introduced to the students in the experiment group and information on how to use the program was given to them. (Picture 1-a); and the components of the circuit (Picture 1-b) were introduced to the students of control group. Both groups were wanted to make a simple electrical circuit and were also demanded to measure the potential differences found among the points of circuit components in the circuit.

Picture 1: Physical environment views of experiment group (a) and the control group (b)



Second Week: The students from both groups starting to work the relationship between the current and potential difference discovered the Ohm's Law on the established circuit and the relation of resistance with the current was examined.

Third Week: The students in the groups were made to determine the current in a serial circuit and the currents in a parallel circuit and the main arm in a mixed connected circuit and the currents in parallel arms.

Picture 2 : Serial circuit views of the experiment group (a) and the control group (b).



Fourth Week: Students were made to compare the brightness of the lamps in serial and parallel circuits that will be prepared by them and to identify the relationship of the brightness with the current that runs over the lamps.

At the end of the class session a lesson content in the form of photocopy materials were handed out to the students. Additionally, experiment reports made in the class sessions were collected in the following hour and checked in detail. At the end of four –week period the (ECST) was applied to both groups as a post - test. The results obtained from the measurement tools were examined statistically and they were analyzed. In the analysis of the data, t-test was used for both independent and dependent (connected) measures.

FINDINGS

Whether any important differences occurred or not between the scores of the experiment and control groups in the interest surveys of Likert Type test questions with 5 choices was analyzed. The results of the analysis are given in Table-2.

Table-2. The Results of t-Test for the Comparison of the Interest Surveys of Experiment and Control Groups.

Survey	Groups	N	\bar{X}	S.S.	S.D.	t	P
(PLIS)	Experiment Group (EG)	14	87,79	12,07	26	0,426	.673
	Control Group (CG)	14	89,43	7,89			
(CLIS)	Experiment Group (EG)	14	89,29	11,76	26	0,427	.673
	Control Group (CG)	14	87,71	7,18			

According to the data in table, there are not any significant differences between the interest survey means of experiment and control groups ($p > .05$) regarding the physics lab. According to the survey results, it was seen that there were not any significant differences between the experiment and control groups' interests and abilities for computer and physics labs. Although there was not a significant difference between the mean scores, one of the groups was chosen as the experiment group because the scores taken from CLIS were higher than that of the other one.

Following the teaching methods conducted during four-week period, the pre-test and post-test scores and means of experiment and control groups taken from ECST are given in Table-3)

Table 3. The Results of The Pre-Post Test Scores of the Students Taken From ECST

EG Students	Pre-test Score	Post - test Score	CG Students	Pre-test Score	Post test Score
E1	12	16	C1	11	21
E2	11	23	C2	8	18
E3	8	18	C3	10	20
E4	9	28	C4	10	29
E5	9	10	C5	13	21
E6	9	21	C6	6	17
E7	12	29	C7	6	13
E8	13	19	C8	14	18
E9	12	22	C9	8	24
E10	12	26	C0	12	17
E11	8	25	C11	11	12
E12	11	24	C12	11	14
E13	8	15	C13	10	23
E14	9	10	C14	13	24
Mean	10,21	20,42	Mean	10,21	19,35

It was analyzed whether there was a significant difference or not between the pre and post test scores of the experiment and control groups and their results are shown in Table-4.

Table 4. The results of t-Test to compare the pre and post test scores of the groups.

Group	Test	N	\bar{X}	S.S.	S.D.	t	P
EG	Pretest	14	10,21	1,80	13	6.612	.000*
	Posttest	14	20,42	6,07			
CG	Pretest	14	10,21	2,48	13	6.877	.000*
	Posttest	14	19,35	4,74			

The mean of the pre test scores of the experiment groups is 10,21 (+/- 1,8) and the mean of the post test points is 20,42 (+/- 6,07). When the results of the pre test and post test of experimental group are compared with the other; it is seen that the mean score of the pre test is statistically and meaningfully higher than the mean score of the pre test [t (26) = 6,877; p< 0,5].

The results of the t-test are given in Table - 5 to determine whether there is a significant difference between the mean scores of the pre test and post test of the experiment and the control groups.

To determine whether the mean score of pre and post tests applied to the experiment and control groups are meaningfully different or not, the results of t-test are given in Table -5 .

Group	Test	N	\bar{X}	S.S.	S.D.	t	P
Pretest	EG	14	10,21	1,8	26	0	1.000
	CG	14	10,21	2,48			
Posttest	EG	14	20,42	6,07	26	0,520	.608
	CG	14	19,35	4,74			

According to the data in the table, as the mean scores of both groups are the same, there is not a significant difference between the mean scores of the pretest of the groups. [t (26) = 0 ; p> 0,5]

The mean score of the post test of the experiment group is 20,42 (+/- 6,07), but the mean score of the post test of the control group is 19,35 (+/- 4,74). According to this data, the difference between the mean of post test scores of the control group and the experiment group is not meaningful statistically. It also shows that the results of the post test of the two groups are not different from each other.

RESULTS

At the end of this study a significant difference was not determined between the effect of lab based learning on student success and the effect of computer (simulation) based learning. Thus, as a result of research for the student’s academic success it can be said that computer (simulation) based physics learning is as effective as lab based physics learning.

Depending on the results of this research, the following offers can be made:

- In a research performed in our country, science teachers stated that due to inadequacy of the labs at schools, large classes etc., they could not make effective use of them (Uluçınar et.al, 2004). So, in cases where lab activities can not be performed for various reasons (inadequate materials, limited time, large classes and the difficulty to control the students), using simulation software of physics subject with necessary design and educational qualities in teaching environments will help students learn the topics in physics much better.

- The physics software simulations having the necessary qualities about electrical circuits offer an opportunity for the students to study at a virtual environment and increase the academic successes of the students as if they studied at a real lab environment.

DISCUSSION

Depending on the applications conducted during this study, the hardships met, evaluations made and the results obtained, the other determinations reached by the researchers are as follows:

- The lab possibilities in our schools aren't good enough to make experimental studies individually. So, the number of materials at physics labs in schools should be increased.
- Like this study about comparing the influence on the students' success between the computer based learning and lab based learning on the subject of electrical circuits, there is the need for doing researches like this one on the other topics of physics.
- In this study only the influence on the student's success of computer and lab based learning was examined. Besides, there is the need for doing researches to compare the students' attitudes and developments in scientific process abilities.
- Nowadays, the schools in our country have begun to use the computer based learning method and a specific level is reached on this subject. But still there are so many schools without computer labs. These schools should be determined immediately and computer labs should be installed in them.
- The number of comprehensive Turkish software in compliance with the teaching principles or even the number of software to be used in computer based physics teaching is so low. Software firms should pay attention to this important subject. The lesson software prepared abroad can be used in our country after being translated. Or Turkish Physics lesson software can be prepared in such a way that it does not give the knowledge directly but is appropriate for the teaching principles, and includes educational properties, which tend the students to do research and discover.
- For the success of computer based learning applications in Physics lessons, in the educational programs of teacher training faculties and in-service training courses arranged for teachers, some changes can be made so as to gain the ability to use the computer actively, to determine the required lesson software, to choose the optimum one according to the changing conditions among the alternative programs and use them and to have the ability to prepare computer based materials (presentation, animation and simulation) on a specific topic in parallel with the determined objectives, where necessary.

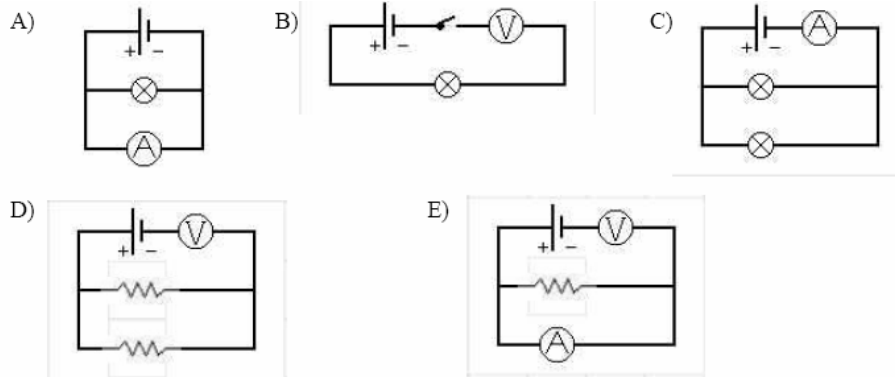
REFERENCES

- Algan, Ş. (1999). *The influence of the Computer Based Physics Teaching on the success of the student and Modern Mathematics and Science Programs applied in Turkey in the years between 1962 and 1985*. Ankara: Gazi University, Institute of Science (Unpublished Master Thesis).
- Bağcı, N. & Şimşek, S. (1999). The influence of different teaching methods in teaching physics subjects on student's success, *The Journal of Gazi Education Faculty*. 19 (3), 79-88.
- Bekar, S. (1996). *The influence of Lab Based Science Teaching on student's success*. Ankara. Gazi University, Institute of Science (Unpublished Master Thesis).
- Bennett, R. (1986). *The Effect of Computer Assisted Instruction and Reinforcement Schedules on Physics Achievement and Attitudes Toward Physics of High School Students*. *Dissertation Abstracts International*, 46(2), 3670A.
- Bryant, R. J. & Edmunt, A. M. (1987). They Like Lab-Centered Science. *The Science Teacher*, 54(8), 42-45.

- Choi, B. & Gennaro, E. (1987). The Effectiveness of Using Computer Simulated Experiments on Junior High Students' Understanding of The Volume Displacement Concept. *Journal of Research in Science Teaching*, 24, 539-552.
- Collette, A.T. & Collette, E.L. (1989). *Science introduction in the middle and secondary schools* (2nd end.). Ohio, USA: Merrill Publishing Company.
- Freedman, M. P. (1997). Relationship Among Laboratory Instruction, Attitude Toward Science, and Achievement in Science Knowledge. *Journal of Research in Science Teaching*, 34(4), 343-357.
- Gülçiçek Ç. & Güneş, B. (2004). Materializing the concepts during Science Instruction: Modeling Strategy, Computer Simulations and Analogies. *Science and Education*, 29(134), 36-48
- Ibiş, M. (1999). *The influence of Computer assisted Science Instruction on the success of the students*. Ankara: Gazi University, Institute of Educational Sciences (Unpublished Master Thesis)
- Jimoyiannis, A. & Komis, V. (2001). Computer Simulations in Physics Teaching and Learning: A Case Study on Students' Understanding of Trajectory Motion. *Computers & Education*, 36, 183-204.
- Karamustafaoğlu, O., Aydın, M. & Özmen, H. (2005). The influence of the Physics activities supported with computer to the learning of students : An example of Simple Harmonic Activity. *The Turkish Online Journal of Educational Technology – TOJET* October 2005 ISSN: 1303-6521 volume 4 Issue 4 Article 10
- Mccoy, L. P. (1991). The Effect of Geometry Tool Software on High School Geometry Achievement. *Journal of Computers in Mathematics and Science Teaching*, 10, 51-57.
- Meyveci, N. (1997). *The influence of Science instruction supported with computer to the success of the students and to the attitude of the students against computer*. Ankara. Ankara University Social Science Institute (Unpublished Master Thesis)
- Miller, D. G. (1986). The Integration of Computer Simulation into The Community College General Biology Laboratory. *Dissertation Abstract International*, 47(6), 2106-A.
- Redish, F. E., Jeffery S. M., and Steinberg R. N. (1997). *On the Effectiveness of Active Engagement Microcomputer based laboratories*. Department of Physics. University of Maryland College Park, MD20742
- Reed, B. B. (1986). The Effects of Computer Assisted Instruction on Achievement and Attitudes of Underachievers in High School Biology. *Dissertation Abstracts International*, 47(4), 1270-A.
- Riche, R. D. (2000). Strategies for Assisting Students Overcome Their Misconceptions in High School Physics. *Memorial University of Newfoundland Education* 6390.
- Özçinar, Z. (1995). *Evaluating the laboratory activities during Science Instructions at primary schools*. Ankara: Ankara University Social Science Institute (Unpublished Master Thesis)
- Soylu, H., & Ibiş, M. (1999). Science Education supported with Computer, 3rd Science Education Symposium. The Ministry of Education. ÖYGM.
- Svec, M., T., & Anderson, H., (1995). Effect of Microcomputer-Based Laboratory on Students Graphing Interpretation Skills and Conceptual Understanding of Motion. *Dissertation Abstracts International*, 55(8), 2338-A.
- Şen A. İ. (2001) “New Approaches in Science Instruction supported with Computer” *Journal of Gazi Education Faculty*, v:21, No. 3
- Şengel, E., Özden, M. Y. & Geban, Ö. (2002). The Influence of the simulated experiments supported with computer on high school students comprehending the Replacement and Velocity concepts. *V. National Science and Mathematics Education Symposium*. Ankara: ODTÜ.
- Tamir, P. (1978) “An Analysis of Laboratory Activities in Two Modern Science Curricula; Profect Physics and PSSC.” Paper Presented at the National Association for Research in Science Teaching Annual Meeting in Toronto, Ontario.
- Uluçinar, Ş., Cansaran, A. & Karaca, A. (2004) “Evaluating the applications of Science Laboratory” *Türk Eğitim Bilimleri Dergisi* v:2, No. 4.
- Yavru, Ö. (1998). The influence of the laboratory experiments on the success of the 4th and 5th graders of the primary schools about the subject of Mechanics and on internalizing these concepts. Istanbul: Marmara Universty, Institute of Educational Sciences (Unpublished Master Thesis).
- Yiğit, N. & Akdeniz, A. R. (2000). Developing the Materials during Physics instructions supported with computer; students' working papers. *IV. National Science Symposium, Hacettepe Education Faculty*. Ankara: 711-716.

*** Some sample questions from ECST**

Q.3. Which of the followings are the circuit components connected as true?



Q.4. Which of the followings that are written about electric current is wrong?

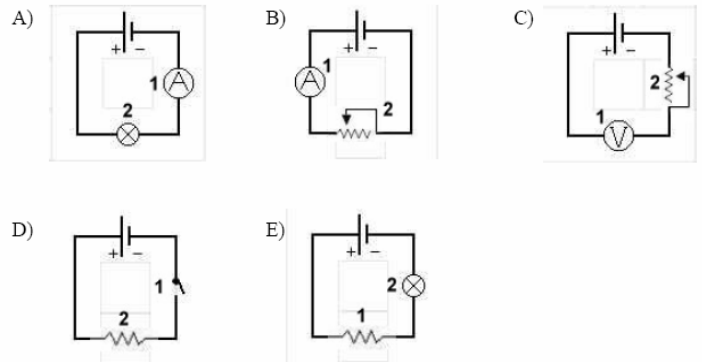
- A) All the conductors show a specific resistance to electric current.
- B) The current running on a conductor decreases as the resistance of the conductor increases.
- C) The current running on a conductor is direct proportional to the potential difference between the two points of the conductor.
- D) In an electrical circuit the current entering the resistance is greater than the one going out of it.
- E) In an Electrical circuit the direction of the electrical current is from positive pole to negative pole.

Q.8. 1. Circuit component: It measures the current which circulates in the circuit.

2. Circuit component: It changes the current which circulates in the circuit..

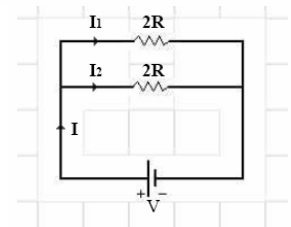
The duties of the two circuit components used in the electrical circuit are explained above.

According to this, in which of the following circuits these circuit components are shown correctly?



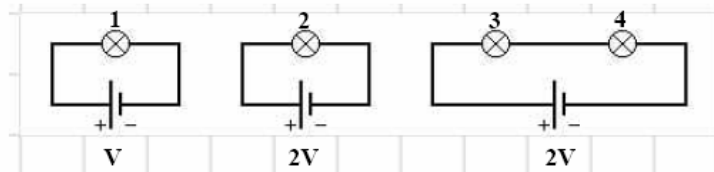
Q26 : Relating to the electrical circuit on the right side, which of the followings are wrong?

- A) $I = I_1 + I_2$
- B) $R_{eq} = 4R$
- C) The potential difference between the two points is V .
- D) The current at the main arm is equal to V/R
- E) The current I_2 is equal to $V/2R$.



Q31 : The lamps in the circuits shown in the each figure are identical. According to this, what is the relationship between the brightness of the lamps?

- A) $1=2=3=4$ B) $1<2<3=4$ C) $1>2>3=4$ D) $2<1=3=4$ E) $1=3=4<2$



TURKISH PARENTS' VIEWS ON QUALITY STANDARDS FOR CHILDREN'S TELEVISION PROGRAMMES

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ABSTRACT

The main purpose of this study was to evaluate the opinions of parents of pre-school children about children's programmes on TV. The study had two phases: In the first step "The Evaluation Scale for Children's Programmes" was translated into Turkish, the reliability and validity of the scale was tested through analyzing of the data collected from parents of preschool children.

The Cronbach Alpha coefficient of the whole scale was: $\alpha=0,95$; $p<0,001$. Thus it was concluded that the Turkish version of the scale had sufficient internal reliability. Test-retest reliability of the scale was found to be high ($r=0,99$; $p<0,0001$). Content validity of the scale was calculated by relating each item to other items in the relevant subscale and the correlation coefficients were found statistically significant as changing between .01 and .05.

In the second step of the study; 189 parents were asked to evaluate the Turkish TV programmes for children on the basis of 9 quality criteria (credibility, comprehensibility, entertainment, aesthetic quality, involvement, presence of role models, innocuousness, restfulness, thought provocation) of the scale. The variables of educational level of parents, the gender and age of children, socio-economic-status of the families were assessed in relation to parents' opinions about the quality of TV programmes for children. The data were analyzed by ANOVA'S.

The results indicated that, the educational level of the mother and the gender of the child were found to be related to the "thought provocation" criteria evaluated by parents. In addition, the age of children was related to the quality criteria of "entertainment" and "involvement". The results were discussed in terms of the suitability and the importance of quality criteria for TV programmes produced for children. Besides, the opinions of parents on those criteria were also discussed.

ÖZET

Bu çalışmanın genel amacı, Televizyon'daki Çocuk Programlarını Değerlendirme Ölçeğinin Türkçeye uyarlanması ve farklı demografik niteliklere sahip anne-babalara uygulanarak, anne-babaların çocuk programları hakkındaki görüşlerinin değerlendirilmesidir. Çalışma iki aşamada gerçekleştirilmiştir. İlk aşamada ölçek Türkçeleştirilmiş, güvenilirliği ve geçerliği çeşitli çalışma gruplarından toplanan verilere dayanılarak kanıtlanmıştır. İç tutarlılık (Cronbach alfa=0,95; $p<0,001$); test tekrar test güvenilirliği ($r=0,99$; $p<0,0001$) hesaplanmış ve yeterli bulunmuştur. Kapsam geçerliği, her maddenin diğer maddelerle ilişkileri için .01 ve .05 düzeyleri arasında değişen değerlerde anlamlı bulunmuştur.

Araştırmanın ikinci aşamasında; 189 anne-babadan, Türkiye'de yayımlanan TV programlarını, Çocuk Programlarını Değerlendirme Ölçeğini kullanarak değerlendirmeleri istenmiştir. Araştırmaya katılan anne-babalar 9 alt boyut yani kalite kriteri (zararsız bulma, rahatlatıcı bulma, model olma, güvenilir bulma, gerekli bulma, estetik bulma, eğlendirici bulma, düşünce uyarımı, anlaşılır bulma) temelinde TV çocuk programlarını değerlendirmişlerdir.

Anne-baba Eğitim düzeyi, ailenin SED'i, çocuğun yaşı, çocuğun cinsiyeti değişkenlerinin çocuk programlarını değerlendirme üzerindeki etkileri incelenmiştir. Toplanan veriler çok boyutlu varyans analizi tekniği uygulanarak değerlendirilmiştir. Araştırmanın bulgularına göre; Anne eğitim düzeyi ve çocuğun cinsiyeti değişkenlerinin "düşünce uyarımı" kriteri üzerinde etkili olduğu belirlenmiştir. Ayrıca "çocuğun yaşı" değişkeni, "eğlendirici bulma" ve "gerekli bulma" kriterleri ile ilişkili bulunmuştur. Bulgular, TV'deki çocuk programlarının hazırlanmasında kalite kriterlerinin uygunluğu, önemi açısından anne-babaların kalite kriterleri hakkındaki düşünceleri ve bilgileri temelinde tartışılmıştır.

INTRODUCTION

When television entered mainstream society in the 1940's, its most conspicuous effect was to bring families and friends together for an evening of entertainment. However, as television viewing became more prevalent, so did speculation regarding its other, less beneficial, effects (Clarke; Kurtz-Costes; 1997).

John Dewey who was the great educator innovator once said, "The environment teaches." He meant by that simple statement that what surrounds the child also teaches the child. In today's world, television is one of the most important effects that surround children. So, it may be said that television becomes the first teacher of the child.

"When a baby was born, it does not only communicate with its family but also communicates with TV"(Yeşiltuna,1999). The development psychologists state that; the children are taking an interest in the sound effects of radio and active images on television and hard watching effect appears as soon as the ages of preoperational stage comes (Özgen; Özgün,1985). For instance, according to a research, which involved 6614 parents in Turkey; the children were watching TV for about 3 hours and 42 minutes per day. Especially; most of the "0" to "6" years-old children were watching TV daily (Özdiker, 2002).

The effects of television watching on children have been studied and discussed since many years and it was concluded that there are both positive and negative aspects related to those effects. Although various researches indicated that television watching had some positive influences on children (Evra, 1998; Koutsouvanov, 1993; Groot, 1994; Steiner, 1999), there are also some other researches that point out the negative effects (Batur, 1998; Buckingham, 1993; Cullingford, 1984; Greenberg, 1976; Gunter VeMcleer, 1990; Singer, 1980). On the positive side of the ledger, research does indicate that well-designed educational programs, such as *Sesame Street*, can help 4- and 5-year-olds read and count and that children that age also benefit from pro-social messages on TV that teach them about kindness and sharing. *Sesame Street* was also found to be a very motivating educational program (Bayram, 1991). On the other hand, studies have also indicated that exposure to television violence can increase the risk of children's behaving aggressively and that media use in early childhood may be related to attentional problems later in life. And while the producers of early childhood media believe their products can help children learn even at the earliest ages, other experts worry that time spent with media may detract from time children spend interacting with their parents, engaging in physical activity, using their imaginations, or exploring the world around them (Rideout & Hamel, 2006). In a longitudinal study (Anderson, Huston, Schmitt, Linebarger, and Wright's, 2001) it was found that Preschoolers who viewed educational TV programs had higher grades and read more books in high school. Another result of the study was also interesting: Among girls, viewing violent programs in preschool was associated with lower high school grades.

Since watching television is so widespread and its influences on children both in positive and negative directions are so controversial, it seems meaningful to evaluate the TV programmes for children in relation to some quality criteria. Peter Nikken and his colleagues identified nine quality criteria in evaluating children's television programmes. These are; comprehensibility: to understand the main messages in the program easily, credibility: to decide if the program has a significant value; entertainment: to find the program joyful; aesthetic quality: to evaluate the program as artistically well designed; involvement: programme's getting attention of the children easily; presence of role models: to find positive role models for children in the programme, innocuousness: to find the programme not harmful for children, restfulness: to find the programme making children relaxed and thought provocation: to evaluate the programme to stimulate creative thinking of children (Nikken, 1997).

The idea of evaluating children's programmes on TV on the basis of some quality criteria, stems from some critics about public television. According to those critics, public television promised to educate the nation through formal instruction and enrichment programming emphasizing culture, arts, science, and public affairs. In addition, it would provide programming for "underserved" audiences (those ignored by commercial broadcasters) such as minorities and children. Ultimately, public television promised to be the democratization of the medium. Sadly, however, these public service imperatives could never flourish as originally intended in a historically commercial system (Zechowski, 2006).

Educational television (ETV) as an important part of public television provides programming, which emphasizes formal instruction for children and adults. Literacy, mathematics, science, geography, first and second (foreign) language and high school equivalency are a few examples of ETV's many offerings. The most successful ETV initiatives in the United States are public television's children's programs. Staples such as *Sesame Street*, *3-2-1 Contact*, *Mister Rogers Neighborhood* and *The Reading Rainbow* teach children academic fundamentals as well as social skills (Zechowski, 2006).

Peter Nikken (1997), one of the leading researcher's in this area had developed a scale for quality criteria for children programmes on TV. It would be interesting to evaluate these criteria in terms of Turkish parents opinions since there is not a research dealing with quality criteria of TV programmes' for children in Turkey. Thus the main purpose of the current study was to standardize Peter Nikken's scale into Turkish and also it was addressed on the parents' views about quality standards for children's television programmes in Turkey.

METHOD

Research Model

"Survey Model" was employed in this research by using the questionnaire, which had been developed in Netherlands. That questionnaire which was standardized into Turkish evaluates children's programmes in terms of parents' opinions according to so called nine quality criteria.

In the first step of the standardization study the questionnaire was translated into Turkish. Reliability and validity analyzes were carried out. For internal reliability; the technique of "Cronbach-Alfa", "Item-total Correlation", "item-total remainder" techniques were used. Test-retest reliability of the scale was also calculated through independent applications of the scale with two weeks interval. "Face validity" was tested through evaluations of the scale by independent experts in the field and "content validity" of the scale was analyzed through calculations of correlations between the items of each subscale.

Sample of Reliability and Validity Study

The sample was randomly chosen from the schools, which were listed in a catalogue issued by the Istanbul National Education Directorate. Those schools represented two main regions of Istanbul, namely Anatolian and European. The sample consisted of 500 parents, who had 3 to 6 years-old preschool children attending kindergartens in Istanbul. The parents were chosen from lower-middle and higher socio-economic statuses on the basis of the amount of tuition-fees they paid for the kindergarten.

Survey Sample

The sample was randomly chosen from the schools located on both Anatolian and European regions of Istanbul. They were listed in a catalogue issued by the Istanbul National Education Directorate. Data were collected, between 2002 and 2003, from 19 preschool education institutes. The sample consisted of 195 parents of 3 to 6 year-olds who were from lower, middle, and higher income levels and also different educational backgrounds. Income levels of parents were identified by the amount of tuition-fees they paid for the kindergarten.

The scale

"The Evaluation Scale for Children's Programmes" which was developed by Nikken at all's (1997) was standardized into Turkish. "The questionnaire of Children's Television Programmes" consists of nine quality criteria for evaluating TV programmes produced for children. The nine quality criteria which were represented in the questionnaire are as follows: Credibility, comprehensibility, entertainment, aesthetic quality, involvement, presence of role models, innocuousness, restfulness, thought provocation.

A five-point scale was used in the questionnaire like in the original scale. The scale ranged from "strongly disagree (1)" to "strongly agree (5)". Thus the possible lowest score which can be available from the scale is "52", the highest score which can be taken from the scale is "260". As the score will be higher so the parents' positive evaluation will be higher, too. The parents filled out the questionnaire according to how they felt about each item (statement). The forms of questionnaire were presented to the parents by the help of the directors of the contributing pre-school institutions.

RESULTS

Psychometric properties of the Turkish version of the questionnaire were tested and it was found that it had satisfactory properties such as a high internal reliability ($\alpha=.95$; $p<0,001$) and test-retest reliability ($r=.99$; $p<0,0001$). Means and standard deviations for all the items of the questionnaire were presented in Table 1 below.

Table 1. Means and standard deviations for all the items of the questionnaire

Item	mean	s. e	s. d
1	3,0620	4,834E-02	1,0810
2	2,8800	5,338E-02	1,1935
3	2,7760	4,560E-02	1,0198
4	3,8060	4,295E-02	,9603
5	3,1720	4,917E-02	1,0995
6	3,6220	4,616E-02	1,0321
7	2,8260	4,529E-02	1,0128
8	3,0020	4,605E-02	1,0296
9	3,0480	4,525E-02	1,0118
10	3,5520	4,502E-02	1,0066
11	3,8120	3,965E-02	,8867
12	3,7740	4,011E-02	,8970
13	3,4440	4,893E-02	1,0942
14	2,2780	4,970E-02	1,1114
15	2,3900	4,552E-02	1,0178
16	2,8280	4,623E-02	1,0337
17	3,0280	4,719E-02	1,0552
18	3,2180	4,802E-02	1,0737
19	2,8160	4,481E-02	1,0021
20	3,4460	4,329E-02	,9680
21	2,6060	4,438E-02	,9923
22	3,8800	3,886E-02	,8690
23	3,4060	4,183E-02	,9354
24	3,0600	4,636E-02	1,0366
25	3,7220	7,379E-02	1,6499
26	3,1060	4,606E-02	1,0300
27	3,0960	4,693E-02	1,0493
28	2,9060	4,898E-02	1,0952
29	3,1460	4,305E-02	,9626
30	3,2900	4,345E-02	,9715
31	3,3720	4,372E-02	,9775
32	2,9160	4,425E-02	,9894
33	3,1040	4,425E-02	,9895
34	3,7240	3,871E-02	,8656
35	2,6200	4,013E-02	,8973
36	2,6660	5,077E-02	1,1354
37	3,8040	3,907E-02	,8736
38	3,1220	4,384E-02	,9803
39	2,7220	4,523E-02	1,0113
40	3,4540	4,547E-02	1,0168
41	3,9920	3,513E-02	,7856
42	2,9140	4,785E-02	1,0700
43	3,0440	4,508E-02	1,0080
44	3,3880	4,707E-02	1,0525
45	3,1120	4,634E-02	1,0361
46	3,0220	5,076E-02	1,1349
47	3,6700	3,812E-02	,8524

48	3,4140	4,215E-02	,9425
49	2,8620	4,254E-02	,9512
50	3,2500	4,677E-02	1,0458
51	3,1460	4,815E-02	1,0766
52	3,3360	4,310E-02	,9638

In the following table (Table 2) the results of “item-total correlations” and the “reliability coefficients if item deleted” related to the scale were presented:

Table 2. Results of “Item-Total Correlations” and “Reliability Coefficients if Item deleted”

Corrected items	Squared Multiple Correlation	Alpha if item deleted
1	0,5608	0,9484
2	0,5230	0,9486
3	0,4618	0,9489
4	0,4071	0,9492
5	0,5527	0,9485
6	0,5214	0,9486
7	0,6339	0,9481
8	0,2110	0,9502
9	0,5348	0,9486
10	0,6378	0,9480
11	0,5283	0,9486
12	0,4602	0,9489
13	0,2436	0,9502
14	0,5369	0,9486
15	0,5173	0,9487
16	0,6476	0,9480
17	0,6494	0,9479
18	0,6586	0,9479
19	0,5075	0,9487
20	0,5231	0,9486
21	0,0608	0,9509
22	0,1254	0,9504
23	0,5703	0,9484
24	0,3926	0,9493
25	0,2056	0,9517
26	0,6737	0,9478
27	0,5330	0,9486
28	0,5908	0,9483
29	0,6909	0,9478
30	0,3434	0,9495
31	0,6411	0,9480
32	0,6832	0,9478
33	0,3270	0,9496
34	0,6128	0,9483
35	0,4359	0,9491
36	0,5504	0,9485
37	0,4884	0,9488
38	0,3720	0,9494
39	0,6289	0,9481
40	0,5831	0,9483
41	0,3867	0,9493
42	0,5422	0,9485
43	0,5403	0,9485
44	0,5254	0,9486

45	0,5819	0,9483
46	0,5938	0,9482
47	0,4963	0,9488
48	0,5578	0,9485
49	0,6111	0,9482
50	0,6779	0,9478
51	0,5932	0,9482
52	0,4906	0,9488

Internal reliability coefficients (Cronbach Alpha) related to the subscales of Turkish And Deutsch versions of the scale were presented below in Table 3

Table 3. Internal Reliability Coefficients of Turkish and Deutsch Versions of the subscales of the scale

Subscales	Turkish	Netherlands
Comprehensibility	0.86	0.84
Credibility	0.71	0.86
Entertainment	0.76	0.79
Aesthetic quality	0.75	0.80
Involvement	0.70	0.71
Presence of role models	0.55	0.91
Innocuousness	0.68	0.66
Restfulness	0.70	0.67
Thought provocation	0.75	0.64

Test-re test reliability coefficient of the scale was presented below in Table 4

Table 4. Test retest reliability coefficient

	mean	ss	t	r	N
1.uygulama	3,3734	,5136	1,461	,995**	36
2.uygulama	3,1977	,5064			

** .0001 signification level

Validity

Face validity of the questionnaire had been evaluated by five independent TV producers and two experts from the faculty of mass media and communication. They evaluated each items' appropriateness to its subscale. All producers and experts agreed upon appropriateness of each item to its relevant subscale.

The correlation between items under the same subscale (criterion) had also been calculated in order to evaluate "content validity" of the scale. The analysis revealed that correlation between each item under the same subscale was acceptable with significance levels of 0,01 or 0,05. Unfortunately, the "criteria validity" could not be tested due to the lack of a similar scale in Turkish.

Demographic Variables

The parents were asked to indicate their educational background (level), their children's sex and age and also the money that they spend for their children's education. The participant mothers and fathers are evenly distributed according to their educational levels, to their income levels and also to their children's gender.

RESULTS

After the scale was standardized into Turkish, the Turkish version administered parents of pre-school children who were from different income and educational classes in order to evaluate the children’s TV programmes.

One of our research questions was if there was any significant differences in the criterion of “thought provocation” related to mother’s education level, social class and gender of the children. A three-ways ANOVA was carried out in analyzing related data. The analysis related to “thought provocation” criterion depending on mother’s education level, socio-economic status and gender of the children are given on Table 5-6.

Table 5. The mean scores and standard deviations for the criterion of “thought provocation”

Mother’s education	Socio-economic status	Gender	mean	sd
Lower	Lower	Girl	21.0	.
		Boy	25.0	1.41
		Total	23.6	2.51
	Middle	Girl	24.7	5.42
		Boy	23.6	3.51
		Total	24.5	5.01
	Higher	Girl	23.1	3.06
		Boy	24.1	4.15
		Total	23.8	3.83
	Total	Girl	23.8	4.33
		Boy	24.1	3.91
		Total	24.0	4.07
Middle	Lower	Girl	26.2	3.30
		Boy	23.0	3.49
		Total	24.0	3.68
	Middle	Girl	25.4	4.27
		Boy	23.1	4.32
		Total	24.7	4.34
	Higher	Girl	23.2	2.84
		Boy	21.3	6.47
		Total	22.7	4.16
	Total	Girl	24.8	3.75
		Boy	22.7	4.28
		Total	23.9	4.10
Higher	Lower	Girl	24.8	2.20
		Boy	25.0	3.83
		Total	24.9	3.32
	Middle	Girl	23.9	2.84
		Boy	24.6	3.13
		Total	24.2	2.92
	Higher	Girl	26.3	3.14
		Boy	26.3	3.14
		Total	26.3	3.14
	Total	Girl	24.7	2.72
		Boy	24.9	3.59
		Total	24.8	3.18
Total	Lower	Girl	25.1	2.77
		Boy	24.2	3.69
		Total	24.5	3.42
	Middle	Girl	24.8	4.24

		Boy	23.9	3.56
		Total	24.5	4.02
	High	Girl	23.8	3.13
		Boy	23.6	4.68
		Total	23.7	3.95
	Total	Girl	24.5	3.62
		Boy	23.9	3.99
		Total	24.2	3.81

Table 6. “Thought Provocation” Related to the Variables of Mother’s Education, Child’s Gender and socio-economic status

	Sum of squares	Df	Mean Square	F	p
Mot.Edu(A)	43.5	2	21.75	1.49	-
Social Class(B)	1.72	2	0.86	0.06	-
Gender(C)	1.97	1	1.97	0.14	-
M.E x s.C(A)X(B)	69.43	4	17.36	1.19	-
M.E x gen.(A)X(C)	94.47	2	47.23	3.24	*<0.041
S.C x Gen.(B)X(C)	6.82	2	3.41	0.23	-
M.Exs.Cxg.(A)X(B)X(C)	16.17	3	5.4	0.37	-

*significant at p<0.041

As it is seen on Table 6; mother’s education, socio-economic statue and gender of the children are not significant for the criterion of thought provocation. However; mother’s education and gender are significant for this criterion. High educational level mothers who have a male child found TV programmes as having more thought provocation than mother’s with middle educational level.

Another question of the study was if there were any significant differences in the criterion of “innocuousness” related to father’s education level, child’s age and gender of the child. A three-ways ANOVA was carried out in analyzing related data. The analysis related to “innocuousness” criterion depending on father’s education, child age and gender was given on Table 7-8.

Table 7. The mean scores and standard deviations for the criterion of “innocuousness”

Father’s education	gender	age	mean	sd
lower	Girl	3.00	18.00	2.00
		4.00	17.80	3.70
		5.00	19.72	5.21
		6.00	16.50	4.20
		Total	18.39	4.28
	Boy	3.00	20.00	7.07
		4.00	19.33	3.78
		5.00	20.45	3.83
		6.00	14.30	4.60
		Total	17.55	5.11
Total	Girl	3.00	18.80	3.96
		4.00	18.15	3.62
		5.00	20.09	4.48
		6.00	14.82	4.48
		Total	17.96	4.69
	Boy	3.00	16.50	2.12
		4.00	17.00	3.19
		5.00	18.26	3.69
		6.00	20.16	1.94
		Total	17.96	4.69

		Total	18.07	3.35
	Boy	3.00	12.50	2.51
		4.00	18.71	4.34
		5.00	19.00	2.75
		6.00	16.00	1.41
		Total	17.21	4.07
	Total	3.00	13.83	2.99
		4.00	17.63	3.63
		5.00	18.44	3.45
		6.00	19.12	2.58
		Total	17.79	3.59
Higher	Girl	3.00	16.16	4.60
		4.00	15.50	1.77
		5.00	15.75	2.50
		6.00	21.33	3.05
		Total	16.48	3.79
	Boy	3.00	16.53	5.30
		4.00	15.64	3.58
		5.00	19.44	4.92
		6.00	17.77	4.02
		Total	17.06	4.59
	Total	3.00	16.37	4.91
		4.00	15.59	3.00
		5.00	18.30	4.57
		6.00	18.66	4.00
		Total	16.85	4.30
Total	Girl	3.00	16.52	3.98
		4.00	16.86	3.11
		5.00	18.44	4.20
		6.00	19.30	3.40
		Total	17.71	3.81
	Boy	3.00	16.09	5.23
		4.00	17.00	4.02
		5.00	19.76	3.94
		6.00	15.75	4.42
		Total	17.24	4.62
	Total	3.00	16.28	4.66
		4.00	16.92	3.51
		5.00	19.01	4.11
		6.00	17.00	4.39
		Total	17.47	4.23

Table 8. “Innocuousness” Related to the Variables of Father’s Education, Child’s Age and Gender

	Sum of squares	Df	Mean Square	F	P
Fat.Edu(D)	25.58	2	12.79	0.79	-
Gender(C)	1.88	1	1.88	0.12	-
Child Age(E)	83.38	3	27.79	1.72	-
F.E(D)Xgender(C)	19.40	2	9.70	0.60	-
F.Exage.(D)X(E)	243.13	6	40.52	2.51	*0.024
Agex Gen.(E)X(C)	116.01	3	38.67	2.39	-
F.Exagexg.(D)X(E)X(C)	51.9	6	8.65	0.53	-

*significant with $p < 0.024$

As it is seen on Table 8; father’s education, child’s age and gender are not significant. However; father’s education and child’s age are significant at the “innocuousness” criterion. ($F=2.506$; $p<0.024$)

The variables of; child’s age and father’s education were evaluated; it was seen that the lower educational level father’s who have “5” years-old children find TV programmes for children less innocuous than the lower educational father’s who have “6” years-old children. In this occasion, parent’s who had “6” years-old children might have thought that their children could do beneficial activities rather than TV viewing.

The educational level of father’s who have “6” years-old children was evaluated in the same criterion, and it was calculated that; the father’s who were with middle or high educational levels perceived TV programmes for children less innocuous than the father’s with lower educational level.

Another question of the study was if there were any significant differences in the criterion of “involvement” related to father’s education level, child’s age and gender of the child. A three-ways ANOVA was carried out in analyzing related data. The analysis related to “involvement” criterion depending on father’s education, child age and gender was given on Table 9-10.

Table 9. The mean scores and standard deviations for the criterion of “involvement”

Gender	Father’s Education	Age	Mean	sd
Girl	Lower	3.00	26.3333	4.5092
		4.00	29.3000	3.2335
		5.00	30.0909	5.7001
		6.00	24.5000	2.6458
		Total	28.6071	4.6852
	Middle	3.00	27.0000	4.2426
		4.00	25.8333	5.9671
		5.00	30.3158	4.9335
		6.00	25.3333	4.5461
		Total	28.0000	5.5108
	Higher	3.00	28.5833	2.9987
		4.00	30.8750	3.1368
		5.00	33.5000	2.3805
		6.00	28.3333	4.9329
		Total	29.9630	3.5135
Boy	Total	3.00	28.0000	3.2787
		4.00	28.3333	4.8802
		5.00	30.6176	4.9788
		6.00	25.7692	4.0856
		Total	28.7447	4.7856
	Lower	3.00	28.0000	2.8284
		4.00	28.3333	3.5119
		5.00	28.9091	4.3693
		6.00	25.5385	6.1592
		Total	27.2759	5.1817
	Middle	3.00	27.0000	4.1633
		4.00	31.1429	4.2201
		5.00	29.6667	3.4448
		6.00	28.0000	2.8284
		Total	29.4737	3.9068
Higher	3.00	30.1333	4.1381	
	4.00	27.6429	3.2011	
	5.00	27.7778	4.9694	
	6.00	26.8889	5.6667	
	Total			

		Total	28.3191	4.4336
	Total	3.00	29.3333	4.0906
		4.00	28.7500	3.7446
		5.00	28.6923	4.2967
		6.00	26.2500	5.6588
		Total	28.2316	4.5975
Total	Lower	3.00	27.0000	3.6056
		4.00	29.0769	3.1744
		5.00	29.5000	4.9929
		6.00	25.2941	5.4745
		Total	27.9298	4.9456
	Middle	3.00	27.0000	3.7417
		4.00	27.7895	5.8839
		5.00	30.1600	4.5614
		6.00	26.0000	4.1748
		Total	28.4828	5.0549
	Higher	3.00	29.4444	3.6934
		4.00	28.8182	3.4865
		5.00	29.5385	5.0434
		6.00	27.2500	5.3108
		Total	28.9189	4.1735
	Total	3.00	28.7368	3.7610
		4.00	28.5185	4.3772
		5.00	29.7833	4.7553
		6.00	26.0811	5.1065
		Total	28.4868	4.6866

Table 10. “Involvement” Related to the Variables of Father’s Education, Child’s Age and Gender

	Sum of squares	Df	Mean Square	F	P
Fat.Edu(D)	0.194	1	0.194	0.009	-
Child Age(E)	230.11	3	76.704	3.725	*0.013
Gender(C)	63.03	2	31.51	1.53	-
F.E(D)Xgender(C)	78.65	3	26.22	1.27	-
F.Exage.(D)X(E)	90.99	2	45.49	2.21	-
Agex Gen.(E)X(C)	25.53	6	4.25	0.21	-
F.Exagexg.(D)X(E)X(C)	98.43	6	16.40	0.8	-

*significant with $p < 0.013$

As it is seen on Table 10; the age of children was significant at the criterion of “involvement”. However, father’s education level and gender are not significant at the criterion of “involvement”. ($F=3.725$; $p < 0.013$)

Moreover; at the criterion of involvement; the parents who have “3” years-old children found TV programmes less involving than the parents who have 6 years-old children. Also parents who have 5 years-old children found TV programmes more involving than the parents who have 6 years-old children.

Another question of the study was if there were any significant differences in the criterion of “entertainment” related to father’s education level, child’s age and gender of the child. A three-ways ANOVA was carried out in analyzing related data. The analysis related to “entertainment” criterion depending on father’s education, child age and gender was given on Table 11-12.

Table 11. The mean scores and standard deviations for the criterion of “entertainment”

Father's education	Gender	Age	Mean	sd
lower	Girl	3.00	16.00	3.46
		4.00	19.00	2.94
		5.00	18.81	3.02
		6.00	13.75	5.05
		Total	17.85	3.70
	boy	3.00	20.50	2.12
		4.00	19.33	1.52
		5.00	18.36	3.04
		6.00	16.38	4.07
		Total	17.72	3.54
	Total	3.00	17.80	3.63
		4.00	19.07	2.62
		5.00	18.59	2.97
		6.00	15.76	4.30
		Total	17.78	3.59
Middle	Girl	3.00	20.50	3.53
		4.00	17.25	3.22
		5.00	19.26	2.76
		6.00	17.00	2.96
		Total	18.35	3.07
	Boy	3.00	18.00	1.41
		4.00	20.14	3.02
		5.00	18.50	2.81
		6.00	18.00	1.41
		Total	18.94	2.57
	Total	3.00	18.83	2.31
		4.00	18.31	3.38
		5.00	19.08	2.73
		6.00	17.25	2.60
		Total	18.55	2.90
Higher	Girl	3.00	17.00	2.41
		4.00	18.50	2.87
		5.00	20.25	2.21
		6.00	17.00	1.00
		Total	17.92	2.60
	Boy	3.00	17.53	1.99
		4.00	16.07	2.67
		5.00	18.44	3.84
		6.00	16.88	3.91
		Total	17.14	3.03
	Total	3.00	17.29	2.16
		4.00	16.95	2.93
		5.00	19.00	3.44
		6.00	16.91	3.36
		Total	17.43	2.89
Total	Girl	3.00	17.23	2.81
		4.00	18.16	3.04
		5.00	19.23	2.75
		6.00	16.00	3.55
		Total	18.08	3.13
Total	Boy	3.00	17.90	2.02

		4.00	17.66	3.22
		5.00	18.42	3.16
		6.00	16.70	3.78
		Total	17.68	3.15
	Total	3.00	17.60	2.39
		4.00	17.94	3.10
		5.00	18.88	2.94
		6.00	16.45	3.67
		Total	17.88	3.14

Table 12. “Entertainment” Related to the Variables of Father’s Education, Child’s Age and Gender

	Sum of squares	Df	Mean Square	F	P
Fat.Edu(D)	18.05	2	9.02	0.99	-
Gender(C)	3.06	1	3.06	0.33	-
Child Age(E)	99.33	3	33.11	3.62	*0.014
F.E(D)Xgender(C)	40.04	2	20.02	2.19	-
F.Exage.(D)X(E)	63.37	6	10.56	1.154	-
Agex Gen.(E)X(C)	24.86	3	8.28	0.90	-
F.Exagexg.(D)X(E)X(C)	66.53	6	11.08	1.21	-

*significant at $p < 0.014$

The Table 12 indicates that; the ages of children are found to be significant at the criterion of “entertainment”. However, father’s education level and gender are not statistically significant at the criterion of “entertainment” ($F=3.617$; $p < 0.014$). Besides; the parents who have 5 years-old children find TV programmes for children more entertaining than the parents who have “6” years-old children.

DISCUSSION

Discussion on the Results Related to the Effects of Mother’s Education Level (MEL), Income Level of Family (ILF) and Gender of the Child(GOC) on the Quality Criteria

According to the analysis of the combined effect of MEL and GOC variables, mother’s who have male children and medium level of education mostly think that children’s TV programmes are less thought provocative, when compared to other mother’s.

Among the families who have male children, the one’s in which mother’s have high education level think that children’s programmes are thought provocative than the one’s in which mothers are in medium educational level. According to the analysis of the combined effect of MEL and GOC variables, mother’s who have male children and medium level of education mostly think that children’s TV programmes are less thought provocative, when compared to other mother’s.

Neither of the variable were not significantly related to the criteria of “innocuousness”; “presence of role models”; “restfulness”; “credibility”; “involvement”; “entertainment”; “comprehensibility”.

Discussion on the Findings about the Effects of Father’s Education Level (FEL), Age of the Child (AOF) and Gender of the Child (GOC) Variables on the Quality Criteria

FEL, AOC, GOC variables were not found to be statistically significant for “innocuousness” quality criterion. Besides, the main and interactions effects of the above mentioned variables were not found to be significant either. According to the analysis of the main effect of AOC variable, parent’s who have “5” years-old children mostly think that children’s TV programmes are more innocuous than the parents who have “3” and “4” years-old children.

A research carried out by Angela Teresa Clarke and Beth Kurtz-Costes (1997) supports our results. That research revealed that television viewing time was negatively related to school readiness for children at 6

years. In this occasion, parent's who had "6" years-old children might think that their children could do beneficial activities rather than viewing TV. Also, a research carried out by Williams and Hanford (1986); indicated that the communities in which there were no television viewing, doing sports activities was more popular among children (Cohen, 1993).

As a conclusion it may be said that parents from different cultures perceive TV watching as being not for beneficial for their children at 5-6 year-olds. FEL, AOF, GOC variables were not found to be statistically significant for "involvement" quality criterion. Besides, the combined effects of the above mentioned variables were not found to be significant either. However; the main effects and interaction of AOC variable was found to be statistically significant.

According to the analysis of the main effect of AOC variable, parent's who have "3" years-old children mostly think that children's TV programmes are less involving than the parents who have "6" years-old children. In addition, parent's who have "5" years-old children mostly think that children's TV programmes are less involving than the parents who have "6" years-old children. On the basis of those results it may be said that when the child gets older, the parents may think that the children's TV programmes are more involved. In a study which were carried out in Turkey; the results indicated that only 17 percent of the Turkish parents of 3-6 year-olds expected that TV programmes for children should be entertaining (Başal,1999).

On this occasion; "3" years-old children's parents may think that their children are so young to understand the children's TV programmes. And the parent's who have "6" years-old children may think that their children have to study for academic development because of their age. Also they may be though that the TV programmes for children are not suitable for all ages. The cognitive abilities of the older children might be related to their higher TV interest than the younger children. Evra (1998) shares similar opinions in this topic such as older children's having longer attention span.

FEL, AOF, GOC variables were not found to be statistically significant for "entertainment" quality criterion. Besides, the combined effects of the above mentioned variables were not found to be significant either. However; the separate effect of AOC variable was found to be statistically significant. These results also revealed that the main effect of AOC variable, parent's who have "5" years-old children mostly think that children's TV programmes are more entertaining than the parents who have "6" years-old children. Thus; children's TV programmes which are produced for fun might be perceived as being more childish by parents who have "6" years-old children.

On the other hand, there are some other researches, which are focused on the parents concerns about entertainment media. Parents are deeply concerned about children's exposure to "inappropriate" content in entertainment media, especially on TV (Rideout, 2004). Two out of three parents (63%) say they are "very" concerned that children are being exposed to too much inappropriate content in entertainment media, and another one in four (26%) say they are "somewhat" concerned. When asked which type of media content concerns them the most, a third (34%) say TV, 20% say all media concern them equally, 16% say the Internet is of greatest concern, 10% say movies, 7% music, and 5% say video games (Rideout, 2004).

On the basis of the results of this research, the quality criteria for the children's TV programs should be studied in relation to the education of children. Thus it could be possible to make television programs more sophisticated in relation to reach educational targets. A suitable way of accomplishing this could be that the teachers and educators in relation to attaining educational goals can evaluate those criteria. Since the television offers a capable and an effective technology for instruction (Zechowski, 2006), more quality criteria should have been defined and studied in this respect for making this technology more influential to educate children and people.

The purpose of this article was to help to increase the quality of policymaking process and decision-making within the media industry, by offering some insights into what parents mostly thought about children's television programmes, the influences they saw on their own children's lives. So the children's television programmes could be more educative and entertaining if the children's programmes would be evaluated by parents, teachers, educators and program makers according to the quality criteria.

REFERENCES

- Anderson, D. R., Huston, A. C., Schmitt, K. L., Linebarger, D. L., & Wright, J. C. (2001). *Early Childhood Television Viewing and Adolescent Behavior: The recontact study*. Monographs of the Societ for Research in Child Development. USA. <http://search.ebscohost.com/login.aspx>
- Başal, Asude Handan.(1999). “3-6 Yaş Çocukların Günlük yaşamlarında Televizyon ve Televizyon ile ilgili Ana-baba görüşleri” (Television in 3 to 6 years old children’s daily life and parent’s views about television).İletişim ortamlarında Çocuk birey Sempozyumu Bildiriler Kitabı. Eskişehir: T.C. Anadolu Üniversitesi İletişim Fakültesi Yayınları
- Bayram, Servet. (1991). “ *An Instructional Design Analysis of Susame Street for Social Learning*”. İstanbul: Institute of Social Sciences, Boğaziçi University.
- Batur, Yüksel. (1998). “*Bilim Kurgu Sinemasında Şiddet ve İdeoloji.*” (Violance and ideology in science fiction cinema).İstanbul: Kitle Yayıncılık
- Buckingham, David. (1993). “*Children talking television*”. The television literacy. London:The Free Press.
- Clarke, Teresa Angela; Kurtz-Costes Beth.(1997). “Television viewing, Educational Quality of the Home Environment, and School Readiness”.*Journal of Educational Research.* 90,279-285.
- Cohen, Stewart. (winter 1993/94) “Television in the lives of children and their families”. *Childhood education.*
- Evra, Judith Von. (1998). *Television and Child Development.* London: Lawrence Erlbaum associates.
- Koutsouvanov, Eugenia. (1993). “Television and child language development.” *International Journal of Early Childhood.*
- Nikken, Peter&Van Der Voort,(1997), “Children’s Views on Quality Standards for Children’s Television Programs”. *Journal of Educational Media.* 23,169-185.
- Steiner, Deborah.(1999). “6 Yaşında” (6 years old) (Çev. Füsün Doruker). İstanbul: Altın Kitaplar.
- Özdiker, Cengiz. (2002). Çocuk Ve Televizyon (Child and television). *Çocuk Çocuk.s:16*
- Özgen; Özgün. (1985) “*Radyo ve Televizyonda Okul Öncesi Eğitim ve Öğretmen Yetiştirme*”. (Preschool education and teacher training in television and radio)Okul Öncesi Eğitimi ve Yaygınlaştırılması Semineri. Ya-Pa Yayınları. İstanbul.
- Rideout, Victoria & Hamel Elizabeth. (2006). “*The Media Family: Electronic Media in the Lives of Infants, Toddlers, Preschoolers and Their Parents*”. California: Kaiser Family Foundation. www.kff.org
- Rideout, Victoria. (2004). “*Parents, Media and Public Policy: A Kaiser Family Foundation*” Washington: Kaiser Family Foundation. www.kff.org
- Yeşiltuna, Dilek. (1999). *Kitle İletişim Sürecinde Çocuk.*(Child in the telecommunication process). İletişim Ortamlarında Çocuk Birey Sempozyumu Bildiriler Kitabı. (140-148). Eskişehir: T.C. Anadolu Üniversitesi Yayınları, İletişim Fakültesi Yayınları.
- Zechowski, Sharon.(2006).*Educational Television.*
<http://www.museum.tv/archives/etv/E/htmlE/educationalt/educationalt.htm>

UNIVERSITY UNDERGRADUATE STUDENTS' INFORMATION SEEKING BEHAVIOUR: IMPLICATIONS FOR QUALITY IN HIGHER EDUCATION IN AFRICA.

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ABSTRACT

The major purpose of the study was to examine the information seeking behaviour of undergraduate students in the University of Botswana. Specifically, the study made effort to determine the sources consulted and the general pattern of information gathering system by the students: the impact of students' gender, level of study and course of study on the students' information seeking behaviour. The study adopted a descriptive survey design and data was collected using a questionnaire administered to two thousand respondents randomly selected from six faculties in the University of Botswana, Gaborone, Botswana. Major findings from the study include are: first, academic information was rated as the predominant information required by the students, while the Internet was rated the most crucial source of most of the academic information required. It was also found that gender, level of study and course of study significantly influence students' information seeking behaviour ($F = 511.8$, level of signification is .05). However, among the factors, the students' level of study contributed more to the observed variation in information seeking pattern, followed by course of study, while gender had the least influence. The sample was taken in two departments from each of the faculty in the University. This is a typical representation of the population of the undergraduate students of the University of Botswana hence; the findings could be generalized for the whole undergraduate students of the University. The paper is a product of recent survey carried out by the authors; hence the findings reported here are original and reflect the current views and practices of information seeking behaviour of University of Botswana Undergraduates.

Key Word: Information, Internet, Quality, Higher Education, Information Seeking Behaviour, Botswana, Africa.

INTRODUCTION

The higher education constituency is growing at a tremendous pace, both within Africa and from outside the continent's borders (Griffin, 2004). Higher education institutions are today recognised by national governments and donors as key agents for social and economic development in view of their inherent capacity to foster knowledge creation, processing and dissemination. According to Ekhuagere (2004), in a study supported by the Ford foundation, countries whose higher education sector is weak and inactive will be continually marginalized in a world whose economy is increasingly globalize and knowledge-driven. Hence, each country tries to improve in the quality of the higher education programmes. However, the developing countries are faced with more challenges in providing quality higher education programme than their counterparts in the developed region.

Many a times when the issue of quality in education, more specifically, quality in higher education is being discussed in Africa, focus have always been on the improvement of resources and facilities and quality of teaching and research. In most of the previous studies on quality in higher education, little or no attention has been paid to the way students in higher institutions organise their learning and its implications for quality. One major organisation that has done a lot of work in Africa is the World Bank. Famous among such interventions of the World Bank is the Nigeria Universities Strategic Improvement Project (NUSIP), other interventions of the Bank in Kenya, Namibia and Zimbabwe, to mention but a few. In all these interventions, focus has been on infrastructural improvements and at best capacity building for staff. In none of these interventions was the students' learning behaviour examined. What all these interventions assumed was that improvement in facilities and teacher quality will automatically result into improved academic achievement of the students.

However, this assumption may seem too simplistic because it is also plausible to argue that even when there are good facilities and quality teachers, students' achievement may still be hampered due to some students factors, principal among which is the way they seek and organise academic information. Hence,

the way students organise their learning and search for academic information could be considered very crucial to their overall performance at the end of the day. This situation gets more chaotic, especially when students are given assignments and presentations to make. They need to search for information on their own, consequently it is expected that they consult appropriate sources for academic information.

In spite of the fact that institutions of higher learning in Africa are generally aware of the impact, if not indispensability of ICT on teaching, learning and research, ICT is still rarely utilized to enrich teaching and learning activities in many universities because of the absence of connectivity in the institutions. According to Ekhuagere (2004) this situation adversely affects the pursuit of higher education studies in these institutions. In another dimension, even when the connectivity is available, the level of accessibility and utilization is still poorly low. In some institutions, students' access is still generally poor, while only the teachers and support staff use the ICT facilities.

The Problem

This study examined the information seeking behaviour of undergraduate students in the University of Botswana. Precisely, the focus was on obtaining information on the nature of academic information needed by the students, the sources consulted and the general pattern of information gathering system by the students. Furthermore, the study examined the influence of students' gender, level of study and course of study on the pattern of information seeking by the students.

Specifically, the following research questions were addressed in the study:

1. What is the predominant information required by the students?
2. What are the major sources of obtaining academic information in the University?
3. Which are the predominant sources consulted by the students?
4. Will students' gender, course of study, and level of study have any influence on their information seeking behaviour?
5. Do students' get all the information required from the identified sources?
6. How will students rate the general availability and access to information in the University?

LITERATURE REVIEW

Some conceptual framework and the review of several variables that previous researchers have done relevant to undergraduate students information seeking behaviour and review of some model form the theoretical foundation of this study.

The Concept of Information

Uttor (1999) defined information as data value in planning, decision making and evaluation of any programme. He goes further to say that it is a data that have been subjected to some processing functions capable of answering user's query be it recorded, summarized, or simply collected that would help decision making. It is well understood in terms of books, journals, magazines, public and private sector documents of all kinds, whether published for mass circulation or unpublished and restricted or confidential in nature, results of research efforts which are made available to colleagues in form of reports, books articles and non-printed materials. From all these definitions, it is apparent that information is crucial to man's survival. The researcher concluded that information is required in man's daily activities be it in school, play, or work situation

In the cognitive viewpoint of information science (Belkin 1977 cited Eskola, 1998) defined information as associated with a text which is the generator's modified by (purpose, intent, knowledge of recipient's state of knowledge) conceptual structure which underlines the surface structure (e.g. language) of that text. Ingwersen (1995, 1998) subsequently elaborated by defining information as being the result of transformation of the generator's cognitive structures (by intentionality, model of the recipients' state of knowledge, and in the form of signs), and on the other way round information is something, a structure, which when perceived may affect and transform the recipient's state of knowledge (Eskola, 1998). And to Dervin and Nilan (1986: 16) information is seen as something constructed by human beings. In the context of this study, information will be conceived based on the definition of (Eskola, 1998) as something which students need during their studies when they construct meaning about the subjects in the process of learning.

Information Behaviour

Various definitions of information behaviour have been given by researchers. Some defined the term based on the general model of information behaviour developed by (Wilson 1997a: 39), where he posited that a general model of information behaviour needs to include at least three elements: (i) an information need and its drives, i.e. the factors that give rise to an individual's perception of need; (ii) the factors that affect the individual's response to the perception of need; and, (iii) the processes or actions involved in that response. To Taylor (1991: 221-222) information is the product of certain elements of the information use environment. The elements according to him are: the assumptions, formerly learned or not, made by a defined set of people concerning the nature of their work; the kinds and structure of the problems deemed important and typical by this set of people; the constraints and opportunities of typical environments within which any group or sub-group of this set of people operates and work; and the conscious perhaps unconscious, assumptions made as to what constitutes a solution, or better said, a resolution of problems, and what makes information useful and valuable in their contexts. He concluded based on this definition that information behaviour of different groups of people also is different. On his own, (Thorsteinsdottir, 2001) put forward some other related concept to information behaviour. He asserted that information behaviour is intertwined concepts which make the concept information behaviour very complex. The concept he gave are:

Information Needs: This is understood in information science as stemming from a vague awareness of something missing and as culminating in locating information that contributes to understanding and meaning (Kuhlthau, 1993). It is an anomalous state of knowledge (Belkin, Brooks and Oddy, 1982), or a gap in individual's knowledge in sense making situations (Dervin and Nilan, 1986). For a person to experience an information need, there must be a motive behind it (Wilson, 1997).

Information Seeking: Ikoja-Odongo and Ocholla (2004) described information seeking as a process that requires an information seeker, or what might be called 'personal information structures' 'such as a person's cognitive abilities, his or her knowledge, skills in relation to the problem or task domain, knowledge and skills specific to a system and knowledge and skills regarding information seeking. Information is undertaken to identify a message that satisfied a perceived need (Wright and Guy, 1997). This activity may be actively or passively done when taking steps to satisfy a felt need (Ikoja-Odongo, 2002). Andersen (2000) in another dimension noted that research on information seeking has looked at how individuals go about finding the materials they need.

Information Seeking Behaviour: This can be described as an individual's way and manner of gathering and sourcing for information for personal use, knowledge updating and development. Faire-Wessels (1990:361 in Kakai et al, 2004) referred to it as the way people search for and utilize information. Kakai et al. (2004) observed that, often students' information seeking behaviour involves active or purposeful information as a result of the need to complete course assignment, prepare for class discussions seminars, workshops, conferences, or write final year research papers. To (Fister, 1992:168) undergraduate students may be smart people, but they are still finding the process of research intimidating. Fister explained that these students do not learn the basic information skills; they only end up using trial and error methods of research. This limits their capabilities to satisfy their needs. Wilson's 1996 model noted that in the process of seeking information, problems are encountered. While Taylor (1990) also noted that after interacting with the information sources (e.g. library) what a user actually needs may not eventually tally with what is practically available, due to constraints either within the stock or due to the user's own inadequacy. Many problems may serve as hindrances for the undergraduates in the process of their search or using the library. These may include library anxiety as asserted by (Mellon, 1986) and users' perceptions of library and its program.

Since this study is conducted in a learning context from students' perspectives, some relevant models are considered:

1. *The Information Search Process Model:* Kuhlthau developed this model by using Belkin's (1980) anomalous states of knowledge, Kelly's (1963) phases of construction, and Taylor's (1968) levels of needs as theoretical bases. She defined the information search process as the user's constructive activity finding meaning from information in order to extend his or her state of knowledge on a

particular problem or topic. Kuhlthau has conducted empirical studies of students' information seeking behaviour in libraries. Her model includes six stages: Task initiation, Topic Selection, Prefocus Exploration, Focus Formulation, Collection and Presentation. This model deals with three realms common to each stage, namely the affective, the cognitive and the physical. In this six stage model of search process (Kuhlthau, 1994) asserted that information professionals can intervene and help the users to identify as well as solve their information needs depending on where the users are in their seeking process.

2. *Another theory of interest relevant to this present research is Limberg model.* Limberg (1998a, 1998b) quoting Thorsteindottir (2001) posited that content is very crucial to how people seek and use information. Which he said it's contrary to the understanding that information –seeking is a general process which occurs independently of the content in the information. Making reference to the aim of LIS which is to established a general view of information-seeking restrain the research and limits understanding of the various ways in which people seek information. It was pointed out by Thorsteindottir that if it were accepted that there is more than one type of information process, it would stimulate a deeper understanding of the information seeking process in general within the field. Instead of trying to prove that the information-seeking process can be described with the model, common for different users in different contexts. Thorsteindottir summarized the theory of Limberg by saying that the difference between contexts, situations and groups should be examined and illuminated, not with the purpose of separating groups but to better understand information seeking as phenomenon.

A good number of studies have been conducted which investigated information –seeking and needs of different library users like graduates and undergraduates, academics, researchers and the like (Colinas, 2004). Some of them have tried to distinguish between these categories of users on the basis of their faculty (Brown, 1999; Fidzani, 1998; Hiller, 2002). There are also research studies on library users' studies across a variety of disciplines (Hammond and Mitchel, 1997; Kakai et al.2004; Kamanda, 1999; Zondi, 1992; Whitmire, 2002). Therefore, this review focuses on the studies of undergraduate students and also includes some examinations of other variables before finally narrow it down to the variable which this study is designed to address.

Fidzani (1998) conducted a study in University of Botswana, Gaborone to establish the information needs and information –seeking behaviour of graduate students. Findings include that there was a heavy reliance on library books, textbooks and journals as sources of information used for course-work. The researcher reported further that students primarily relied on scanning the shelves, or browsing through journals rather using the index and abstract databases to locate information. Relevant to this finding (Osiobe, 1988) found that browsing was the most important source of finding references for undergraduate students. He concluded that respondents in the University of Botswana did seek help from University library staff with 40% receiving help from the reference librarian and approximately 32% from the subject librarian. Majid and Ai (2002) studied the use of information resources by computer engineering students in Singapore and found that the top five information resources in order of preference were books,(94%), Lecturers (84%), the internet(86%), and friends (84%). They relied heavily on printed sources of information and their use of electronic journals and databases was very low. While Hartmann (2001) concluded that undergraduate students experienced difficulty in locating items from the library collection and did not understand the processes for retrieving journal articles.

In another study conducted by (Seamans, 2001), it was reported that first year undergraduate students reported that all of the participant felt that they had little need to look for information outside what faculty provided for them in their course and where information was needed. They felt they were able to acquire it using general search engines. Other findings from this research is that student participants were comfortable using technology to learn and that web modules could be used in the future to teach library instruction. Kerins, Madden and Fulton (2004) in another study of graduate engineering students reported that the majority of the students indicated that the Internet was the first source of information they used for a project, and also (Mittermeyer, 2003) reported that many students used the Internet extensively for finding course-related information.

Moreover, Hiller (2002) in a study conducted in the University of Washington reported that undergraduates preferred to visit the library to study rather than to seek journals or books. Similarly, (Seiden, Szmborski and Barbara cited in Callinan, 2004) conducted a focus group study with undergraduate students from Skidmpore college in New York and found that the students had a strong overall preference for digital resources. These preferences were explained to reinforce by a lack of familiarity for printed sources. Wei (1995) observed that undergraduate students in a focus group showed themselves to be inexperienced in online system. They were keen to receive instruction on how to find periodicals, with (58%) and almost half of them wished to receive instruction on using electronic resources in science library.

Having reviewed the various findings of research conducted on various variables influencing or affecting information-seeking behaviour, the next review now focus on the variables investigated in the present study. It was noted earlier in this review that research conducted on library, even here in University of Botswana have shown that undergraduate students do not use most of the library information resources. It may be true that students are experiencing technical problems in accessing information resources; in addition with their lack of basic knowledge and awareness of the resources. Therefore, undergraduate student poor information seeking behaviour was captured and considered the biggest problem to be examined. Apart from the above observation, although a good number of studies have been conducted on information seeking behaviour, but the issue of the influence of gender and subject specialization, particularly in the context of University of Botswana have not been given much consideration. The present study is an attempt in this direction.

Gender and Information Seeking Behaviour

Gender is understood as a social phenomenon with a fundamental social and structural ordering of men and women in the society (Wiklund, 1998). In this relation, men are generally given the preferential right of interpretation, leading to an uneven distribution of resources. These relationships are seen as circumstances in which people have opportunities to act. Description of the academic community according to Wiklund as male research culture belongs here. In this perspective, he considers men and women as not having to act differently, but women have to adjust to structural and cultural conditions where they do not have the same status as men.

Wiklund (1998) again posited that the academic community is a stratified social structure built on competition and a need to be acknowledged. To him, in this environment men and women do not have the same opportunities and one manifestation is that women have difficulties in gaining access to social networks. This is likely to affect women's access to information, particularly information otherwise difficult to get, since that is usually available through informal personal contacts. When studying how men and women find for themselves relevant information, it is interesting to take into consideration differences in access to information (Wiklund, 1998). In a study of highly successful students, (Ford, Miller, and Moss, 2001) found that females tended to experience more difficulty finding information online. It is the focus of this study therefore, to find out whether or not; gender will influence information seeking behaviour of the University of Botswana Undergraduate students.

Subject Specialization and Information Seeking Behaviour

It could be expected that undergraduate students' information-seeking behaviour would differ from faculty and graduate students because their information seeking skills are not as well developed (Whitmore, 2002). However, similar information-seeking pattern could also be expected because undergraduate majors are socialized and indoctrinated into the research process of their academic disciplines through course assignments and lecturers (Whitmore, 2002). This researcher explained further that faculty expose undergraduates' to the major theories and researchers in their field including identifying which journals, authors, books are important and perhaps which databases and academic libraries are useful for seeking information to complete course assignments.

Researchers like (Smart, Feldmann, and Etington, 2000), believe that undergraduates select majors based upon values, interests and characteristics that they share with faculty in the same academic discipline. As Whitmore said, library and information science research has always been interested in examining disciplinary differences (2002). There are students that confirm Whitmore position. Covi (1999) for example analyzed information-seeking behaviour of academic researchers in the field of molecular biology,

literacy theory, and computer science and their use of digital libraries. Her result indicated differences in the search strategies employed and the types of material selected among the researchers in the various academic disciplines. Researchers like (Bates, 1996; Broadus, 1987; Watson-Bone, 1994; Wilberly and Jones, 1989) also investigated the information-seeking behaviours of people in the humanities. They generally reported that humanities scholars did not use indexes and abstracts or consult librarians. Kerins, Madden and Fulton (2004), examined the information-seeking patterns of final year undergraduate engineering students split evenly between two engineering institutes in Irish universities.

It was reported that students' engineers seem to have a preference for channels that require the least effort, such as the Internet. They explained that the result was due to the fact that students' engineers viewed the Internet as a speedy, current information source which fed initial information needs quickly. These same authors Kerin et al. (2004) explored information-seeking behaviour among law students focused on the information experiences of Irish University law students. It was reported that most students claimed to use the resources of the library heavily over the course of their academic programmes. Brown (1999) analyzed the information seeking behaviour of physical scientists. She found that those scientists preferred using journal articles, finding new information by attending conferences and through preprints. Her reports further shown that, they preferred electronic access to bibliographic databases, although they favoured obtaining journals articles in print versus electronically. Folster (1995) reviewed social scientist information-seeking patterns and found that they preferred journals instead of other sources, to follow citations instead of using indexes or abstracts to find articles, and they did not view librarians as important sources of information. Finally, Ellis, Cox and Hall (1993) compared the information-seeking patterns of physical and social scientists and found that no essential differences. This is why this study has included all these factors in analysing the pattern of information seeking behaviour of University of Botswana undergraduate students.

METHODOLOGY

This is essentially a survey study. Two thousand undergraduate students randomly selected from across the six faculties in the University of Botswana constituted the sample for the study. Two departments were selected from each faculty, yielding a total of twelve departments, and from each of these departments the lists of students were obtained and using a proportional to size sampling technique, the sample size of 2000 was generated. A questionnaire tagged "Undergraduate Students' Academic Information Seeking Behaviour Scale (USAISBS) was used to collect data for the study. Examples of items contained in the questionnaire are:

1. Which of the following do you use last to research a problem? :
 - a. the library. b. the Internet. c. the books etc.
2. Which of the following do you use to obtain information for your academic work?
 - a. the library. b. the Internet. c. journals

The questionnaire had a total of twenty items and was validated using both internal and external validity procedures, with a reliability coefficient of 0.92 using the cronbach alpha.(A sample of the questionnaire is attached). The questionnaires were administered to the sample in their respective classrooms to reduce the mortality rate. On the whole, two thousand completed cases were used for data analysis. Data collected was analysed using descriptive statistics of frequency and percentages, also Multiple Regression were employed to analyse data across and within groups.

RESULTS

The results of the analyses obtained are presented as follows:

Research Question 1

What are the predominant information required by the students?

Table 1. Predominant Information Required by the Students.

Required Information	Frequency	Percentage
Health Information	225	11.25
Information for personal development.	250	12.5
Academic Information	1282	64.1
Employment Information	186	9.3
Global Information	57	2.85
Total	2000	100

In Table 1 above, the results show that the predominant information required by students is academic information. This is confirmed with 1282 students 64.1%. Other required information by the students but which may not be as vital as academic information are: information for personal development; health information; employment information and global information.

Research Question 2

What are the major sources of obtaining academic information in the University?

Table 2. Major Sources of Academic Information

Sources of Information	Frequency	Percentage	Rank
Lecture Notes & Handout	312	15.6	2
School Library	129	6.4	3
Internet	1089	54.4	1
Consulting and photocopy colleagues notes	50	2.5	8
University Bookshop	29	1.4	10
Textbooks	97	4.9	4
Thesis/Dissertations	85	4.3	5
Newspaper	79	4.0	6
CD-ROMs Database	42	2.1	9
Print Journals	20	1.0	11
Electronic Resources	68	3.4	7
Total	2000	100	

The results in table 2 above show the eleven major sources of obtaining information by the students.

Research Question 3

Which are the predominant sources consulted by the students?

The same Table 2 above provide answer to this question. The result as reveals from the table show Internet as the most consulted source by the students. This is confirmed by the overwhelming majority of the participants 1089 (54.4%). Next to it is the Students Lecture Notes and Handouts with 312 (15.6%). School Library was rated as the third source of information most consulted by the students. Other sources indicated are: Textbooks 97 (4.3%); Newspaper 79 (4%); Electronic Resources 68 (3.4%); Consulting/Photocopying of Colleagues Notes 50 (2.5%); CD-ROMs Database 42 (2.1%) and Print Journal 20 (1%).

Research Question 4

Will students' gender, course of study, and level of study have any influence on their information seeking behaviour?

Table 3. Stepwise Multiple Regression Analysis on the Influence of Gender, Course of Study, and Level of Study on Information Seeking.

Standard error of the estimate = 8.500				
Multiple R adjusted = 0.6237				
R2 (adjusted) = 0.522				
Analysis of Variance				
Source of variation	Suns of Squares	df	Mean Square	F.Obs.
Regression	9443.70	3	4721.9	511.8
Residual	18,426.27	1996	9.227	
Total	127869.97	1999		

Table 3 above provides a summary of the results of the multiple regression analysis for the influence of gender, course of study and level of study on the information seeking behaviour of the participants. The result reveals that all these variables significantly influence students' information seeking behaviour. This is because all the factors jointly exert 52% influence on student information seeking pattern.

Table 4. Descriptive Statistics and Intercorrelations among the variables

Variables	No	Mean	S.D	Info. Seeking	Gender	Course of study	Level of Study
Infor. Seeking	1999	50.86	11.6	1.0000			
Gender	1999	20.62	5.1	.2122**	1.0000		
Course of Study	1999	28.14	7.9	.3416**	-.2011*	1.0000	
Level of Study	1999	30.07	8.4	.3911**	-.1076*	-.2600*	1.0000

N= 1999, correlation greater than .2 are significant at **P<.001.

To determine the extent to which each of the three factors (variables) influenced the information seeking of the students, the test of the significance of the estimated parameters in the regression model was carried out and findings presented in table 5.

Table 5. Relative Extent of influence of the factors on Information Seeking

Model	B	Standard Error	Beta	T-Value	P
Constant	25.623	8.327		8.71	<.001
Gender	.063	.081	.116	3.22*	<.001
Course of study	.119	.126	.141	3.68*	<.001
Level of study	.235	.221	.337	4.91*	<.001

The Table 5 above shows that each of the factors had a significant influence on students' information seeking behaviour. Level of study had the most significant influence (Beta = .337; t = 4.91; P<.001). Course of study is the next with (Beta = .141; t = 3.68, P <.001) It can be infer from these results as well that differences exists in the information seeking behaviour of the participants based on gender, course of study and level of study. This is shown by the variation in the Value of T obtain on each of them.

Research Question 5.

Do students get all the information required from the identified sources?

Table 6. Getting Required Information from Identified sources

Item	YES	%	NO	%
I get all the information I need from the sources identified	1235	(61.8)	765	(38.2)
All the sources identified are very rich because I always get what I want from them at once.	1468	(73.4)	532	(26.6)

Table 6 above reveals that a majority of the participants confirmed that they get the required information from the identified sources. To get more detail on this, participants were asked to indicate their level of satisfaction with getting required information from these identified sources. The next table contain the detail.

Table 7. Level of Satisfaction of Information Obtained.

Response	Frequency	Percentage
Very Satisfied	1200	60
Satisfied	426	21.3
Less Satisfied	300	15
Dissatisfied	74	3.7
Total	2000	100

Table 7 above gave a complementary result to what obtain in table 6. The results confirm that 1200 participants (60%) who constitute the majority indicated they are very satisfied with all the information they are getting from the identified sources. Furthermore, 426(21.3%) indicated they were satisfied while 300 (15% and 74 (3.7 %) indicated less satisfied and dissatisfied respectively.

Research Question 6.

How will students rate the general availability and access to information in the university?

Table 8. Rating of Accessibility of Information in the University

Level of Accessibility	Frequency	Percentage
Highly Accessible	918	45.9
Accessible	515	25.7
Slightly Accessible	374	18.7
Inaccessible	193	9.7
Total	2000	100

Table 8 above indicates the participants’ rating of the accessibility to information in the University. The result show that 918 (45.9%) indicated the information were highly accessible; 515 (25.7%) indicated the information were accessible and 374 (18.7%) indicated the information in the University were slightly accessible. To infer from these result, it is generally clear that information is generally accessible to students in the University.

DISCUSSION

Major challenges facing most tertiary institutions in Africa is the provision of infrastructural facilities, especially academic support facilities such as the Internet connectivity (Igun, 2005). However, beyond the problem of facilities is the way students organise their own learning, how they sourced for the academic information needed for them to excel. In addressing the issue of quality in Africa higher education institutions, therefore, a more holistic approach needed to be adopted, rather than the isolationist, fragmented tendencies. The students who are the direct beneficiaries and users of these facilities must be factored into the quality issues. Hence, this study provides some useful insights into the way students organise their own learning and how this could help in promoting quality in higher education in the continent.

Information gathering could be a challenging and an arduous task to the tertiary institutions students in Africa. These students are loaded with many assignments and class presentations which required they source for information on their own in an environment that seem academically unfriendly, in terms of limited sources. As shown from this study, the Internet provides the most consulted sources among the plethora of sources listed in this study. It is striking to note that students in this particular University have access to the Internet facilities, and they utilize same for their learning. This seemingly growing dependence on the Internet by undergraduate students in an African university therefore calls for urgent actions in the provision of the facilities. It is however strange to find out that the students rated the University library as the third most consulted sources, after Internet and Instructors lecture notes. This is perhaps strange because the University of Botswana Library is rated among the best in Africa universities in terms of size and volume (Ojedokun and Owolabi, 2003). It may be postulated that students actually find it easier to locate materials on the internet than searching through the library, a task which may seem laborious. The use of the internet by a majority of the students as reported in this paper was contrary to the findings of Fidzani (1998), when he reported that there was a heavy reliance on library books and journals. This perhaps is a positive indication that the University of Botswana has progressed positively from the traditional library dependent University to the more virtual library-based University. It may also be reasoned that perhaps, appropriate library education programme need to be put in place to assist the students further in accessing library information. This is not restricted to our sample; this would be assumed for students in other tertiary institutions, especially in Africa. The expectation is that when students are fully informed about the potential of the libraries, they will make use of them more.

More importantly, the findings with regard to Internet usage provide a big challenge to Africa universities. If quality in higher education is to be attained in Africa, a more radical and positive approach to the provision of Internet facilities in our tertiary institutions must be adopted. Presently, even in those universities where Internet facilities are available, there is still a limitation in terms of access to the students. In most instances, access of Internet to students is still largely minimal, even here in the University of Botswana (Ojedokun and Owolabi, 2003).

Hence, in a majority of higher institutions across Africa, students are forced to patronise the private internet service providers popularly known as cyber cafes. To stem this tide and to ease the problems faced by students in terms of access to Internet, direct investment in its provision must be given ultimate priority. This will be a big challenge to most African governments that are groaning under the hardship of poor economies. It therefore calls for the intervention of international donor agencies and foreign governments to salvage African higher institutions from its present predicaments.

The study further determined the interactive influence of gender, course of study and level of study on the information seeking behaviour of students. Findings from the study show that whereas all these three factors significantly influenced the way students search for academic information, however, the level of study of students contributed most to the observed significance. One may postulate that the higher the students go on the academic ladder, the more academic information they required to tackle the various challenges. At a more higher stage, students tends to be given opportunities to organise their own learning, more assignments and projects are given that will require them to search for information. More specifically, those thesis and projects will require them to surf the Internet more frequently. Hence, it is gratifying to note that the level of study is a key factor in information seeking behaviour of higher institution students.

On the level of accessibility of information, our sample indicated that academic information is accessible and they are satisfied with the information facilities provided by the university. Positive as this may seem, this findings could not hold for a majority of tertiary institutions in Africa. As pointed out earlier on, the University of Botswana, where this study was carried out has invested a lot into information technology for teaching and learning, unlike most comparable institutions in Africa. As reported by Ekhaguere (2004) most of the universities in Nigeria for example lacked Internet connectivity. Perhaps, it should be stressed to that even within the University of Botswana, where the Internet facilities are available, as large as 38.2% of the students indicated that they could not get all the information required for their academic work. Also about 28.4% of the students indicated that they were not satisfied by the level of information they are getting from the internet services.

While it may be plausible to argue that a majority of the sample indicated positive responses on most of the parameters examined, it may be dangerous to dismiss the percentage that are not getting access. It therefore seems that more facilities are still needed, especially, the provision of more computers for students' use. It has been previously observed that students are not getting adequate access to computers in this university (Ojedokun, 2001). The finding in this study has therefore reinforced the earlier observation; hence the urgent need to address this inadequacy.

CONCLUSION

The issue of quality in higher education in Africa has become more paramount now, with the release of the results of the ratings of world universities in 2005, which shows that only a negligible few (not up to 1%) of universities in Africa was ranked among the first 500 universities in the world. This issue poses a serious challenge to African universities. In tackling the problem of quality therefore, it is imperative that the provision of information technology should be the nucleus of the strategies for improving quality. Students in tertiary institutions need information for their academic activities and this can not be taken for granted. A well articulated and sustained effort is required to provide ICT facilities in African universities and make the same more accessible to the students.

REFERENCES

- Bates, M.J. (1996). The Getty end-user online searching project in the humanities: Report No 6: Overview and conclusions. *College and Research Libraries*, 57, 514-523.
- Belkin, N.J Oddy, R. & Brooks, H. (1982). Information retrieval: Pt. 1 Background theory. *Journal of Documentation* 38(2), 61-71.
- Best, J. W. & Kahn, J. V. (1998). Research methods in education. Englewood Cliffs N.J: Prentice-Hall.
- Broadus, R.N. (1987). Information needs of humanities scholars: A study of requests made at the National Humanities Center. *Library and Information Science Research*, 9113-129.
- Brown, C.M. (1999). Information-seeking behaviour of scientists in the electronic information age: astronomers, chemists, mathematicians, and physicists. *Journal of the American Society for Information Science* 50 (10), 925-943.
- Callinan, J.E. (2004). Information-seeking behaviour of undergraduate biology students: A comparative analysis of first year and final year students in University of College Dublin. *Library Review*, 54, (2) 86-99.
- Clougherty, L. (1998). The University of Iowa Libraries' undergraduate user needs assessment. *College and Research Libraries* 59, (6), 572-584.
- Covi, L.M. (1999). Material mastery: Situation digital library use in university research practices. *Information Processing and Management* 35, 293-316.
- Dervin, B. & Nilan. (1986). Information needs and users. *Annual Review of Information Science and Technology*, 21: 3-33.
- Ellis, D., Cox, D & Hall, K. (1993). A comparison of information-seeking patterns of researchers in the physical and social sciences. *Journal of Documentation* 49, 356- 369.
- Eskola, E.L. (1998). University students; information seeking in a changing learning environment- How are students' information needs, seeking and use affected by new Teaching methods? *Information Research* 4 (2). Available at: <http://www.shef.ac.uk/~is/publication/infres/isic/eeskolahtml> (access on 10th February, 2006).
- Fidzani, B.T. (1998). Information needs and information-seeking behaviour of graduate students at the University of Botswana. *Library Review* 47(7), 329-340.
- Fister, B. (1992). The research process of undergraduate students. *Journal of Academic librarianship*, 18 (3), pp 163-169.
- Folster, M.B (1995). Information-seeking patterns: Social sciences. *The Reference Librarian*, 49/50, 83-93.
- Ford, N., Miller, D., & Moss, N. (2001). The role of individual differences in Internet searching: an empirical study. *Journal of the American Society for information Science and Technology* 52 (9), 1049-1066.
- Hammond, C. & Mitchell, E. (1997). Library instruction for the professions: information needs and Libraries. *Reference Services Review* 25 (2) 79-86.
- Hartmann, E. (2001). Understanding of information literacy: the perception of first year undergraduate students at the University of Ballarat. *Australian Academic and Research Libraries* 32, (2), 35-43.

- Hillers, S. (2002). How different are they? A comparison by academic area of library use, priorities and information needs at the University of Washington, *Issues in Science and Technology Librarianship*, Vol.33, available at: <http://www.ist.org/02-winter/article.html> (access 10 February, 2006).
- Igun, S.E. (2005). Users and Internet skills: A report from Delta state University, Abraka, Nigeria. *Electronic Journal of Academic and Special Librarianship* 6 (3), 1-9.
- Ikoja-Odongo, R & Ocholla, D.N. (2004). Information-seeking behaviour of the informal sector entrepreneurs: The Uganda Experience. *Libri* 54, pp. 54-66.
- Ikoja-Odongo, R. (2002). A study of the information needs and uses of the informal sector of Uganda. University of Zululand, South Africa (Unpublished PhD thesis).
- Ikoja-Odongo, R & Ocholla, D.N. (2003). Information behaviour of Fisher folk in Uganda. *International Library and information Research*. 25(1), 89-105.
- Ingwersen, P, & Borlund, P. (1996). Information transfer view as interactive cognitive process. In Ingwersen P. and N.E Pors (Editors), *Information Science interaction in perspective*. Copenhagen, DK. *The royal School of Librarianship*, 219-232.
- Ingwersen, P. (1995). Information and information science. In: Allen Kent (ed.) *Encyclopaedia of Library and Information Science*. 56. 19. New York: Marcel Dekker. 137-174.
- Kakai, M., Ikoja-Odongo, R. & Kigongo-Bukeny, I.M.N. (2004). A study of the information seeking behaviour of undergraduate students of Makerere University, Uganda. *World Libraries*, 14(1), 544 - 564.
- Kamanda, R.W. (1999). Library-use by university students: Case study of the East African School of Library and Information Science. Kampala: Makerere University Unpublished DLS dissertation.
- Kahlthau, C.C. (1994). Seeking meaning: A process approach to library and information services... Norwood, NJ: Ablex Publishing
- Keelhaul, C. (1993). Seeking meaning. A process approach to library and information services. Norwood, NJ: Ablex.
- Kelly, G. (1963). A theory of personality: The psychology of personal constructs. New York: Norton.
- Kerins, G., Madden, R, & Fulton, C. (2004). Information-seeking and the students studying for professional careers: the case of engineering and law students in Ireland. *Information Research* 10 (1) paper 208.
- Limberg, L. (1998a). Att söka information för att lära. En studie av samspel mellan informationsökning och lärande. Göteborg, VALFRID. (Avhandling vid institutionen för biblioteks-och informationsvetenskap vid Göteborgs Universitet.
- Limberg, L. (1998b). Three conceptions of information-seeking and use. In exploring the contexts of information behaviour. Proceeding of the Second international conference on research in information needs, seeking and use in different contexts. 13/14 August 1998. Sheffield, UK. Edited by T.D Wilson and D.K. Allen. London, Taylor Graham, P.116-135.
- Mann, T. (1993). Library research models: A guide to classification, cataloguing and computers. New York: Oxford University Press.
- Majid, S., & Ai, T.T. (2002). Usage of information resources by computer engineering students: a case study of Nanyang Technology University, Singapore. *Online Information Review* 26 (5), 318-325.
- Mellon, C.A. (1986). Library anxiety: A grounded theory and its development. Available at <http://www.library.arizona.edu/users/buchwaln/undergraduate.html> (access on 10th February, 2006).
- Mittermeyer, D. (2003). Information literacy: study of incoming first year undergraduates in Quebec. Paper presented at the Conference of Rectors and Principals of Quebec, Universities, Montréal, available at http://www.creug.ca/documents/bibl/formation/studies_Ang.pdf (access on 10th February, 2006).
- Ojedokun, A.A. (2001). Internet access and usage by students of the University of Botswana. *African Journal of Archive and Information studies* 11 (2), 97- 107.
- Ojedokun, A.A., & Owolabi, C. (2003). Internet access competence and the use of the Internet for teaching and research activities by Universities of Botswana academic staff. *African Journal of Archives and Information Science* 13 (1), 43- 53.
- Osiobe, S.A. (1998). Information-seeking behaviour. *International Library Review* 20 (3), 337-346.
- Seamans, N.H. (2001). Information literacy: a study of freshman student's perceptions, with recommendations. PhD thesis, Virginia Polytechnic Institute and State University. Available at: <http://www.scholar.lib.vt.edu/theses/available/etd-05142001-104550/unrestricted/seamans.pdf> (access 10 February, 2006).
- Ssendikadiwa, E.N.N. (1996). Evaluation of library-use instruction programs first year students in Makerere University Kampala-Uganda. Unpublished Project Report.

- Shera, J.H. (1972). The foundation of education for librarianship. New York: John Wiley & Sons, p.164.
- Smart, J.C. (2000). Academic disciplines: Holland's theory of the study of college students and faculty. Nashville: Vanderbilt University Press.
- Sonnenwald, D.H. & Wildermuth, B.M. (2001). Investigating information seeking behaviour using the concept of information horizons. ALISE Methodology Paper Competition. University of North Carolina, Chapel Hill.
- Taylor, R. (1968). Question-negotiation and information-seeking in libraries. *College and Research Libraries* 29, 178-194.
- Taylor, D.C. (1990). Undergraduates' use of periodicals: Implication for libraries reference work. *Reference Librarian*, 27/28, pp 51-65.
- Taylor, R.S. (1991). Information use environment. In Brebda Dervin & Melvin J. Voigt (Eds). Progress in communication sciences. Norwood, NJ: Ablex 10, 217- 225.
- Thorsteindottir, G. (2001). Information-seeking behaviour of distance learning students. *Information Research* 6(2). Available at: <http://InformationR.net/ir/6-2/ws7.html> (access on February 10, 2006).
- Uttor, J. (1999). The role of law libraries in a democratic culture. A paper presented at The 1999 NLA National Conference and AGM. Aug 15th-20th.
- Watson-Bone, R. (1994). The information needs and habits of humanities scholars. RQ, 203-216.
- Wei, W. (1995). Rethinking science library services: a user study at the University of California, Santa Cruz. *Science and Technology Libraries* 15(3), 17-33.
- Weissing, T. (2005). Information as a value concept: Reconciling theory and practice. *Library Philosophy and Practice* 8 (1), 1-13.
- Witemire, E. (1996). College students experience questionnaire. Retrieved from <http://www.findarticles.com>. on 10/01/2006.
- Whitmire, E. (2001). A longitudinal study of undergraduates' academic library experiences. *The Journal of Academic Librarianship* 27 (5), 379-385.
- Whitemire, E. (2002). Discipline differences and undergraduates' information-seeking behaviour. *Journal of the American society for Information Science and Technology* 53 (8), 631-638.
- Whitemire, E. (2003). Epistemological beliefs and the information-seeking behaviour of undergraduate. *Library and Information Science Research* 25, 127-142.
- Wilson, T.D. (1997a). Information behaviour. An interdisciplinary perspective. In P. Vakkari, R. Savolainen & B. Dervin (Eds) Information seeking in context of. Proceeding of an international conference on research in information needs, seeking and use in different contexts 14-15, August, 1996, Tampere, Finland. London: Taylor Graham.
- Wilson, T.D. (1997b). Information behaviour: an inter-disciplinary perspective. *Information Processing & Management* 33(40), 551-572.
- Wiklund, G. (1998). Information as a social and intellectual capital in the research career: a gender perspective. *Information Research* 4(2), 23-34.
- Wimberley, S.E. Jr & Jones, W.G (1989). Patterns of information-seeking in the humanities. *College and Research Libraries*, 50, 638-645.
- Wright, M. and Guy, L. (1997). Where do I find it and what do I do with it: Practical problem-solving in the data library, at http://dphs.dacc.wisc.edu/types/data_reference.html, date retrieved 10th February, 2006
- Xie, H. (2000). Shifts of interactive intentions and information-seeking strategies in interactive information retrieval. *Journal of the American Society for Information Science*. 51((0), 841-857.
- Zondi, L.E. (1992). Library use skills and information-seeking patterns of first year students at the University of Zululand, South Africa. *South African Journal of Library and Information Science* 60(4) pp 204-208.

VARIABLES PREDICTING FOREIGN LANGUAGE READING COMPREHENSION AND VOCABULARY ACQUISITION IN A LINEAR HYPERMEDIA ENVIRONMENT

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ABSTRACT

Factors predicting vocabulary learning and reading comprehension of advanced language learners of English in a linear multimedia text were investigated in the current study. Predictor variables of interest were multimedia type, reading proficiency, learning styles, topic interest and background knowledge about the topic. The outcome variables of interest were vocabulary and reading comprehension scores. Participants were 69 undergraduates enrolled at the foreign language teaching department of a Turkish university. Participants were randomly assigned to three different forms of an authentic electronic text, which differed from each other based on the type of multimedia: (a) definition of words, (b) definitions coupled with pictures, and (c) definitions coupled with short movies. The participants were given the text to read for general comprehension and were given an unannounced vocabulary test along with a reading comprehension test. Multiple regression analyses with vocabulary scores and reading scores as the criterion variables and the independent variables as the predictors served to reveal whether a relationship existed between the independent and dependent variables. Findings suggest that annotation type, reading ability and prior topical knowledge are important variables contributing to vocabulary learning whilst reading ability and learning styles (visual score) are important variables contributing to reading comprehension in a hypermedia environment.

Keywords: Multimedia/Hypermedia, media in education, computer assisted language learning, vocabulary learning, reading comprehension

ÖZET

Bu çalışma ileri düzey dil öğrencilerinin doğrusal hipermetin okuma ortamlarında sözcük ve okuma puanlarına etki eden faktörleri incelemektedir. Bağımsız değişkenler açıklayıcı not türü, okuma bilgisi, bilişsel ve algısal öğrenme stilleri, konuya ilgi ve ön bilgi testlerinin sonuçlarıdır. Bağımlı değişkenler, sözcük ve okuma testlerinin sonuçlarıdır. Araştırmaya Türkiye'deki bir üniversitede okuyan 69 adet 1. sınıf İngilizce öğretmenliği öğrencisi katılmıştır. Katılımcılar, özgün bir elektronik metni okumak amacıyla yansız atama yoluyla üç gruba ayrılmışlardır. Elektronik metinler birbirlerinden açıklayıcı notların türü bakımından farklıdır. Üç farklı açıklayıcı not kullanılmıştır: a) Sözcük tanımları, b) sözcük tanımları ve bu tanımlarla ilgili resimler, c) sözcük tanımları ve bu tanımlarla ilgili kısa filmler. Katılımcılardan anlama amacıyla metni okumaları istenmiştir. Daha sonra önceden duyurulmamış bir sözcük testi ile beraber okuma testi verilmiştir. Değişkenler arasındaki ilişkiyi görmek amacıyla yapılan çoklu regresyon analizine sözcük ve okuma testlerinin sonuçları bağımlı değişken olarak, yukarıda sayılan diğer değişkenler ise bağımsız değişkenler olarak dahil edilmiştir. Sonuçlar, açıklayıcı not türü, okuma bilgisi ve konuyla ilgili ön bilginin hipermetinde sözcük öğrenmeye katkısı olan, öte yandan okuma bilgisi ve görsel öğrenme stillerinin okuma-anlamaya katkısı olan değişkenler olduğunu göstermiştir.

Anahtar Kelimeler: Çoklu ortamlar, eğitimde medya, bilgisayar destekli dil eğitimi, sözcük öğrenme, okuma-anlama

INTRODUCTION

Using multimedia or hypermedia as a supplemental medium for foreign/second language (L2) learning and teaching has received considerable interest. Notable numbers of multimedia software have been developed for teaching foreign languages since multimedia is considered a promising technology to facilitate L2 learning and teaching (Chiquito, Meskill, & Renjilian-Burgy, 1997). Due to its integration of different media, multimedia could have positive effects on language learning (Kramsch & Andersen, 1999; Shea, 1996). Along with the presentation of input in multiple forms, interaction provided by hypermedia and the use of authentic materials can make it an ideal language learning medium (Chiquito et al., 1997; Heller, 1990; Kramsch & Andersen, 1999).

Multimodality in hypermedia environments is basically provided with the aid of hypermedia annotations or glosses incorporated into a reading text in multiple forms of media. It is suggested that providing glossaries is better than simplifying a text in helping learners to cope with comprehension since simplification deteriorates the authenticity of the text (Luppescu & Day, 1993; Watanabe, 1997; Widdowson, 1984). Moreover, glosses increase flow of reading, independence from dictionaries and accuracy in finding meaning (Nation, 1990). Finally, they help readers confirm or disconfirm their vocabulary guesses from the context.

Research studies on the effectiveness of hypermedia on L2 learning have mostly investigated the effects of multimedia glossing techniques on certain aspects of L2 learning such as vocabulary learning (Chun & Plass, 1996a; De Ridder, 2003; Hulstijn, Hollander, & Greidanus, 1996; Knight, 1994; Seghayer, 2001) and text comprehension (Ariew & Erçetin, 2004; Aust, Kelley, & Roby, 1993; Chun & Plass, 1995, 1996b; Davis & Lyman-Hager, 1997; Erçetin, 2003; Knight, 1994; Lomicka, 1998; Roby, 1999; Sakar & Erçetin, 2005).

With respect to vocabulary learning, previous studies suggest that glosses/annotations with word definitions and visuals (e.g., pictures and videos) help learners learn vocabulary more efficiently than annotations with word definitions alone (Chun & Plass, 1996a; Seghayer, 2001). However, empirical studies have revealed contradictory findings regarding the relative importance of the type of visual annotations. Chun and Plass (1996a) suggest that annotations which include word definitions coupled with pictures are more effective on vocabulary learning than annotations that include definitions coupled with videos. Seghayer's (2001) investigation, on the other hand, has yielded the conclusion that definitions coupled with videos are more effective in facilitating vocabulary learning.

When certain variables are added into the research design, notable changes in the results can occur. For instance, Knight (1994) investigated the effects of on-line dictionary access along with L2 verbal ability on vocabulary learning of learners of French. Results indicated that vocabulary learning outcomes varied according to the linguistic proficiency of the learners.

As for reading comprehension, it is suggested that hypermedia environments have the potential to facilitate L2 reading comprehension since they provide additional information at both the word and the topical level (Lomicka, 1998; Martinez-Lage, 1997). In other words, electronic reading provides L2 readers with the opportunity to learn beyond the texts via textual and extratextual information contrary to the traditional reading. However, the relationship between hypermedia use and reading comprehension is somewhat indirect (Chun, 2001). Other variables, such as verbal ability and proficiency may interact with the effects of hypermedia (Ariew & Erçetin, 2004). These predictions stem from the reading studies conducted in L1 and L2. These studies revealed that the ability to utilize better reading strategies to comprehend the text depends on the learners' foreign language reading proficiency (Devine, 1988), prior knowledge on the subject domain (Carrell, 1988), topic interest (Schiefele & Krapp, 1996) and learning styles (Bernhardt, 1991).

The variables that affect traditional reading and vocabulary learning are expected to be influential in hypermedia environments as well. Furthermore, providing several authentic multimedia symbol systems should create a more interesting learning environment serving learners with different learning styles. It is suggested that differences in learning styles should result in distinctive navigation patterns and differences in learning outcomes in hypermedia environments (Parkinson & Redmond, 2002). Literature provides studies with contradictory findings some establishing a relationship between individual learning styles and learning outcomes (Andris, 1996; Plass, Chun, Mayer, & Leutner, 1998) whilst others failing to establish a connection between learning styles and achievement (Calcaterra, Antonietti, & Underwood, 2004; Liu & Reed, 1994). Replication of the studies in different learning situations and with different learner populations may help to shed light on these issues. The current design aims to investigate whether selected explanatory variables predict foreign language vocabulary learning and reading comprehension in hypermedia environments at a practically significant level.

METHOD

Participants

The experiment was conducted with 69 (22 males and 47 females) freshman TEFL students studying at an English-medium university in Turkey. In order to encourage participation in the experiment, full participation was awarded with 5 % of students' English Composition grades. Participants were randomly assigned to three groups each containing 23 students.

Materials

Treatment: Reading Software

Using the reading software designed by Ariew (1999), a hypermedia text was generated. The software allowed integration of glosses to an electronic text collecting data with its built-in tracking tool, which recorded every single interaction of the readers with the material. That is, the frequencies of access to annotations, the order in which they are accessed and the amount of time spend on reading were recorded by the tracking tool.

The original text of the software comes from an advanced reading book by Smith and Mare (1997). The reading passage was chosen based on a topic interest questionnaire given to participants before. A pen-and-paper version of the original text was piloted with 20 senior students who did not participate in the original study in order to determine the words to be annotated. All unknown words were annotated. For each word, 4 pictures and 3 videos were found. Four English teachers selected the most suitable videos and pictures for each word. Each picture was standardized to a size of 450 pixels width and 303 pixels height. The videos used were similar to each other in length and quality. The mean length of the videos was 13.7 seconds (SD: 1.07). The American Heritage Dictionary (2000) was used as the source of all the word definitions.

Three parallel forms of the electronic text were prepared. The first form included only textual definitions, which provided the definition of a highlighted word or phrase, and its grammatical form –noun, adjective, verb, etc appears. For example, the textual annotation for the word “doomed” appears as ‘adj. - Condemned to ruination or death’. The second version of the text included an associated image of the word in addition to the definition provided in the first group. The third version of the text included an associated movie and the definition provided in other groups. In picture and video groups, participants were free to choose either one type of annotation or both types provided. Annotations were presented successively when they were clicked rather than simultaneously.

The text was presented in a linear order in 9 pages and students were allowed to go forward and backward in the text by clicking on one of two arrow-buttons provided at the bottom of the screen. The design had a navigation map at the top-left side of the screen that indicated which page the student was reading and how many pages there were left to read.

Vocabulary Test

Overall vocabulary scores were computed based on 3 subtests. They were prepared by the researcher based on the tests used by Knight (1994), Rott (1999) and Waring and Takaki (2003). All subtests were piloted for item development. Items with insufficient item facility, item discrimination and distractor efficiency indices were modified. The first subtest included a checklist in which students were asked to indicate the words they remembered from the text. The checklist was comprised of 42 target items and 30 fillers. The second subtest involved students writing the L1 equivalents or synonyms of every target word. Since this subtest would allow subjectivity in scoring, two independent raters scored the papers and an interrater reliability of .95 was found for the pre-test, .98 for the immediate post-test and .98 for the delayed post-test. The third subtest was a multiple-choice test whose first half involved synonym recognition and the second half involved definition recognition. The reliability coefficients obtained from the actual administration revealed that alpha of the pre-test was .76, that of immediate post test was .72 and that of the delayed post test was .69.

Reading Comprehension Test

The reading comprehension test consisted of a multiple-choice and a true-false section. The true-false part consisted of 22 questions and each question had a third choice called “no information”. This reduced the

chance of getting the right answer by guessing alone from 50 % to 33 %. The multiple-choice part consisted of 12 questions, 4 distractors for each. In both parts, grammatically parallel and correct distractors were provided. Moreover, incidental insignificant information and details were not tested. The test was developed by the researcher with the assistance of an expert, and edited by an American colleague to eliminate odd structures or unidiomatic language. Administration procedures including speed and time control were determined after a pilot study. The actual data revealed that the Cronbach's Alpha of the multiple choice test was .79 and that of true-false part was .70.

Prior Knowledge Test

The prior knowledge test consisted of two parts. In the first part, participants were asked to write down every single thing they knew about the topic. A total of 31 propositions were mentioned by the participants in the essays and each coherent and acceptable proposition was given 1 point. An independent rater was trained and an interrater reliability coefficient of .97 was found between the scorers on the first part. The second part consisted of 5 open-ended questions and 2 precise completion items. The highest possible score was determined to be 16 for the second part. A detailed scoring rubric was prepared and an independent rater was trained. An interrater reliability coefficient of .96 was found between the researcher and the independent scorer on the second part. The cumulative scores of the two parts were used as the prior knowledge score.

Nelson – Denny Reading Test

In order to see whether the groups were equal with regard to their reading ability, the Nelson-Denny Reading Test prepared by Brown, Fisho and Hanna (1993) was used. It is a standardized reading survey for high school and college students and adults, which measures vocabulary development, comprehension and reading rate. The test was administered to all the participants at the same time and in the same room according to the instructions given in the Nelson-Denny test manual.

Learning Style Questionnaire

Rebecca Oxford's (1993) 'Style Analysis Survey (SAS)' was used as the learning style assessment instrument in the study. The material provides individuals' overall style preferences focusing on their general approach to learning and working. SAS has a Cronbach Alpha of .87 in testing with 468 language students at the university level in a U.S. university.

Topic Interest Questionnaire

On the very same sheet with the prior knowledge test, a topic interest test was also given to the students. The test was adapted from Schiefele and Krapp (1996). The questionnaire consisted of value-related and feeling related valences. To calculate value-related valences, students were asked to rate the topic on its usefulness, meaningfulness, importance and worthiness on a 4-point scale, 4 showing complete agreement and 1 showing complete disagreement. To calculate feeling-related valences, students were asked how they would feel, when they read the text by rating again on a 4-point scale, 4 implying complete agreement with a specific feeling and 1 implying complete disagreement with it; i.e., boredom, interest, indifference, involvement and engagement. For each subject, a score of topic interest was computed by adding feeling-related and value related scales (Schiefele & Krapp, 1996; 146). The highest possible score was 36.

Procedure

Participants were given the Nelson-Denny Reading test, the prior knowledge test and vocabulary pre-test two weeks before the treatment. They were given the learning style questionnaires a week before the treatment. The treatment was given at one of the computer laboratories of the university, which was designed for simultaneous processing of 25 computers each connected to a local area network (LAN). Participants were given the treatment successively on the very same day. Before the reading session, the researcher oriented students with the reading software by providing a demonstration on how the software worked through a data projector. Each group was given exactly the same instructions and was told that they should read the text carefully since they would have a reading comprehension test after the treatment session. After the treatment, participants were given the unannounced vocabulary test, the announced reading comprehension test and a background questionnaire successively. Within four days following the treatment 63 of the 69 students were given semi-structured interviews. Exactly 3 weeks after the treatment, again unannounced, all students were given the vocabulary test again.

Data Analysis

Since randomization was realized, the groups were considered to be theoretically equal (Ary, Jacobs, & Razavieh, 1996). However, a further inspection of the groups was also carried out. The groups were compared using one-way analyses of variance (ANOVA) on vocabulary pre-test scores, general point average (GPA), age, prior topical knowledge, topic interest, L2 reading ability, PC aptitude, WWW use, learning style, and frequency of lookup behavior to determine whether the groups differed from each other in terms of those variables at a probability value of .05 or below. The assumptions of ANOVA were checked before running the analyses. The groups were not different from each other at the inception of the study at a probability value of .05.

In order to control for the vocabulary pre-test scores, gained vocabulary scores were calculated. All variables were put into a bivariate correlation calculation in SPSS 14.0 for windows. Explanatory variables that had moderate or high correlations with response variables were selected, and multiple regression analyses with each response variable were conducted. Assumptions of normally distributed errors, linearity, multicollinearity and uncorrelated residual term were checked before interpreting the analyses.

RESULTS

Vocabulary Learning

Immediate Post-test Scores

Predictor variables that had high correlation with gained vocabulary post-test scores were language proficiency ($r=.323$, $p<.007$) and prior topical knowledge ($r=.355$, $p<.003$). Text format was used as a dummy variable in the analysis. Variables were entered into the analysis successively. Language proficiency scores explained 10 % of the vocabulary post-test scores ($R^2=.104$, $F=7.801$, $p<.007$). The next variable, annotation type, created an R squared change of .16. More specifically, it explained an additional 16 % in the criterion variable (R^2 change=.16, F change=7.076, $p<.002$). The final variable, prior knowledge score, explained an additional 4.6 % in the criterion variable (R^2 change=.046, F change=4.309, $p<.042$). The regression model with these three variables accounted for 31 % of variance in the criterion variable. In other words, above variables explained 31 % of immediate vocabulary post-test scores. The regression equation is as follows: Immediate post-test score= 0.258 (language proficiency) + 0.241 (annotation type) + 0.228 (prior topical knowledge).

Further analysis revealed that the groups performed differently based on the annotation type ($F_{2,66}=9.819$; $p<.001$). Multiple comparisons with Scheffe test revealed that both the picture and video group performed significantly better than the definition only group in terms of immediate post-test scores. However, there was no difference between the picture and the video group.

Delayed Post-test Scores

The only predictor variable that had high correlation with delayed vocabulary post-test scores was language proficiency ($r=.319$, $p<.008$). Even though prior topical knowledge had a significant correlation with the criterion variable ($r=.278$ $p<.021$), it did not create a significant R^2 value in the hierarchical regression analysis. Text format was used as a dummy variable in the analysis again. The analysis revealed that language proficiency scores explained 10 % of variability in the criterion variable ($R^2=.102$, $F=7.590$, $p<.008$). Annotation type, created an R squared change of .12. In other words, it explained an additional 12 % in the criterion variable (R^2 change=.116, F change=4.828, $p<.011$). Overall, the model with these two variables accounted for 22 % of variance in the criterion variable. More specifically, the variables explained 22 % of delayed vocabulary post-test. The following regression equation evolves: Delayed post-test score= 0.306 (language proficiency) + 0.163 (annotation type).

Further analysis was conducted with delayed post-test scores as well. Similar to above results, groups performed differently based on the annotation type ($F_{2,66}=4.822$; $p<.011$). Multiple comparisons with Scheffé test revealed that the video group performed significantly better than the definition only group.

Reading Comprehension

Potential explanatory variables that had high correlation coefficients with the criterion variable were reading ability ($r=.386$, $p<.001$) and learning styles (SAS visual score) ($r=.248$, $p<.04$). Annotation type was used as a dummy variable. A hierarchical regression analysis with the reading comprehension scores as the criterion and above variables as the predictors was conducted. Results revealed that language proficiency scores explained 15 % of variability in the criterion variable ($R^2=.149$, $F=11.760$, $p<.001$). The second variable, SAS visual score, explained an additional 6 % variability in the criterion (R^2 change=.059, F change=4.887, $p<.03$). Annotation type did not have a significant R^2 value in the analysis. In sum, language proficiency and SAS visual score explained 21 % of variability in reading comprehension scores. The regression equation evolving from this analysis is as follows: Reading comprehension score= 0.383 (language proficiency) + 0.242 (SAS visual score).

DISCUSSION

Findings of the study suggest that when advanced language learners are under scrutiny, predictors of vocabulary learning in hypermedia reading environments are annotation type, reading ability and prior topical knowledge. Moreover, findings suggest that predictors of reading comprehension are reading ability and SAS visual score.

These findings confirm the results of previous studies. More specifically annotation type is an important variable contributing to vocabulary learning (Chun & Plass, 1996a; Seghayer, 2001) along with linguistic proficiency (Knight, 1994). Moreover, as suggested by Devine (1988), the ability to comprehend the text primarily depends on the learners' foreign language reading proficiency. Finally, in terms of learning styles, the findings follow a path similar to those of Andris (1996) and Plass et al (1998) maintaining that there is a relationship between individual learning styles and learning outcomes. Within the scope of the current study, one could claim that hypermedia environments may provide learning opportunities for learners with different visual learning styles.

Combining text with visuals regardless of the type of visual used is more effective in facilitating vocabulary learning than providing only definitions of words. In this respect, findings are in line with the Generative Theory of Multimedia Learning (Mayer, 1997; 2001), particularly with the dual channels assumption, which suggests that it is better to present an explanation in words and visuals than solely in words.

Treatment of the study had low element interactivity, that is, elements in the material could be learnt successively rather than simultaneously since they did not interact. So, the intrinsic cognitive load was low. Sweller and his colleagues suggest that extraneous cognitive load is a problem in cases of high element interactivity. They claim that manipulating the instructional design might have no beneficial outcomes when the element interactivity is low (Sweller, 1994; Sweller, van Merriënboer, & Paas, 1998). The current study suggested that students exposed to visual annotations were better in vocabulary tasks than those who were merely exposed to verbal annotations even though the element interactivity of the material is low. Thus, extraneous cognitive load could be a problem also for low element interactivity materials for advanced language learners.

Several pedagogical implications can be suggested based on the current design and relevant literature. In hypermedia reading environments, the interaction between the reader and the text provides individualized learning and promotes learner autonomy. Learners can have control over their learning process and learn at their own pace. Therefore, both slow learners and fast learners can make use of hypermedia environments efficiently because of the interaction they provide. Second, the presentation of authentic input is made easier with hypermedia software. Besides, learners are not only presented with real language, but also with original means to deal with the authentic language. Thus, multimedia are more feasible in creating natural L2 learning tasks than text simplification methods that may result in inauthenticity. Third, in order to make better use of hypermedia environments, L2 readers need to add new strategies to their repertoire to be independent during the reading process. In this respect, familiarizing L2 learners with hypermedia experience and training them can be quite feasible. Finally, professionals involved in material development should consider the importance of visual aids in language teaching through hypermedia.

The study poses several limitations; thus, the findings should be considered with caution. First, the target population of the study was EFL students who learn English for academic purposes. This study should be replicated in other learning contexts with students from different levels to generalize findings to a larger target population. Second, further studies with larger sample sizes must be conducted to investigate whether a really significant variation existed in the population. Third, the use of a pre-test affected the generalizability of this study: the results cannot be generalized to people who are not pre-tested. Finally, participants were exposed to a non-traditional treatment, but tested with traditional testing methods in the current study. Employing on-screen tests where visual elements are incorporated would be more suitable for use in hypermedia environments.

REFERENCES

- American heritage® dictionary of the English Language* (4th ed.). (2000). Boston: Houghton Mifflin Company.
- Andris, J., 1996. The relationship of indices of student navigational patterns in a hypermedia geology lab simulation to two measures of learning style. *Journal of Educational Multimedia and Hypermedia*, 5, 303–315.
- Ariew, R. (1999). *Reading Toolbox* (Version 2.0). [Computer Software]. Tucson, AZ.
- Ariew, R., & Erçetin, G. (2004). Exploring the potential of hypermedia annotations for second language reading. *Computer Assisted Language Learning Journal*, 17, 237-259.
- Ary, D., Jacobs, L. C., & Razavieh, A. (1996). *Introduction to research in education* (5th ed.). Orlando: Harcourt Brace College Publishers.
- Aust, R., Kelley, M. J., & Roby, W. (1993). The use of hyper-reference and conventional dictionaries. *Educational Technology, Research and Development*, 41, 63-73.
- Bernhardt, E. B. (1991). *Reading development in a second language: Theoretical, empirical and classroom perspectives*. New Jersey: Ablex Publishing.
- Brown, J. I. Fishco, V. V., & Hanna, G. S (1993). *Nelson-Denny Reading Test, Forms G and H*. Itasca, IL: Riverside Publishing.
- Calcaterra, A., Antonietta, A., & Underwood, J. (2004). Cognitive style, hypermedia navigation and learning. *Computers & Education*, 44, 441-457.
- Carrell, P. L. (1988). Some causes of text-boundedness and schema interference in ESL reading. In P. Carrell, J. Devine, & D. Eskey (Eds.), *Interactive approaches to second language reading* (pp. 101-113). Cambridge: Cambridge University Press.
- Chiquito, A. B., Meskill, C., & Renjilian-Burgy, J. (1997). Multiple, mixed, and malleable media. In bush, M.D. (Ed.), *Technology-enhanced language learning* (pp.47-76). Illinois: National Textbook Company.
- Chun, D. M. (2001). L2 reading on the web: Strategies for accessing information in hypermedia. *Computer Assisted Language Learning*, 14, 367-403.
- Chun, D. M. and Plass, J. L. (1995). Project CyberBuch: A hypermedia approach to computer-assisted language learning. *Journal of Educational Multimedia and Hypermedia*, 4, 95-116.
- Chun, D. M. & Plass, J. L. (1996a). Effects of Multimedia Annotations on Vocabulary Acquisition. *The Modern Language Journal*, 80, 183-198.
- Chun, D. M. & Plass, J. L. (1996b). Facilitating reading comprehension with multimedia. *System*, 24, 503-519.
- Davis, J. N., & Lyman-Hager, M. (1997). Computers and L2 reading: Student performance, student abilities. *Foreign Language Annals*, 30, 58-72.
- De Ridder, I. (2003). *Reading from the screen in a second language*. Apeldoorn: Granat Publishers.
- Devine, J. (1988). The relationship between general language competence and second language reading proficiency: Implications for teaching. In P. Carrell, J. Devine, & D. Eskey (Eds.), *Interactive approaches to second language reading* (pp. 260-277). Cambridge: Cambridge University Press.
- Erçetin, G. (2003). Exploring ESL learners' use of hypermedia reading glosses. *CALICO Journal*, 20, 261-283.
- Heller, R. S. (1990). The role of hypermedia in education: A look at research issues. *Journal of Research on Computing in Education*, 22, 431-441

- Hulstijn, J. H., Hollander, M., & Greidanus, T. (1996). Incidental vocabulary learning by advanced foreign language students: The influence of marginal glosses, dictionary use, and reoccurrence of unknown words. *The Modern Language Journal, 80*, 327-339.
- Knight, S. (1994). Dictionary: The tool of last resort in foreign language reading: A new perspective. *The Modern Language Journal, 78*, 285-299.
- Kramsch, C., & Andersen, R. W. (1999). Teaching text and context through multimedia. *Language Learning and Technology, 2*, 31-42.
- Liu, M., & Reed, W.M. (1994). The relationship between the learning strategies and learning styles in a hypermedia environment. *Computers in Human Behavior 10*, 419-434.
- Lomicka, L. (1998). To gloss or not to gloss: an investigation of reading comprehension online. *Language Learning and Technology, 1*, 41-50.
- Lupescu, S., & Day, R. (1993). Reading, dictionaries and vocabulary learning. *Language Learning, 43*, 263-287.
- Martinez-Lage, A. (1997). Hypermedia technology for teaching reading. In M. D. Bush & R. Terry (Eds.), *Technology Enhanced Language Learning* (pp. 121-163). Lincolnwood, IL: National Textbook Company.
- Mayer, R. E. (1997). Multimedia learning: Are we asking the right questions? *Educational Psychologist, 32*, 1-19.
- Mayer, R. E. (2001). *Multimedia learning*. Cambridge: Cambridge University Press.
- Nation, I. S. P. (1990). *Teaching and learning vocabulary*. New York: Heinle & Heinle Publishers.
- Oxford, R. L. (1993). *Style analysis survey (SAS)*. Tuscaloosa, AL: University of Alabama.
- Parkinson, A., & Redmond, J.A. (2002). Do cognitive styles affect learning performance in different computer media? *ACM SIGCSE Bulletin, 34*, 39-43.
- Plass, J. L., Chun, D. M., Mayer, R. E., Leutner, D. (1998). Supporting visual and verbal learning preferences in a second-language multimedia learning environment. *Journal of Educational Psychology, 90* (1), 25-36.
- Roby, W. B. (1999). What's in a gloss? *Language Learning and Technology, 2*, 94-101.
- Rott, S. (1999). The effect of exposure frequency on intermediate language learner's incidental vocabulary acquisition and retention through reading. *Studies in Second Language Acquisition, 21*, 589-619.
- Schiefele, U., & Krapp, A. (1996). Topic interest and free recall of expository text. *Learning and Individual Differences, 8*, 141-160
- Seghayer, K. (2001). The effect of multimedia annotation modes on L2 vocabulary acquisition: A comparative study. *Language Learning & Technology, 5*, 202-232.
- Shea, P. (1996). *Media, multimedia, and meaningful language learning: A review of the literature*. Paper presented at WebNet 96. San Francisco, CA.
- Smith, L. C., & Mare, N. N. (1997). *Topics for today: An advanced reading skills text*. Massachusetts: Heinle & Heinle Publishers.
- Sweller, J. (1994). Cognitive load theory, learning difficulty and instructional design. *Learning and Instruction, 4*, 295-312.
- Sweller, J., Van Merriënboer, J. & Paas, F. (1998) Cognitive architecture and instructional design, *Educational Psychology Review, 10*, 251-296
- Şakar, A., & Erçetin, G. (2005). Effectiveness of hypermedia annotations for foreign language reading. *Journal of Computer Assisted Learning, 21*, 28-38.
- Waring, R., & Takaki, M. (2003). At what rate do learners learn and retain new vocabulary from reading a graded reader? *Reading in a Foreign Language, 15*, 130-163. Retrieved January 15, 2004 from, <http://nflrc.hawaii.edu/rfl/October2003/waring/waring.pdf>
- Watanabe, Y. (1997). Input, Intake and Retention: Effects of Increased Processing on Incidental Learning of Foreign Language Vocabulary. *Studies in Second Language Acquisition, 19*, 287-307.
- Widdowson, H. G. (1984). *Teaching Language as Communication*. Oxford: Oxford University Press.