



Educational Research and Reviews

Volume 9 Number 14 23 July, 2014
ISSN 1990-3839



*Academic
Journals*

ABOUT ERR

Educational Research and Reviews (ISSN 1990-3839) is published bi-monthly (one volume per year) by Academic Journals.

Educational Research and Reviews (ERR) is an open access journal that publishes high-quality solicited and unsolicited articles, in English, in all areas of education including education policies and management such as Educational experiences and mental health, the effect of land tenure system on resource management, Visualization skills and their incorporation into school curriculum, Gender, education and child labour etc. All articles published in ERR are peer-reviewed.

Contact Us

Editorial Office: err@academicjournals.org

Help Desk: helpdesk@academicjournals.org

Website: <http://www.academicjournals.org/journal/ERR>

Submit manuscript online <http://ms.academicjournals.me/>.

Editors

Prof. Peter Massanyi

*Slovak University of Agriculture, Faculty of
Biotechnology and Food Sciences, Department of
Animal Physiology
Tr. A. Hlinku 2, SK-949 76 Nitra, Slovak Republic
Slovak Republic.*

Prof. Name Mostafa El-Sheekh

*Faculty of Science, Tanta University,
Tanta 31527, Egypt
Egypt.*

Prof. Minghua Zhou

*Nankai University
No. 94, Road Weijin,
Nankai District,
Tianjin 300071, China
China.*

Prof. Muhammad Abdul Rauf

*United Arab Emirates University
United Arab Emirates.*

Prof. Shao Hongbo

*Qingdao University of Science Technology
Zhengzhou Road 53, Qingdao266042, China
China.*

Prof. Ghasem D. Najafpour

*Oshirvani University of Technology
Babol, Iran
Iran.*

Prof. Toyin Ayodele Arowolo

*Department of Environmental Management &
Toxicology
College of Environmental Resources Management
University of Agriculture
P.M.B. 2240
Abeokuta 110001
Ogun State
Nigeria.*

Dr. Vikrant John Vedamanikam

*University Malaysia Terengganu,
Mengabang Telipot,
21030 Kuala Terengganu,
Terengganu,
Malaysia.*

Dr. Xue Song Wang

*Department of Chemical Engineering, Huaihai Institute
of Technology, PR. China
CangWu Road 59#, Lianyungang, Jiangsu, PR. China
China.*

Dr. Mohamed Nageeb Rashed

*Aswan Faculty of Science, South Valley University,
Aswan,
Egypt.*

Prof. Hamayun Khan

*Department of Chemistry
Islamia College University
Peshawar-25120,
Pakistan.*

Editorial Board

Prof. García Mayo, María del Pilar

*Departamento de Filología Inglesa y Alemana y de Traducción e Interpretación
Universidad del País Vasco (UPV/EHU)
Paseo de la Universidad 5
01006 Vitoria- Spain*

Dr. Faisal Manzoor Arain

*C-5, Block # 7, Gulshan-e-Iqbal, Karachi 75300,
Pakistan.*

Prof. Frank Witlox

*Ghent University – Department of Geography
Krijgslaan 281, S8
B-9000 Gent
Belgium.*

Prof. Georgios D. Sideridis

*University of Crete
Department of Psychology
Rethimno, 74100
Greece.*

Prof. Mutendwahothe Walter Lumadi

*North West University
Private Bag x 2046
Mmabatho
2735
South Africa..*

Dr. Miriam McMullan

*Faculty of Health and Social Work
University of Plymouth
Plymouth PL6 8BH*

Dr. Jitendra Pandey

*Banaras Hindu university
Environmental Science Division, Department of Botany,
Banaras Hindu university, Varanasi – 221005,
India.*

Prof. Moshe Barak

*Graduate Program for Science and Technology Education
Ben-Gurion University of the Negev, Beer Sheva 84105
Israel*

Dr. Boniface Francis Kalanda

*Malawi Social Action Fund
Private Bag 351
Lilongwe
Malawi*

Dr. Hiam Zein

*Psychology and Education
Lebanese American University
P.O.Box: 13-5053.Chouran-Beirut,
1120 2801-Lebanon
Lebanon*

Dr. Joel O. Eriba

*Faculty of Education
Benue State University,
Makurdi
Nigeria.*

Prof. Bingjun Yang

*School of Foreign Languages,
Southwest University, Beibei,
Chongqing 400715, P. R. China,
China*

Dr. Ernest W. Brewer

*The University of Tennessee,
Educational Administration and Supervision,
324A Claxton Addition,
Knoxville,
Tennessee*

Prof. Gail Derrick

*Regent University
School of Education
1000 Regent University Drive
Virginia Beach, VA 23464.*

Dr. Evridiki Zachopoulou

*Department of Early Childhood Care and Education,
P.O. Box 141, Sindos 57400,
Thessaloniki,
Greece.*

Prof. Michael Omolewa

*Nigerian Permanent Delegation to UNESCO Rue Miollis
75015, Paris.*

Dr. Francesco Pastore

*Research fellow, IZA Bonn
Assistant Professor, Seconda Università di Napoli
Palazzo Melzi, Piazza Matteotti, 81055,
Santa Maria Capua Vetere (Caserta)
Italy*

Dr. Syed Iftikhar Hussain Shah

*Technical Education and Vocatio TEVTA Secretariat,
96-H Gulberg-II, Lahore
Pakistan.*

Educational Research and Reviews

Table of Contents: Volume 9 Number 14 23 July, 2014

ARTICLES

Research Articles

- High school administrators' perceptions of their technology leadership preparedness** 441
Osman Ferda Beytekin
- Effect of hypertextual reading on academic success And comprehension skills** 447
Erhan Durukan
- A validation and reliability study of community service activities scale in Turkey: A social evaluation** 456
Özden Demir*, Halil İbrahim Kaya and Murat Taşdan
- Elective drama course in Mathematics education: An Assessment of pre-service teachers** 466
Sagirli, Meryem Özturan
- New pedagogical literacy requirement resulting from technological literacy in education** 478
Abdullah Adigüzel

Full Length Research Paper

High school administrators' perceptions of their technology leadership preparedness

Osman Ferda Beytekin

Faculty of Education, Ege University, Izmir, Turkey.

Received 9 June, 2014; Accepted 18 June, 2014

The interaction between schools and technology forges the school leaders to transform their practices to support 21st century paradigm skills. Schools have the complicated mission of incorporating technologies to enhance effective management practices in their schools. A project known as FATİH was launched to enhance the opportunities and to improve technology in schools in Turkey. This project aimed to establish interactive boards in classrooms to make the learning environment more effective in schools. In the first and expanded pilot phase, 49000 tablet PCs have been distributed to both students and teachers in 81 provinces in Turkey. The tablets and interactive boards have been delivered to 150 high schools of the total 1704 in Izmir Province. The school administrators and teachers who delivered the project have had a technological preparation course during the implementation of the pilot project. A quasi-experimental quantitative study was used as a research design to determine school administrators' views of technology leadership preparedness and to investigate the impact of this technological preparation course. The technological leadership survey developed by Hacifazlıoğlu et al. (2011) from ISTE, 2009 *International Society for Technology in Education*, standards for administrator was used and 618 principals and vice principals were surveyed in Izmir during the second term of 2013/2014 educational year. Descriptive statistics and a one-way multivariate analysis of variance were applied to analyze the data. The findings revealed that the high school administrators' highest perceptions of technology leadership preparedness were in subscale of visionary leadership whereas the subscale digital citizenship had the lowest mean score. There was a statistically significant difference of technology leadership preparedness perceptions between the high school administrators who delivered the technology preparation course and non-course participants, where the course participants perceived higher levels of preparedness on all five subscales of visionary leadership, digital age learning culture, excellence in professional practice, systemic improvement and digital citizenship.

Key words: Technology leadership, visionary leadership, digital age learning culture, excellence in professional practice, systemic improvement and digital citizenship.

INTRODUCTION

Educational leadership in this era was faced with strategic decisions for dealing with the competition and

recruiting students. In the final wave, which includes the present, the internet and affordable computing are

E-mail: ferda.beytekin@ege.edu.tr Tel: +905327235514

Author agree that this article remain permanently open access under the terms of the [Creative Commons Attribution License 4.0 International License](https://creativecommons.org/licenses/by/4.0/)

creating a globalized environment in which educational leaders are faced not only with more competition, but with competition from outside of their own localities. In other words, schools have changed from relatively closed systems in which one leader was responsible and accountable for producing predetermined outcomes, to dynamic systems that must adopt and respond to rapid societal changes on a global level (Franciosi, 2012). This kind of technological leadership is a key element in management processes necessary for guiding today's teachers and students of the 21st century. Leadership, especially from the principal, is generally acknowledged as an important influence on a school's effectiveness, a belief that is supported by empirical evidence (Hallinger and Heck, 1996; Leithwood and Riehl, 2003). Studies of school improvement also point to the importance of principals' leadership in such efforts (Fullan, 2001; Fullan and Stiegelbauer, 1991; Louis, 1994).

Education reform is an important topic to review in relationship to educational technology as one will not really come full circle without the other and implementing them both will require strong leaders who can lead in a culture of change. New competencies that school-based administrators need to develop in order to be effective in their new roles as technology leaders are described in the context of a five-part model. An argument is made that technology leadership is much more than resource acquisition and management. Instead, we argue that technology leadership has multiple dimensions given the complexity of schools as learning organizations (Flanagan and Jacobsen, 2003). The traditional role of the school administrators have been managing and keeping the day to day events of the school running smoothly. The distinction of leader versus manager is of importance as it is the leader in an organization that creates a vision for change and the manager that can plan and implement the details of that change. There are a small number of administrators who consider themselves technology leaders. Few will admit that they know all there is to know about technology leadership. The quest for understanding technology leadership and technology integration appears to be a lifelong rather than a short journey. Slowly but surely, we are accumulating a critical mass of information which describes the roles and functions of the superintendent, principal, and technology coordinator when weaving technology into the fabric of schools (Bailey, 1996).

On the other hand, today's educational approach requires shaping school administrators to be not only educational leaders but also leaders of technology by the use of new information technologies and practices. Administrators need a host of skills. One of the most important involves understanding change and the change process. Technology integration at the district, building, and classroom level involves second order changes. One cannot bring about massive change if one does not understand the nature of change and the change process. Before introducing technology into the classroom, the

technology leader must have a good grasp of the dynamics of change and how people react to change. Three essential aspects of the change process need to be understood: personal change, organizational change and cultural change. The goal of a technology leader is to motivate teachers to integrate technology into their curriculum and become proficient with technology. How a technology leader accomplishes this goal requires more than just expertise with technology. Technology leaders must be familiar with educational technology goals and standards. They must understand the benefits of how technology should be integrated into education and be able to develop staff development programs for teachers. A major component of technology leadership is how they will motivate teachers to learn, use and implement technology into their curriculum (Speed and Brown, 2014).

Standards for technology leadership

The National Educational Technology Standards for Administrators (International Society for Technology in Education, 2009) are the most recent set of suggestions in the literature about what school leaders, especially principals, should know and be able to do with educational technology. The International Society for Technology in Education (ISTE) (iste.org) has put together standards for educational technology leaders. These standards are revised on a regular basis, with the latest version having been updated in 2009 as of this writing. The purpose of the core standards, titled National Education Technology Standards for Administrators (NETS-A), is to provide guidance to the educational technology leader. The NETS-A includes transformational leadership themes such as communicating a vision and empowering subordinates to act on their own (Franciosi, 2012). The ISTE standards are grouped into five categories as follows (ISTE, 2009):

1. Visionary leadership: Educational Administrators inspire and lead development and implementation of a shared vision for comprehensive integration of technology to promote excellence and support transformation throughout the organization.

a. Inspire and facilitate among all stakeholders a shared vision of purposeful change that maximizes use of digital-age resources to meet and exceed learning goals, support effective instructional practice, and maximize performance of district and school leaders.

b. Engage in an ongoing process to develop, implement, and communicate technology-infused strategic plans aligned with a shared vision.

c. Advocate on local, state and national levels for policies, programs, and funding to support implementation of a technology-infused vision and strategic plan.

2. Digital age learning culture: Educational Administrators create, promote and sustain a dynamic, digital-

age learning culture that provides a rigorous, relevant, and engaging education for all students.

- a. Ensure instructional innovation focused on continuous improvement of digital- age learning.
- b. Model and promote the frequent and effective use of technology for learning.
- c. Provide learner-centered environments equipped with technology and learning resources to meet the individual, diverse needs of all learners.
- d. Ensure effective practice in the study of technology and its infusion across the curriculum.
- e. Promote and participate in local, national, and global learning communities that stimulate innovation, creativity, and digital age collaboration.

3. Excellence in professional practice: Educational Administrators promote an environment of professional learning and innovation that empowers educators to enhance student learning through the infusion of contemporary technologies and digital resources.

- a. Allocate time, resources, and access to ensure ongoing professional growth in technology fluency and integration.
- b. Facilitate and participate in communities that stimulate, nurture and support administrators, faculty, and staff in the study and use of technology.
- c. Promote and model effective communication and collaboration among stakeholders using digital age tools.
- d. Stay abreast of educational research and emerging trends regarding effective use of technology and encourage evaluation of new technologies for their potential to improve student learning.

4. Systemic improvement: Educational Administrators provide digital age leadership and management to continuously improve the organization through the effective use of information and technology resources.

- a. Lead purposeful change to maximize the achievement of learning goals through the appropriate use of technology and media-rich resources.
- b. Collaborate to establish metrics, collect and analyze data, interpret results, and share findings to improve staff performance and student learning.
- c. Recruit and retain highly competent personnel who use technology creatively and proficiently to advance academic and operational goals.
- d. Establish and leverage strategic partnerships to support systemic improvement.
- e. Establish and maintain a robust infrastructure for technology including integrated, interoperable technology systems to support management, operations, teaching and learning.

5. Digital citizenship: Educational Administrators model, facilitate understanding of social, ethical and legal issues and responsibilities related to an evolving digital culture.

- a. Ensure equitable access to appropriate digital tools and resources to meet the needs of all learners.
- b. Promote, model and establish policies for safe, legal,

and ethical use of digital information and technology.

- c. Promote and model responsible social interactions related to the use of technology and information.
- d. Model and facilitate the development of a shared cultural understanding and involvement in global issues through the use of contemporary communication and collaboration tools (ISTE, 2009).

According to Bailey and Lumley (1997), technology leaders have to possess several skills. They include:

- (1) Technology skills; leaders must be able to model the technology.
- (2) People skills; leaders must be able to get along with other people as we learn to use the new technologies
- (3) Curriculum skills; leaders must understand how to integrate the technology into all disciplines
- (4) Staff development skills; leaders must understand the important of training to those people using the technology.
- (5) Learning leadership; leaders must understand the "big picture" (systems thinking) as they work with others to use technology to transform teaching and learning. Changes in the educational system, leadership and pedagogy are all needed for education reform to come full circle and incorporate technology as a seamless tool for teaching and learning. The arrival of digital technologies in schools has impacted the roles and responsibilities of principals in significant ways. Information and communication technology (ICT) has triggered demands for systemic changes in public schools necessitated by the shift from the industrial age to the knowledge economy. Inevitably, teachers and principals feel the pressure to change, and must find ways of implementing and sustaining technological innovations in classrooms (Flanagan and Jacobsen, 2003). As a result, many of today's administrators are novice technology users and have very little experience necessary to be effective technology leaders (Redish and Chan, 2007; Riedl et al, 1998).

METHODOLOGY

Research design

This quasi-experimental study was guided by the main question: "What is the perceived technology leadership preparedness level of school administrators on the 2009 ISTE NETS-A standards?" and the following sub-question was "How do technology leadership preparedness perceptions differ between principals who attended the technology preparation course and those who did not". The themes of NETS-A 2009 were visionary leadership, digital age culture, excellence in professional practice, systemic improvement and digital citizenship. In other words, this quantitative research was designed to examine the perceptions of school administrators regarding their technology leadership preparedness and the impact of technology preparation course on those perceptions.

Participants

This study was conducted in 300 public high schools of Izmir City in

Table 1. Descriptive statistics for the school administrators.

Technology leadership subscales	N	Min	Max	Mean	Std. Dev.
Visionary leadership	618	2	5	4.30	.702
Digital age learning culture	618	1	5	4.01	.814
Excellence in professional practice	618	1	5	3.90	.834
Systemic improvement	618	1	5	4.20	.710
Digital citizenship	618	1	5	3.84	.874

Turkey. The technology leadership survey developed by Hacifazlıoğlu et al. (2011) from ISTE, 2009 *International Society for Technology in Education*, standards for administrator was used and 640 principals and vice principals who attended the technology preparation course and non-course participants were surveyed in İzmir during the second term of 2013/2014 educational year. The 22 surveys with missing data were excluded in inferential analysis resulting in 618 surveys used for calculations.

Instrumentation

The technological leadership survey developed by Hacifazlıoğlu et al. (2011) from ISTE (2009) *International Society for Technology in Education*, standards for administrator was used and the overall reliability of the instrument is high with a Chronbach's alpha (α) = .97. The survey intended to indicate the preparedness levels of principal and vice-principals on the subscales of visionary leadership, digital age culture, excellence in professional practice, systemic improvement and digital citizenship. An additional demographic question was included in the survey to support the research question based on participation in the technology preparation course. Both surveys used the same rating scale for participant responses. Principals were asked to indicate their perception of preparedness on technology leadership skills. Each question had a 5-point scale where 1 represented *not at all* prepared, 2 represented *minimally* prepared, 3 represented *somewhat* prepared, 4 represented *significantly* prepared, and 5 indicated *fully* prepared. Subscale ratios were calculated to account for variances in the number of questions in each subscale.

Data analysis

The descriptive statistics including frequency, mean, range, and standard deviation level was applied using SPSS 19.0. Next, a multivariate analysis of variance (MANOVA) was applied to evaluate the effect of the independent variable across the five technology leadership subscales: visionary leadership, digital age culture, excellence in professional practice, systemic improvement and digital citizenship. The independent variable was participation in the technology preparation course and the dependent variables were the five technology leadership subscales. The results compared the perception of preparedness based on whether or not the principal participated in the preparation program. Further analysis using a one-way analysis of variance was performed to reveal any subscale statistical significance.

FINDINGS

The data was analyzed to search the perceived

technology leadership preparedness level of school administrators. The mean range was from a low score of 3.84 on a scale of 5 to a high score of 4.30 on a scale of 5 (Table 1). Among technology leadership dimensions school administrators considered themselves the most efficient in visionary leadership and followed by systemic improvement, digital age learning culture, excellence in professional practice and the least one was digital citizenship (Table 1).

The next level of analysis used descriptive statistics for the five technology leadership subscales: visionary leader, digital age culture, excellence in professional practice, systemic improvement and digital citizenship (Table 2) related to technology course participation. The five subscales had unequal associated indicators which accounted for additional variation in mean scores. Therefore, subscale ratios were included for comparison. A multivariate analysis of variance (MANOVA) was used to search the differences between technology course participation and perceived technology leadership preparedness level across the five subscales (Table 3). For this analysis a Wilks' Lambda value of .81 was generated. A Wilks' Lambda value of 1 indicates no difference in the means; therefore, this analysis showed a difference in means. The F ratio calculated for this MANOVA was 3.24. This value indicated that the variability between groups is 3.24 times greater than the variability within the groups. The F ratio of 3.24 exceeded the statistical significance level with alpha level .05. Further analysis showed that the probability of the responses being attributed to chance is 1 in 100 ($p = .01$) or a 1% chance. Finally, the eta square value ($\eta^2 = .16$) indicated that the effect size is large, which further indicated a difference between the course and non-course participants.

Analysis of the individual subscales was performed to determine which subscales differed with statistical significance. An analysis of variance (ANOVA) for each subscale was performed to provide this information (Table 4). A Bonferroni adjustment generated an alpha level of .01 (.05/5). This adjustment was made to reduce Type I errors that can be generated by repeated ANOVA tests. The subscale with the least variance between course and non-course participants was visionary leadership with an eta square of .00. An effect size of $\eta^2 = .05$ was calculated for excellence in professional practice. Subscales, digital age culture and systemic improvement,

Table 2. Mean scores of perceived technology preparedness by technology course participation.

<i>Dependent Variable</i>	<i>Course</i>	<i>Mean</i>	<i>Std. Dev.</i>	<i>N</i>
Visionary leadership	Participate	20.1483	2.89043	306
	Non Participate	19.6538	2.35140	312
Digital age learning culture	Participate	18.7312	2.87622	306
	Non Participate	12.9872	2.76652	312
Excellence in professional practice	Participate	16.1132	2.13734	306
	Non Participate	12.3421	2.81891	312
Systemic improvement	Participate	20.2341	2.09872	306
	Non Participate	18.6322	3.98872	312
Digital citizenship	Participate	14.5438	2.09181	306
	Non Participate	11.8862	3.72625	312

Table 3. Multivariate Analysis of Variance

<i>Effect</i>	<i>^</i>	<i>f</i>	<i>df1</i>	<i>df2</i>	<i>p</i>	<i>n2</i>
Group	.81	3.24*	5	85	.01	.16

* $p < .05$

had a .06 effect size. The largest effect size of .12 was for digital citizenship. Additionally, large effect size for digital citizenship, the level of significance, $p = .00$ rounded from .002, was the only subscale to reach statistical significance of variance. This level indicated that there is no probable chance that the difference between groups is random. Approaching statistical significance was the subscale systemic improvement with a significance level of $p = .05$.

DISCUSSION AND CONCLUSION

In this study, among technology leadership dimensions school administrators considered themselves the most efficient in visionary leadership and followed by systemic improvement, digital age learning culture, excellence in professional practice and the least one was digital citizenship. High school administrators reported their highest level of technology leadership preparedness as visionary leadership. This subscale called for leaders to inspire and lead development and implementation of a shared vision for comprehensive integration of technology to promote excellence and support transformation throughout the organization. It guides leaders to inspire a shared vision with stakeholders to maximize positive instructional change. A visionary leader is expected to advocate technology efforts by committing time and resources to support change. This finding was particularly interesting in that one session specifically targeted technology

leadership and vision.

Previous studies in Turkey and in other countries have also found that school administrators have positive attitudes towards technology (Cakir, 2012; Akbaba-Altun, 2008; Bailey, 1997; Dawson and Rakes, 2003; Flanagan and Jacobsen, 2003; Maxwell, 2001; Serhan, 2007). Conversely, principals reported their lowest level of technology leadership preparedness as digital citizenship. Digital citizenship expected leaders to promote, model, and establish policies that ensured safe, legal, and ethical use of technology. Responsible use of technology and social interactions in a digital environment were also expected. As this finding indicates, school administrators as technological leaders must develop their digital citizenship skills and encourage the technological development and training of teachers, provide sufficient technological infrastructure support, and develop an effective school-evaluation plan. This findings of this study also indicated school administrators technology leadership skills have to be improved. However, although school leaders may have formally mandated technology leadership responsibilities this can be problematic since they often do not have the training or background to feel confident in dealing with technology (Stuart et al., 2009).

Differences in technology leadership preparedness perceptions among school administrators who attended the technology course and those non-participants were also examined. There was a statistically significant difference between technology leadership preparedness perceptions of participants and non-participants. These findings show that this kind of technology courses are effective for their management practices cause leaders who participated in the course perceived that they were better prepared to lead technologically to their schools than that those who had not participated. Technological leadership is emerging within the increasingly diversified educational leadership world. Schools striving to excel in the information age need leaders that are well versed in

Table 4. Analysis of variance.

<i>Effect</i>	Digital citizenship	<i>F</i>	<i>df1</i>	<i>df2</i>	<i>p</i>	<i>n2</i>
Visionary leadership	.00	.00	1	89	.99	.00
Digital age learning culture	36.24	3.36	1	89	.06	.06
Excellence in professional practice	11.28	2.28	1	89	.13	.05
Systemic improvement	38.32	3.54	1	89	.05	.06
Digital citizenship	72.16	9.82*	1	89	.00	.12

the potential and in the pitfalls of information and communication technology (Chang, 2012). Rapid technical change and highly uneven distribution of expertise make technological leadership particularly challenging. Such work should incorporate leaders' ability to cope with complex change (Fullan and Stiegelbauer, 1991). However, administrators and other practitioners should understand that while technology infrastructure is important, for educational technology to become an integral part of a school, technology leadership is even more necessary. Such educational leaders not only make teachers more effective but also directly affect students' academic achievement.

Conflict of Interests

The author has not declared any conflict of interest.

REFERENCES

- Akbaba-Altun S (2008). Investigating the relationship between the school administrators' attitude towards technology and their emotional intelligence: Düzce province case. *Proceedings of IETC, Eskişehir*.
- Bailey GD (1995). Technology leadership: Ten essential buttons for understanding technology integration in the 21st century. *Educational Considerations*. Retrieved 01/06/14 from <http://leadteachlearn.org/21stcenturytechleaders/techleadfiles/currentbuttonart.html>
- Bailey G, Lumley D (1997). Technology staff development program--A leadership sourcebook for school administrator's. Bloomington Ind: National Educational Service.
- Bailey G (1997). What technology leaders need to know: The essential top 10 concepts for technology integration in the 21st century. *Learn. Lead. Technol.* 25(1):57-62.
- Cakir R (2012). Technology Integration and Technology Leadership in Schools as Learning Organizations. *Turkish Online J. Educ. Technol.* 11(4):273-282.
- Chang IH (2012). The Effect of Principals' Technological Leadership on Teachers' Technological Literacy and Teaching Effectiveness in Taiwanese Elementary Schools. *Educ. Technol. Soc.* 15(2):328-340.
- Dawson C, Rakes G (2003). The influence of principals' technology training on the integration of technology into schools. *J. Res. Technol. Educ.* 36(1):29-49.
- Flanagan L, Jacobsen M (2003). Technology leadership for the twenty-first century Principal. *J. Educ. Adm.* 41(2):124-142.
- Franciosi SJ (2012). Transformational leadership for education in a digital culture. *Digital Culture Educ.* 4(2):235-247.
- Fullan M (2001). *Leading in a culture of change*. San Francisco: Jossey-Bass.
- Fullan M, Stiegelbauer S (1991). *The new meaning of educational change*. New York: Teachers College Press.
- Hacıfazlıoğlu Ö, Karadeniz Ş, Dalgıç G (2010). Eğitim yöneticileri teknoloji liderliği Standartlarına ilişkin öğretmen, yönetici ve denetmenlerin görüşleri. *Kuramve Uygulamada EğitimYönetimi Dergisi [Educational Administration: Theory Practice]*16(4):537-577. file:///C:/Users/sunny/Downloads/903-1698-1-SM.pdf
- Hacıfazlıoğlu Ö, Karadeniz, Ş, Dalgıç G (2011). Eğitim yöneticileri teknoloji Liderliği öz- yeterlik ölçeğinin geçerlik ve güvenilirlik çalışması. *Kuramve Uygulamada Eğitim Yönetimi [Educational Administration: Theory and Practice]* 17(2):145-166. file:///C:/Users/sunny/Downloads/912-1716-1-SM.pdf
- Hallinger P, Heck RH (1996). Reassessing the Principal's Role in School Effectiveness: A review of the empirical research, 1980-1995. *Educ. Adm. Q.* 32:5-44.
- ISTE (2009). *International Society for Technology in Education Standards for Administrators*. Retrieved 01/06/14 from <http://www.iste.org/standards>
- Leithwood KA, Riehl C (2003). *What we know about successful school leadership*. Philadelphia, PA: Laboratory for Student Success, Temple University.
- Louis KS (1994). Beyond managed change: Rethinking how schools improve. *School Effectiveness and School Improvement* 5:2-24.
- Redish T, Chan TC (2007). Technology Leadership: Aspiring Administrators' Perceptions of Their Leadership Preparation Program. *Electronic J. Integration Technol. Educ.* 6:123-139.
- Riedl R, Smith T, Ware A, Wark A, Yount P (1998). *Leadership for a technology-rich educational environment*. Charlottesville, VA: Society for Information Technology and Teacher Education. <http://eric.ed.gov/?id=ED421128>
- Serhan D (2007). School principals' attitudes towards the use of technology: United Arab Emirates technology workshop. *Turkish Online J. Educ. Technol.* 6(2):42-46
- Speed C, Brown M (2014). *Technology Leadership in Education*. Retrieved 01/06/14 from http://imet.csus.edu/imet1/mica/AR_Project_Final.pdf
- Stuart C, Mills A, Remus U (2009). School leaders, ICT competence and championing innovations. *Computers Educ.* 53(3):733-741.

Full Length Research Paper

Effect of hypertextual reading on academic success and comprehension skills

Erhan Durukan

Fatih Faculty of Education, Karadeniz Technical University, 61335 Trabzon, Turkey.

Received 13 February, 2013; Accepted 13 June, 14

As computer technology developed, hypertexts emerged as an influential environment for developing language skills. This study aims to evaluate a text prepared in a hypertextual environment and its effects on academic success and comprehension skills. In this study, “preliminary test final test control group experimental pattern” was used as the experimental model. The study group is comprised of 61 students in the 8th grade of primary education. The data of the present study were collected using the “Success Test for Understanding What You Listen to/Read (STULR)” (*Cronbach Alpha=0,83*), prepared by the researchers; and analyzed using the SPSS 16 software. In this study, results indicate that hypertextual reading is more effective in terms of developing students’ comprehension skills, compared to traditional education.

Key words: Elementary education, multimedia/hypermedia systems, teaching/learning strategies.

INTRODUCTION

Language education is based on the comprehension and descriptive/explanatory skills. These skills cannot be separated from each other. Comprehension skills are crucial, as they serve as a platform for developing other skill sets. Comprehension skills include reading, listening and observation (Carrell, 1998; Good et al., 2001; Temizkan, 2009).

The importance of these skill sets requires that new materials and techniques are in constant review. Computers have advanced greatly since their first commercial use in the 1960s. They have developed from expensive, cumbersome devices to powerful but affordable tools used in modern life for both professional and leisure activities. Their use in education has increased dramatically in recent years and now computers and related technologies are in most schools all over the world.

Advances in technology are inevitably reflected in educational systems. In most developed countries education has been penetrated by Information Technologies (IT). Many teachers use computers and new technologies while teaching and many textbooks have included new technologies (Hicks and Holden, 2007; Pilli and Aksu, 2013). Most educators and researchers try to use these new technologies, and this integration has changed the nature, concepts and methods of work in each subject (Custer, 2000). One of these used in language education is hypertexts.

The “hypertext” concept, which emerged with the focus on computer-internet-aided education as a result of developing technology, is an educational tool of crucial importance in developing comprehension skills (Liou, 1997; Lomicka, 1998; Warschauer and Healey, 1998;

E-mail: edurukan007@hotmail.com Tel: +904623777088

Author agree that this article remain permanently open access under the terms of the [Creative Commons Attribution License 4.0 International License](https://creativecommons.org/licenses/by/4.0/)

Felix, 1999; Ganderton, 1999; Brooks, 2002; Konishi, 2003; Çakmak and Altun, 2008).

Hypertexts are generally defined as digital or digitalized, linear and/or non-linear interactive texts. Hypertexts are also defined as one of the sustaining elements of the developing information and communication technologies with regard to reading. Hypertexts are rich reading environments that we encounter in daily life and for educational purposes (Çakmak and Altın, 2008). Hypertext is a system in which a textual part is connected to another textual part through machine-aided references. In this system, users can directly interact with the text (Conklin, 1987). Hypertexts are also multimedia-based information systems in which related documents and data are associated with one another and organized through virtual connections. The first reference studies on hypertext were carried out by Vannervar Bush in 1945. Then, this system was developed by Engelbart, Nelson, Trigg and Shneiderman (Brown, 2000; Sala, 2002; Salmeron et al., 2005; Karadeniz, 2006). The preparation, usage features, advantages and limitations of hypertexts are as follows:

1. They are prepared using software similar to flash creation software in a computer environment. There is no need for printed materials while reading a hypertext; however, printed materials can optionally be required while analyzing the text.
2. The parts of a text and the images supporting the text may not appear on the screen at the same time, the elements of the text can be seen in different orders depending on the preference of the creator or when the user intervenes.
3. A user may access an Internet page, an activity or different parts of the text via links. A user can develop his/her reading strategy while reading the text, and can easily re-read the sections or easily link to a related information source.
4. Texts are displayed as supported by images; hypertexts are based on a system in which visual images support the text and the text is read aloud, depending on the preference of the reader. As hypertexts can trigger one's psychomotor skills in the text-related activities in a digital environment, they provide those who learn visually, audibly and kinaesthetically with the multi-learning opportunity.
5. The reader can access more sources of information in a single document, compared to similar printed materials.

This is both an asset and a drawback to hypertext. The availability of multiple sources and links could distract readers from the actual text and purpose (Gall and Hannafin, 1994; Jonassen and Reeves, 1996; Dias and Sousa, 1997; Kyaw and Boldyreff, 1998; Chou and Lin, 1998; Jonassen and Grabinger, 1999; Sala, 2000; Alessi and Trollip, 2001; Sala, 2002; Lee and Tedder, 2003; Chen and Dwyer, 2003; Çakmak and Altun, 2008).

Although the computer-aided education on which hypertext is based is considered to be an expensive

education in some countries, the Turkish Ministry of National Education is trying to address this issue. Since 2001, all the schools in Turkey, including rural settlement areas, have been provided with computers, up-to-date materials and Internet access. This attention to computer-aided education indicates that popularization of hypertexts in Turkey will encounter few obstacles. This study aims to determine the effect of a text transformed into a hypertext on the comprehension skills of primary school students: what they read/how they listen. In this study, a hypertext includes the links through which students can go to the sources of information on the Internet and the activities related to the text.

METHODOLOGY

In the present study, "preliminary test final test control group experimental pattern" was used as the experimental model. The study group of the present research consists of 61 students studying in two different 8th grade classes in a primary school. The school is located in the Erzurum city centre and the period of the study is the Academic Year 2009 to 2010. One class was randomly chosen as the control group (n=30), and the other class was chosen as the experimental group (n=31). Reading activities were conducted using a hypertext in the experimental group while the same activities were conducted using conventional education methods in the control group. As shown in Table 1.

Collection and analysis of data

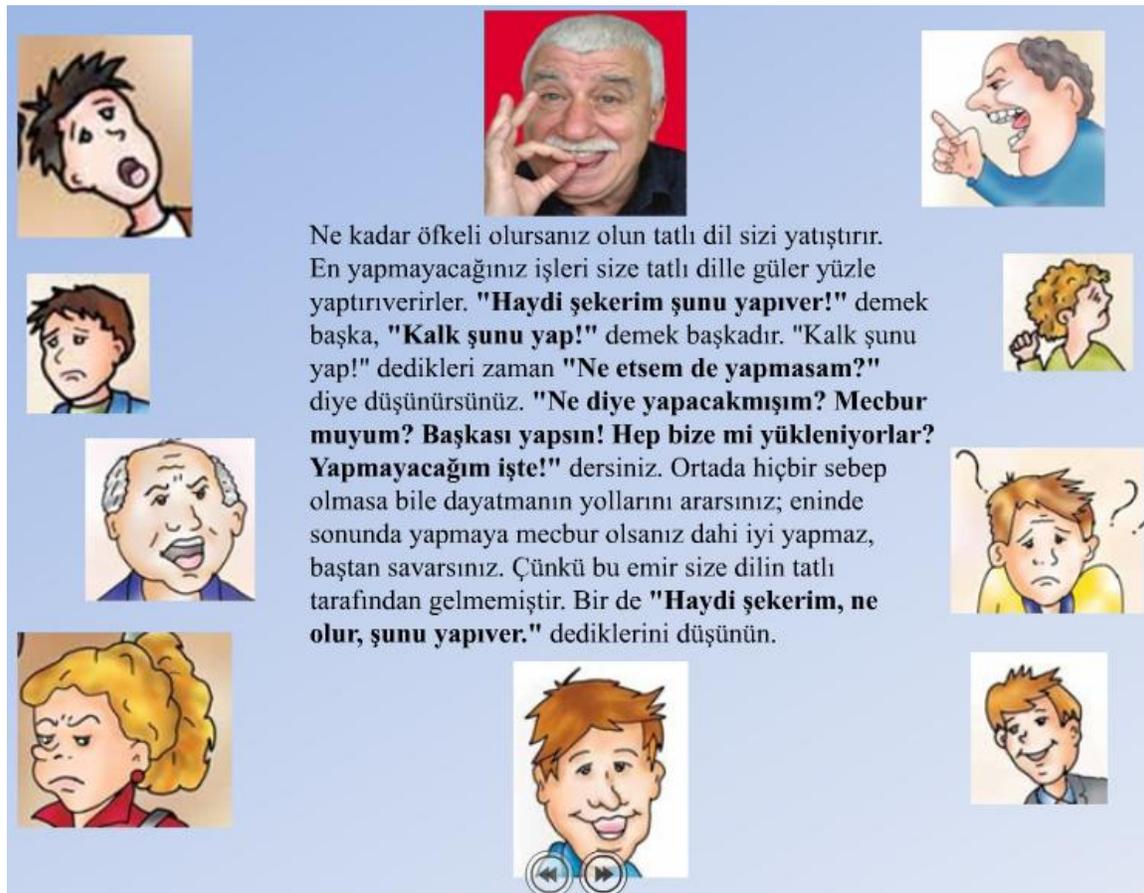
The "Success Test for Understanding What You Listen to/Read", developed by the researchers, was used to study the effect of the methods applied, in terms of the primary school students' success at comprehending what they read and heard. 40 questions were selected from the questions of the SBS (student Placement Test) and the OKS (Test for Institutions of Secondary Education) from the previous years. These were used for the Success Test for Understanding What You Read, which was used for measuring reading comprehension skills. The first version of the success test, consisting of 40 questions, was examined by Turkish Language Teachers and some of the questions were omitted (12 questions) as they were considered less effective at comprehension measurement. A preliminary test sample was given to 117 primary school students in order to test the reliability of the 28-question test. After the test administration, 3 questions were omitted; they were found to reduce the reliability of the test. Then, it was determined that the item difficulty rates of the "Success Test for Understanding What You Listen to/Read" are between 0,20 and 0,89, while the internal consistency coefficient was found to be 0,85 using the KR-20 formula. In this test, each question was scored 1 point.

Application process

The "Success Test for Understanding What You Listen to/Read" was administered to the study group as the preliminary test at the beginning of the study in order to determine whether there is a statistically significant difference between the experimental group (using the hypertextual reading method) and the control group (using conventional educational methods) in terms of comprehension skill improvement. Results of this test indicated that, there is no statistically significant difference between the two sample groups (Table 1) and the experimental and control groups were

Table 1.The research pattern used in the study.

Study group	Sex		Before application	Application process	After application
	Female	Male			
Control	14	16	Preliminary Test	Conventional Education	Final Test
Experimental	16	15	STULR	Hypertextual Reading	STULR

**Figure 1.** Application material view.

randomly established.

The text titled "Tatlı Dil" in the 8th grade Turkish Language course book was converted into a hypertext, using flash creation software, in order to teach the subject of the text in the experimental group. A 2-week reading process with hypertextual reading was planned. While planning the course process according to the hypertext, the course requirements were also considered and activities were included in the hypertext in order to meet these requirements. In the first week, the hypertextual reading text was presented to the students using various technological means. Students were given an explanation of hypertexts and shown how to use them. A hypertextual reading activity was administered in an environment where the students can use computers. As shown in Figure 1 and 2. During the hypertextual reading activity, teachers questioned the students to ensure that each one understood the text and all the features of the hypertext. The hypertext prepared for the session included both visual and audial elements. Internet links were

established on the hypertexts to ensure that the students could access different examples about the subject of the text. At the end of the hypertextual reading process, the researcher asked the students questions about the subject of the text and found that the students appeared to comprehend what they had seen. The final test was given at the end of the second week.

In the control group, the researcher explained the subject using the conventional education method. Daily plans were prepared by researchers, who also prepared the necessary tools and materials were beforehand. In the control group, theoretical data about topic titles were considered by the researcher during the whole process. In these theoretical courses, the researcher asked students to read the related material for the subject of that day aloud and to themselves, and he simply narrated the necessary information and explained the critical points regarding skills. At the end of each lesson, the subject of that day was summarized. The students were asked to be prepared for the subject of the next day before each



Figure 2. The students have called the related vision by clicking relevant part in hypertext.

Table 2. The preliminary – final test findings of the experimental and control groups.

	n	Preliminary test		Final Test	
		\bar{x}	Sd	\bar{x}	Sd
Experimental	31	13.55 % 54	1.895	22.97 %92	1.560
Control	30	13.57 %54	2.012	21.17 %85	2.422

*Level of Absolute Success = Average / the highest points to be received.

lesson and whether or not they were prepared was recorded. At the end of theoretical lessons, the researcher asked for student feedback and repeated any missing parts. The researcher provided feedback and reinforcement and thereby completed the course.

Both groups were taught using the respective methods for 2 weeks, 5 course hours per week. At the end, the "Success Test for Understanding What You Listen to/Read" was given to the experimental and control groups as the final test. The results would determine whether there is a statistically significant difference between the two different methods on the comprehension skills. In order to determine the retention levels of each group 6 weeks after the process, students were given a memory test ("Success Test for Understanding What You Listen to/Read"). The data of the preliminary test, final test and memory test results of the control and

experimental groups were collected and analyzed using the SPSS 16 software.

FINDINGS

Findings about the success of the experimental and control groups at reading / listening

As is seen in Table 2, while the preliminary test average of the experimental group where the hypertextual reading method used is $\bar{x} = 13,57$, this value is $\bar{x} = 22,97$ in the final test; while the preliminary test average of the control group is $\bar{x} = 13, 57$, this value is $\bar{x} = 21,17$ in the final test. These results indicate that the preliminary – final test average scores of the students in both groups increased. When the students are evaluated in terms of their level of absolute success, results indicate that the students in the experimental group had already achieved 54% of the target according to their preliminary test results and this rate increased up to 92% in the final test. Students in the control group had already achieved 54% of the target according to their preliminary test results and this rate increased up to 85% in the final test.

Table 3, displays the Analysis of variance (ANOVA) test results regarding the changes in test scores (above) and the factors contributing to the changes (that is,

Table 3. Preliminary – final test ANOVA results of the experimental and control groups.

Source of Variance	Sum of squares	Sd	Mean squares	F	p*
Between Respondents	269.032	60			
Group (Experimental - Control)	24.228	1	24.228	5.839	.019
Error	244.804	59	4.149		
In Respondents	2456.658	61			
Measurement (Preliminary - Final Test)	2208.052	1	2208.052	583.215	.000
Group* Measurement	25.232	1	25.232	6.665	.012
Error	223.374	59	3.786		
Total	2725.69	121			

* p. 0,05

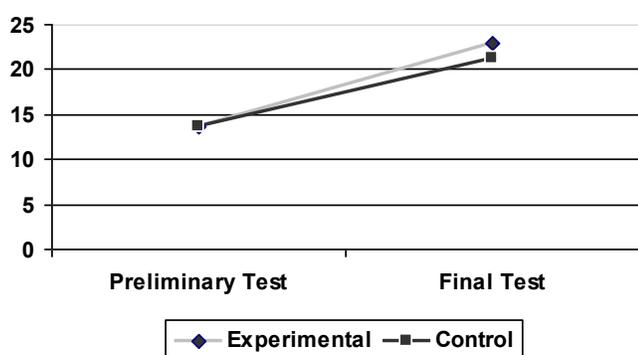


Figure 3. Change in the preliminary – final test average scores of the experimental and the control groups.

different teaching methods). When the data in the Table are analyzed, results indicate a statistically significant difference ($F_{(1, 59)}=5,839, p<0,05$) between the preliminary and final test results of the experimental and control groups before and after the administration. This finding shows that the average scores of the students in the experimental and control groups change irrespective of the measurements (before and after the application). The results in the table also indicate a statistically significant difference between the average scores of the students included in the present study, before and after the administration and irrespective of the groups (experimental – control) ($F_{(1, 59)} = 583,215, p<0,05$). Results indicate a statistically significant relationship between the common effects of the factors, indicating the group difference and different measurement times in the table on the average scores of the students ($F_{(1, 59)}= 6,665, p<0,05$).

This finding indicates that the changes in the average scores of the students in the experimental group (using the hypertextual reading method) are different from the changes in the average points of the students in the control group. In other words, the average scores of the students in the experimental and control groups are

Table 4. The final test and memory test findings of the experimental and control groups.

	n	Final Test		Memory Test	
		\bar{x}	Sd	\bar{x}	Sd
Experimental	31	22.97 %92	1.559	20.19 %81	1.887
Control	30	21.17 %84	2.422	17.10 %71	1.604

* Level of Absolute success = Average / the highest score to be received.

statistically different from each other, depending on the methods and processes used. These findings indicate that the hypertextual reading method used in the experimental group is more effective at raising levels of skill comprehension (reading/listening), compared to the conventional education method used for the control group. This finding is also reflected in Figure 3. According to Figure 3, there is no difference between the preliminary test averages of the experimental and control groups, while there is a clear difference between their final test averages. As is seen in Table 4, the final test arithmetical average of the experimental group was $\bar{x} = 22,97$, and this value decreased to $\bar{x} = 20,19$ in the memory test; the final test arithmetical average of the control group was $\bar{x} = 21,17$, and this value decreased to $\bar{x} = 17,10$ in the memory test. When compared in terms of absolute success levels, it was determined that the students in the experimental group had achieved 92% of the target according to the final test results, and this rate decreased to 81% in the memory test. It was also determined that the students in the control group had achieved 84% of the target and this rate decreased to 71% in the memory test. In the memory test administered to the students in the experimental and control group after the final test, a very slight decrease was observed in the memory levels of all students.

Table 5. The final test and memory test ANOVA results of the experimental and control groups.

Source of Variance	Sum of squares	Sd	Mean squares	F	p*
Between Respondents	442.656	60			
Group (Experimental - control)	182.626	1	182.626	41.437	.000
Error	260.030	59	4.407		
In Respondents	534.111	61			
Measurement (Final - Memory Test)	356.734	1	356.734	127.836	.000
Group* measurement	12.734	1	12.734	4.563	.037
Error	164.643	59	2.791		
Total	976.767	121			

* p. 0.05

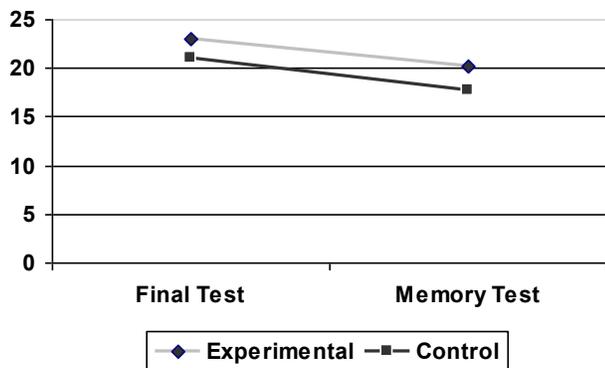


Figure 4. Change in the final- memory test average scores of the experimental and the control groups.

The two factor ANOVA test results regarding whether the above mentioned changes observed in the success averages of the students at understanding what they read/listen to in the experimental and control groups in which different methods were used display a statistically significant difference are given in Table 5. Table 5 displays the ANOVA results for the Final Test and Memory Test of both groups. When the data in the Table are analyzed, it the results indicate that there is a statistically significant difference ($F_{(1, 59)}=41,437, p<0,05$) between the experimental and control groups' final test and memory test results, from before and after the administration. These findings indicate that the average scores of the students in both the experimental and control groups were different, irrespective of the measurements (before and after the administration). Regarding the measurement basic effect, results indicate a statistically significant difference ($F_{(1, 59)} = 127,836, p<0,05$) between the average points of the students included in the study before and after the administration, irrespective of the groups (experimental-control). Results also indicate that there is a statistically significant relationship between the common effects of the factors –

Table 6. The findings related to the preliminary – final and memory tests of the experimental group.

Measurements	n	\bar{x}	Sd
(1) Preliminary Test		13.55	1.894
(2) Final Test	31	22.97	1.559
(3) Memory Test		20.19	1.887

indicating the group difference and different measurement times - in the table, on the average scores of the students ($F_{(1, 59)}= 4,563, p<0,05$).

This finding indicates that the change in the average scores of the experimental group students is different from the changes in the average points of the control group students. The average scores of the students in the experimental and control groups are statistically different from each other, depending on the methods and process used. It would be seem, from these findings, that the hypertextual reading method used in the experimental group is more effective at raising reading/listening comprehension levels, than the conventional education method used for the control group. This finding is also reflected in Figure 4. When the Figure above is analyzed, it is seen that there is a little decrease between the final test and memory test averages of the experimental and control groups.

As is seen in the Table 6, the preliminary test arithmetical average of the experimental group was $\bar{x}= 13,55$ and this rate increased up to $\bar{x} = 22,97$, and was calculated as $\bar{x} = 20,19$ in the memory test. These results indicate a clear change (increase → decrease) in the average scores of the students in the experimental group. Table 7 displays the one factor ANOVA test results regarding whether or not there was a statistically significant difference in comprehension level improvement between the two student groups. When the data in the Table 8 are analyzed, there appears to be a statistically significant difference ($F_{(2, 60)}=330,093, p<0,05$) between the preliminary test, final test and memory test results of

Table 7. Preliminary – final and memory tests ANOVA results of the experimental group.

Source of Variance	Sum of squares	Sd	Mean squares	F	p*	Statistically Significant Difference
Between Respondents	155.462	30	5.182			1-2, 1-3
Measurement (Preliminary - Final - Memory)	1452.645	2	726.323	330.093	0000	2-3
Error	132.022	60	2.200			
Total	1740.129	92				

* p. 0.05

Table 8. The findings related to the preliminary – final and memory tests of the control group.

Measurements	n	\bar{X}	Sd
(1) Preliminary Test		13.57	2.012
(2) Final Test	30	21.17	2.422
(3) Memory Test		17.10	1.604

the experimental group, before and after the administration. As a result of the multi-comparison analysis (Post-Hoc Bonferroni) performed with the aim of determining the difference among the preliminary, final and memory measurements, it was determined that there is indeed a statistically significant difference among the preliminary test, final test and memory test averages ($p < 0,05$). These findings show that the hypertextual reading method is an effective way to improve students' reading/listening comprehension skills.

As is seen in the Table 8, while the preliminary test arithmetical average of the control group in which conventional education method used was $\bar{X} = 13,57$, this rate increased up to $\bar{X} = 21,17$ and was calculated as $\bar{X} = 17,10$ in the memory test. This finding indicates that there is a clear change (increase → decrease) in the average scores of the students in the control group. Table 9 displays the one factor ANOVA test results for students in the control group.

When the data in the Table are analyzed, there appears to be a statistically significant difference ($F_{(2, 58)} = 109,337$, $p < 0,05$) between the preliminary test, final test and memory test results of the control group, before and after the application. As a result of the multi-comparison analysis (Post-Hoc Bonferroni) performed with the aim of determining the difference among the preliminary, final and memory measurements, it was determined that there is a statistically significant difference among the preliminary test, final test and memory test averages ($p < 0,05$). These findings indicate that the hypertextual reading method is effective at improving student reading/listening comprehension levels.

CONCLUSION AND DISCUSSION

The objective of this study is to determine the effect of a

text, transformed into hypertext, on the comprehension skill levels of primary school students. The results of this study indicate that the success level of the experimental group, who were taught using the hypertextual reading method, is higher than that of the control group, who were taught using conventional education methods. Accordingly, in this study, results indicate that;

1. The hypertextual reading method used in the experimental group is more effective than to the conventional method used in the control group;
2. Based on the data obtained from the memory tests of the students in the experimental and control groups after the application, the hypertextual reading method is more effective in terms of what students remember, compared to the conventional method.

The results obtained in the present study are similar to the results of other studies on hypertextual education (Reinking., 1988; Horney and Anderson-Inman, 1994; Miall and Dobson, 1998; Dillon and Gabbard, 1998; Liu, 2004; Naumann et al., 2007; Çakmak and Altun, 2008). Besides it has been seen that some studies are also related to language arts and their results are similar to the results of our studies. As a result of the research, by Taşçı and Soran (2008), on 58 students (Control= 29, Experimental= 29) attended in foreign language preparation class in Hacettepe University, it has been concluded that the students in experimental group, which multimedia applications used in, have been shown more success in terms of reaching the manners at the application level. Akbulut (2007), has made a research, about understanding the text and grammar success, on 69 students who are in first call of English Teaching Department of a university in Turkey. Linear hypertext was used in the research. As a result of the study, it has been stated that the reading passage with hypertext has more effective role on comprehension skill and grammar skills of students.

In addition to these studies Karadeniz (2008) has made a research on 13 university students by using quantitative and qualitative data collection tools and concluded that hypertexts are effective for increasing the success level of students but the students prefer using hypertexts in the activity stage after learning the subject instead of using it throughout learning stage. Hypertextual language

Table 9. Preliminary – final and memory tests ANOVA results of the control group.

Source of Variance	Sum of squares	Sd	Mean squares	F	p*	Statistically Significant Difference
Between Respondents	132.056	29	4.554			1-2, 1-3
Measurement (Preliminary – Final - Memory)	867.822	2	433.911	109.337	.000	2-3
Error	230.178	58	3.969			
Total		89				

* p. 0,05

teaching activities can be conducted in other study groups with different language skills and different socio-economical characteristics. These methods and teaching environments can be used to address different types of issues with regard to reading, writing, listening and grammar. In addition, this method may be useful in researching the language skills for different disciplines.

Conflict of Interests

The author have not declared any conflict of interests.

REFERENCES

- Akbulut Y (2007). Variables Predicting Foreign Language Reading Comprehension and Vocabulary Acquisition in a Linear Hypermedia Environment. *Turkish Online J. Educ. Technol.* 6(1):53-60.
- Alessi SM, Trollip AR (2001). *Multimedia for Learning: Methods and Development*. 3rd edition. Massachusetts, America: Allyn and Bacon.
- Brooks K (2002). Reading, Writing, and Teaching Creative Hypertext: A Genre-Based Pedagogy. *Pedagogy: Critical Approaches to Teaching Literature, Language, Composition, and Culture* 2(3):337-356.
- Brown B (2000). The Theory of Hypertext. *WebNet J.* 2(1):46–51.
- Carrell PL (1998). Can reading strategies be successfully taught?. *Lang. Teacher* 22:(3):7-14.
- Chen W, Dwyer F (2003). Hypermedia research: Present and future. *Int. J. Instructional Media* 30(2):143-148.
- Chou C, Lin H (1998). The Effect of Navigation Map Types and Cognitive Styles on Learners' Performance in a Computer-Networked Hypertext Learning System. *J. Educ. Multimedia Hypermedia* 7(2-3):151-176.
- Conklin J (1987). Hypertext: An Introduction and Survey. *IEEE Computer* 20(9):17-41.
- Custer RL (2000). Blurring the boundaries. In: G. E. Martin (Ed.), *Technology education for the 21st century*. 49th yearbook. Council on Technology Teacher Education. Peoria, IL: Glencoe/McGraw-Hill.
- Çakmak E, Altun A (2008). İlköğretim Öğrencilerinin Hipermetinsel Okuma Süreçlerinin İncelenmesi [Examining Elementary School Students' Hypertextual Reading Processes], *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi [Hacettepe University Journal of Education]*, 34:63-74.
- Dias P, Sousa P (1997). Understanding navigation and disorientation in hypermedia learning environments. *J. Educ. Multimedia Hypermedia* 6(2):173-185.
- Dillon A, Gabbard R (1998). Hypermedia as an educational technology: A review of the quantitative research literature on learner comprehension, control, and style. *Review of Educational Research*, 68, 322-349.
- Felix U (1999). Web-based language learning: A window to the authentic world. In: R. Debski and M. Levy (eds.). *World CALL: Global perspectives on computer-assisted language learning*. Lisse: Swets & Zeitlinger. pp.85-98.
- Gall JE, Hannafin MJ (1994). A Framework for the study of hypertext. *Instructional Science*, 22, 207-232.
- Ganderton R (1999). Interactivity in L2 web-based reading. In: R. Debski and M. Levy (eds.). *World CALL: Global perspectives on computer-assisted language learning*. pp.49-66. Lisse: Swets & Zeitlinger.
- Good RH, Simmons DC, Kame'enui EJ (2001). The importance of decision-making utility of a continuum of fluency-based indicators of foundational reading skills for third-grade high stakes outcomes. *Scientific Studies of Reading*, 5(3):257-288.
- Horney MA, Anderson-Inman L (1994). The electrotext project: hypertext reading patterns of middle school students. *J. Educ. Multimedia Hypermedia* 3:71-91.
- Jonassen DH, Reeves TC (1996). Learning with technology: Using computers as cognitive tools. In: D. H. Jonassen (Ed.), *Handbook of research on educational communications and technology*. New York: Macmillan pp.693-719.
- Jonassen DH, Grabinger RS (1999). Problem and issues in designing hypertext/hypermedia for learning. In: D. H. Jonassen & H. Mandl (Eds.). *Designing hypermedia for learning*. Berlin: Springer-Verlag. pp.3-25.
- Hicks D, Holden C (2007). *Teaching the global dimension: Key principles and effective practice*. London: Routledge.
- Karadeniz Ş (2006). Öğretim Amaçlı Hiper Metin, Hiper Ortam ve Çoklu Ortamlar İçin Tasarım İpuçları. *Yüzüncü Yıl Üniversitesi Eğitim Fakültesi Dergisi [Yuzuncu Yil University Journal of Education]*, 3(2):12-33.
- Karadeniz Ş (2008). Bilişsel Esnekliğe Dayalı Hipermetin Uygulaması: Sanal Bilgisayar Hastanesi. *Türk Eğitim Bilimleri Dergisi* 6(1):135-152.
- Konishi M (2003). Strategies for Reading Hypertext By Japanese ESL Learners. *Reading Matrix* 3(3):97-119.
- Kyaw P, Boldyreff C (1998). A Survey of Hypermedia Design Methods in the Context of World Wide Web Design. <http://citeseer.ist.psu.edu/kyaw98survey.html>.
- Lee MJ, Tedder CM (2003). The effect of three different computer texts on readers' recall: based on working memory capacity. *Computers Human Behav.* 19:767-783.
- Liou H (1997). The impact of WWW texts on EFL learning. *Computer Assisted Lang. Learn.* 10(5):455-478.
- Liu M (2004). Examining the performance and attitudes of sixth graders during their use of a problem – based hypermedia learning environment. *Computers Human Behav.* 20:357-379.
- Lomicka LL (1998). To gloss or not to gloss: An investigation of reading comprehension online. *Lang. Learn. Technol.* 1(2):41-50.
- Miall DS, Dobson TM (1998). Orienting the reader? A study of literary hypertext. The VIth Biannual IGEL Conference, Utrecht, The Netherlands, file:///C:/Users/sunny/Downloads/download.pdf
- Naumann J, Richter T, Flender J, Christmann U, Groeben N (2007). Signaling in Expository Hypertexts Compensates for Deficits in Reading Skill. *J. Educ. Psychol.* 99(4):791-807.
- Pilli O, Aksu M (2013). The effects of computer-assisted instruction on the achievement, attitudes and retention of fourth grade mathematics students in North Cyprus. *Computers Educ.* 62:62-71.

- Reinking D (1988). Computer-mediated text and comprehension differences: The role of reading time, reader preference, and estimation of learning. *Reading Res. Q.* 23:485-489.
- Sala N (2000). Web Learning Environment (WLE): An Example of the Use of The Internet in Educational Process, 2(4), <http://search.usi.ch/publications/771/Web-Learning-Environment-WLE-An-Example-of-the-Use-of-The-Internet-in-Educational-Process>
- Sala N (2002). Cooperative Hypertext: An Educational Example. *Turkish Online J. Dist. Educ.* 3(1):14-19.
- Salmeron L, Canas JJ, Kintsch W, Fajardo I (2005). Reading Strategies and Hypertext Comprehension. *Discourse Proc.* 40(3):171-191.
- Taşcı G, Soran H (2008). Hücre Bölünmesi Konusunda Çoklu Ortam Uygulamalarının Kavrama ve Uygulama Düzeyinde Öğrenme Başarısına Etkisi. *Hacettepe University J. Educ.* 34:233-243.
- Temizkan M (2009). Metin Türlerine Göre Okuma Eğitimi [Reading Education With Regard to Text Types]. Ankara: Nobel Publications.
- Warschauer M, Healey D (1998). Computers and language learning: An overview. *Lang. Teach.* 31:57-71.

Full Length Research Paper

A validation and reliability study of community service activities scale in Turkey: A social evaluation

Özden Demir*, Halil İbrahim Kaya and Murat Taşdan

Department of Educational Sciences, Faculty of Education, Kafkas University, 36004, Paşaçayırı, Kars, Turkey.

Received 22 April, 2014; Accepted 13 June, 2014

The purpose of this study is to test the reliability and validity of Community Service Activities Scale (CSAS) developed by Demir, Kaya and Taşdan (2012) with a view to identify perceptions of Faculty of Education students regarding community service activities. The participants of the study are 313 randomly chosen students who attend six different departments in Faculty of Education, Kafkas University. The data were analysed through exploratory and confirmatory factor analysis to enhance the construct validity. Internal consistency (Cronbach Alpha) co-efficiency was evaluated for the reliability of the instrument. A 33-item instrument with "Thinking Processes and Skills", "Awareness" and "Benefit" subscales was developed as a result of the analyses conducted. Cronbach Alpha internal consistency co-efficiency that explains 55,046 % of the total variance was found .93, .90 for the first factor, .92 for the second factor and .73 for the third factor. Some fit statistics calculated with the same analysis are: $(X^2/df)= 2,54$; RMSEA= 0,070; RMR= 0,085; GFI= 0,81; AGFI= 0,78; NNFI= 0,97; NFI= 0,96; CFI= 0,98.

Key words: Community service activities; learning; thinking; reliability; confirmatory factor analysis.

INTRODUCTION

Community Service Activities are experimental practice that students are required to apply to the theoretical knowledge of the lessons in non-profit community organizations. Educators, researchers, and legislators believe that Community Service Activities bring very important experiences in students (Nathan and Kielsmeier, 1991 cited in Shiarell et al., 2000; Rubin and Matthews, 2013). Community Service Activities gives the students an opportunity to develop various skills in issues such as team building, leadership, problem solving, communication, organization and how to make use of their time. (Tucker et al., 1998 cited in Shiarell et al., 2000; Simons et al., 2011).

Community Service Learning also prepares the

students for adulthood and citizenship by exposing them to be sensitive to the needs of the society and by showing them that they could make a difference when they use their time and skills for the benefit of the society (Smith, 1994 cited in Shiarell et al., 2000). Service learning provides students and instructors with additional means for reaching course objectives while applying content in community or school settings. In a teacher education program, it is much more effective to require students to apply course objectives in real life contexts and make relevant theoretical concepts, pedagogical techniques, and methodology concrete as opposed to the abstract concepts found in textbooks (Bernadowski et al., 2013). "Service-learning offers powerful opportunities to

*Corresponding author. E-mail: oooozden@gmail.com.

acquire the habits of critical thinking; that is, the ability to identify the most important questions or issues within a real-world situation" (<http://www.servicelearning.org> cited in Bernadowski et al., 2013; Kelly, 2013). In conclusion, Community Service Activities are usually an important part of the mission of universities and a property that they try to give their students in time (Cohen, 1994; Markus et al., 1993 cited in Shiarell et al., 2000).

Service-learning, is a way of teaching and learning where students participate in activities that respond to current human and community needs along with organized reflection opportunities that are purposefully designed to foster student learning and development (Jacoby and Associates, 1996 cited in Lamberton, 2012). Drawing from the vast data from the National Survey of Student Engagement, Kuh (2008 cited in Lamberton., 2012) presented ten high impact practices, which according to educational research, increase the student retention rate as well as student engagement both inside and outside of the classroom during the college years. Among the high impact practices are service-learning, learning communities, collaborative projects, diversity/global learning and internships. In addition to promoting and/or fostering the spiritual development of college students, these practices promote the overall health and wellness of the institutions that serve them (Lamberton, 2012). There are scales which are developed in foreign and domestic fields to measure Community Service Activities. One of those scales is Community Service Activities Scale (CSAS), which is developed by Shiarella et al. (2000). The scale has been switched with a more general term, in a way that Schwart's (1977) model fit volunteering. The volunteering here usually involves continuously helping people. Shiarella et al. (2000, cited in Shiarella et al., 2000) explain 65% of eight-factor variance in the scale of community service they developed. The Cronbah Alfa reliability coefficients related to the subscales of the scale are Awareness (Alfa=.78), Actions (alfa .83), Skill (alfa .82), Rules (alfa: .84), Empathy (alfa: .83), Costs (alfa: .85), Benefits (alfa: .80), Seriousness (alfa: .86) and Intention to participate in community service (alfa: .89).

Community Service Activities combine learning and teaching in classroom with service learning by integrating them within the boundaries of university (Zlotkowski, 1996; in Shiarella et al., 2000). It also enable the students to improve some of their skills such as teamwork, leadership, problem solving, communication and time management (Tucker et al., 1998). After the students attend the Community Service Activities, they become more interested and more knowledgeable about their works, they enjoy much more learning process, they improve their communication skills, and they raise their interest in community involvement (Bringle and Hatcher, 2009; Draper, 2004; Hatcher-Skeers and Aragon, 2002; Kalivas, 2008; Rizzolo et al., 2013). In literature review, it is seen that Community Service Activities in Turkey are

Examined with different perspectives by various researchers. Those sides are: "social responsibility" by Yılmaz (2011); "gaining the opinions of social studies teacher candidates on Community Service Activities lesson" by Sönmez (2010); "the perception related to Community Service Activities lesson" by Elma et al. (2010); "operation process of Community Service Activities lesson and views on its acquisitions" by Uğurlu and Kıral (2011); "development of social responsibility" by Saran et al. (2011: 28); "its contribution social life in the context of community service" by Öğülmüş (2006); "the evaluation of social studies teacher candidates on "Community Service Activities" by Gökçe (2011); and "Community Service Activities and authentic learning" by Horzum and Bektaş (2012).

In their study which they try to determine the individual and social results of Community Service Activities, Simons and Cleary (2006) establish that the students have improved themselves from the beginning of the term to the end in some issues such as sensitivity to the social differences, political awareness, social self-efficacy and citizenship relations (Elma et al., 2010). As for the results of some studies related to Community Service Activities, it is pointed out that it raises social and cognitive skills (Klute and Billig, 2002 cited in Stewart, 2012), social and cultural heritage are contacted (Billig et al., 2003 cited in Stewart, 2012), it also provides awareness for social problems and contribution to the rise of civil participation information (Melchior and Bailis, 2002 cited in Stewart, 2012), it improves problem-solving skills and moral evaluation (in reasoning) (Eyler et al., 1999 cited in Stewart, 2012), it raises more love and respect to different races (Stewart, 2009; Stewart and Bai, 2010 cited in Stewart, 2012), it raises political participation and political competence expectation (Billig et al., 2005 cited in Stewart, 2012), it raises the civil competence productivity expectations (Kahne and Westheimer, 2006 cited in Stewart, 2012), it improves advanced proficiency participants and skills which are required for civil engagement (Althof and Berkowitz, 2006 cited in Stewart, 2012), it improves the abilities which could connect interpersonal civic participation problems and social problems to academic learning (Eyler et al., 2001 cited in Stewart, 2012).

Developing the social awareness and participation skills of university students are closely associated with the effective use of awareness, understanding of individual and social benefits, thinking processes and skills of individuals. Individuals who are aware of learning skills of self-learning (planning, organization and evaluation) and people who develop them can contribute to social development. The general aim of the research, based on the above, is to develop an assessment instrument, the intent of which is to determine the level of suitability of learning and teaching environments at the level of Faculty of Education to improve service learning and to determine the awareness of teacher candidates on

Community Service Activities.

METHODOLOGY

Research model

The study is a research in which the development of "Community Service Activities Scale (CSAS)" at the level of Faculty of Education, and its validity and reliability are examined. In the process of measuring instrument development, these are respectively monitored as a way; preparing scale materials, receiving expert opinion for content validity, trial application, exploratory factor analysis and confirmatory factor analysis in data analyses, validity and reliability.

Population and sample

The research is constituted by the teacher candidates who received education at Kafkas University in 2011 to 2012 school years and who took the lesson of Community Service Activities. Of this population, 313 fourth-grade students who receive education in six departments (Classroom Teaching, Turkish Language Teaching, Science Teaching, Preschool Teaching, Psychological Counseling and Guidance and Social Sciences) determined with cluster sampling method, which is not based on probability, compose the sample of the research. Students who received community service course in different departments were included in the sample and thus enhanced "maximum variation". The purpose of this sampling method is to find the common points and similarities between various cases and to reveal different aspects of the problem according to this variation. Therefore, the present study made use of non-probability sampling method. 126 (40.3%) of the students are female, 175 (55.9%) of them are male and 12 (3.8%) of them didn't indicated their genders.

The process of preparing community service activities scale

The following steps, which are suggested by De Vellis (2003; cited in DeVellis, 2003), are applied in the process of preparing Community Service Activities Scales. Preparation of Item Pool: The process of developing Community Service Activities has been started with the studies related to the preparation of the item pool. First of all, related literature has been scanned and the information about which features these practices should have has been examined to improve community service learning in teacher candidates.

In the direction of these determinations, first draft articles have been written. The draft articles have been written in the way it would contain the behaviors which improve service learning and application environment sizes within the scope of the concept of "Community Service Activities", which are defined as operational. Those prepared items have carefully been reviewed and a pool of 65 items has been formed. Expert Opinion Studies of the Article Pool: The item pool has been reached to three experts to get expert opinion. While one of those experts is a person who works as a teacher in primary schools and who took the lesson of Community Service Activities within the scope of the schedule of his master degree; other two experts are academicians who work in the Department of Education Sciences at Kafkas University Faculty of Education, who lecture about Community Service Activities, and who are experts on the process of learning-teaching.

The Pilot Study of Community Service Activities Scale: 60-item trial scale, which has been prepared accordingly, has been applied on a 35-person group, who are the students of Social Sciences

Department, and it has been checked in terms of language and understanding. In line with the recommendations, some required arrangements have been made on the items in terms of statement and page layout. The 60-item trial scale, which has been finalized as a result of those studies, has been applied to 130 students of Faculty of Education, who were selected from the departments, in one session of the classroom and the actual application of the scale has been made. At the beginning of the factor analysis which is made to determine the factor structure of the Community Service Activities scale, Kaiser-Meyer-Olkin (KMO) coefficient and Barlett Sphericity test results have been examined to clarify whether the data are suitable to factor analysis, and those values have been seen to be statistically meaningful (KMO=0.89; Barlett Sphericity test $\chi^2 = 1,878$ df = 300 p<.001). In consequence of the pilot application of Community Service Activities Scale with 136 students, the Cronbach Alfa reliability value of a 25-item form is .89 in total, in the first sub-factor (14 items) .94, in the second sub-factor (6 items) .72 and in the third sub-factor (5 items) .48.

Confirmatory factor analysis has been applied to test the accuracy of the three-factor structure. Though there are many statistics for the data suitability of the model (Jöreskog and Sorbom 1993; in Çokluk et al., 2010), the indicators are usually χ^2 , χ^2/df , RMSEA, NNFI, CFI and GFI values (Çokluk et al., 2010). Confirmatory factor analysis, which has been made to examine how much the three-factor model is adjust with the data gathered, and chi-square value, which is calculated for model-data alignment, have been found meaningful ($\chi^2 = 1704.62$, df= 857, p<.01). When the four-factor model was examined, it was proved in consequence of DFA, conformity index values obtained RMSEA=.086 and $\chi^2/df=1.98$ value and RMR=0.069, STRMR=0.083, GFI=.063, AGFI=0.59, NFI=0.57, NNFI=0.71, CFI=0.73 and the values are seen to be appropriate with the suggested criteria. The standardized coefficients, which show the relations of the items with their factors change between .87 and .43 and all of them are meaningful at the level of .01. In general, analyzing the conformity indices of model, the model shows a good conformity by RMSEA=.086, $\chi^2/df=1.98$ (Tabachnick and Fidell, 2001), though it catches a conformity at a medium level.

Studies for criterion validity

Community Service Activities Scale, which was improved by Elma et al. (2010), has been dealt to examine the criterion-related validity of Community Service Activities Scale. The scale by Elma et al. has been applied to 415 students of Faculty of Education, Kaiser-Meyer-Olkin (KMO) coefficient and Barlett Sphericity test results have been examined and these values have statistically been found to be meaningful (KMO=0.687; Barlett Sphericity test $\chi^2 = 1732,474$, df = 378 p<.001). Cronbach Alfa value of the scale is also .88 in total. For this study, Community Service Activities Scale by Elma et al. (2010) has been applied to a 47-person group, Kaiser-Meyer-Olkin (KMO) coefficient and Barlett Sphericity test results have been examined, these values have statistically been found to be meaningful (KMO=0.62; Barlett Sphericity test $\chi^2 = 727,027$, df = 378 p<.001) and Cronbach Alfa value has been calculated as .87 in total.

Data analysis

Within the scope of the validity and reliability analyses of Community Service Activities Scale, consistency analysis on the data gathered has been made with Cronbach Alfa analysis for reliability, expert opinion for the content validity, exploratory and confirmatory factor analysis for construct validity and Community Service Scale for criterion validity.

The arithmetic average and standard deviation of the substances

and substance-total point correlations have also been examined; the resolving power of the substance has been calculated by t-test analysis. Arithmetic average, t-test, and one-way analysis of variance techniques have been used with the aim of comparing the data in terms of gender, participating the service learning activity before university education, participating the service learning activity during university education, the department variables.

FINDINGS

Findings in relation to structure validity and reliability of community service activities scale (CSAS)

In the analyses; coefficient of skewness and pointedness, correlation between item and total point, values of correlation matrix of items, mutual variance, factor loadings (at least 30), and the differences between factor loadings of items that are loaded to more than one factor (at least 29), of the items that have been taken into extent of scale, have been examined and 27 items have been needed to be taken out of the scale at the end of series of analysis. These processes have been done by using factor subtraction method orthogonal (varimax) turning gear operation of main components.

At the head of factor analyses done in order to specify factor structure of CSAS, the results of Kaiser-Meyer-Olkin (KMO) coefficient and BarlettSphericity test have been examined with the aim of specifying whether data are suitable for factor analysis.

These values are clearly seen to be statistically meaningful KMO= .94; BarlettSphericity test $X^2= 6.540$ $df= 528$ $p<.001$). As a consequence of application, of the Community Service Activities Scale (CSAS), done with 313 students; the values of three-dimensional 33 point form are in total like; Cronbah Alpha reliability value is .93, .93 in the first sub-factor (18 items), .92 in the second sub-factor (10 items), and .73 in the third sub-factor (5 items). The initial results of factor analysis have shown that the scale has 5 components whose eigen values are above 1.00. However; it has been clearly seen that items, collected under factors out of the first 3 components whose eigen values are above 2.00, are either very few in number (1 or 2 items) or they have got factor loading above .30 under the other components and charges under 2 components are so close to each other. When the line of Table eigen values (scree plot) has been examined, it is sighted that the most clear crash is in the third factor. In the process of deciding total factor number; eigen value, contribution percentage to total variance and scree plot are the most frequently used scales (DeVellis, 2003; Kalaycı, 2009). Cattell (cited in Akt et al., 2003) claims that factor number, until point that scree plot takes a horizontal shape, may be used to specify appropriate factor number. In addition to these values, item pool is generally prepared under these 3 main headings such as process and ability of thinking, awareness, and benefit. By taking this fact into consideration; factor analysis has been applied again by

being limited with these 3 factors. Below are shown on Table 1;

1. Factors that are obtained from factor analysis and reliability analyses reached at three iterations and resulted with a structure of 3 factors,
2. Factor loadings,
3. Factor eigenvalues,
4. Variance percentages and Cronbah Alpha values that factors explains,
5. Corrected item-total point correlation belonging to items,
6. Mutual variance,
7. t values.

The factor structure of CSAS has been analyzed with exploratory factor analysis (EFA) and Confirmatory Factor Analysis (CFA). Exploratory factor analysis aims to discover the factor structure based upon relations between variables. Confirmatory Factor Analysis examines model-data agreement, tests hypotheses established about relations between variables (Klein, 1998; Tabachnick and Fidell, 2001).

The first component obtained at the end of analyses is the aspect of "Thinking, process and skills" that consists of the items 19, 18, 21, 20, 23, 17, 26, 25, 27, 22, 24, 30, 31, 13, 5, 16, 15, and 8 which are related expressions that are necessary for thinking, process and skills. Some items taking part in this scale are such as; "I develop my abilities of organization/organizing by joining social services", "I develop my abilities of solving problem by joining social services", "I provide the conditions that learning opinions get into actions by joining social services". Factor loadings of 18 items being this sub-scale are between .34 and .79; their item-total point correlation is between .28 and .75; Cronbah Alpha coefficient of internal consistence is .90.

According to the results of exploratory factor analysis; the second component in CSAS consists of 10 items (item pool no: 11, 1, 10, 7, 12, 2, 9, 3, and 35) connected with aspect of awareness of social service applications such as; "There are people whose needs are not satisfied in the society." and "It is so important to develop societies in order to have a qualified society." Factor loadings belonging to items in this group are "Awareness" is between .54 and .81; item-total point correlation is between .57 and .69. However, Cronbah Alpha coefficient of internal consistence is .92. The third factor taking part in CSAS in the results of analysis consists of 5 items that deal with the aspect of benefit of service applications of university students, such as; Even if I join social service, I don't believe that something will change in this society." and "I think that I am conscious in learning by serving the society". This factor is named as "Benefit". Cronbah Alpha coefficient of internal consistence of these items in sub-scale (item no: 37, 38, 36, 42, and 43 items) is determined as .73; their factor loadings are between .59 and .80; however, item-total point correlation is between

Table 1. Factors in the community service activities scale (CSAS), factor loadings, variance percentages that factors explain, values of item-total point correlation (r).

Item No	F 1	F 2	F 3	\bar{X}	T	SS	r*
19	.79			3,81	-15,91	1,04	,75*
18	.78			3,83	-15,86	1,05	,68*
21	.78			3,87	-14,18	1,06	,73*
20	.77			3,94	-11,45	1,06	,70*
23	.75			3,87	-12,55	,98	,74*
17	.74			3,86	-12,54	,97	,66*
26	.74			3,74	-13,96	1,01	,70*
25	.73			3,86	-12,82	1,03	,73*
27	.72			3,80	-13,53	1,05	,70*
22	.72			3,91	-13,53	1,06	,73*
24	.70			3,82	-10,69	,99	,64*
30	.66			3,86	-12,40	,96	,65*
31	.60			3,96	-12,80	1,01	,67*
13	.59			3,97	-12,36	,95	,64*
5	.51			3,65	-7,92	1,03	,47*
16	.35			4,04	-3,85	3,04	,28*
15	.35			3,96	-6,03	1,91	,33*
8	.34			3,45	-5,80	1,23	,28*
11	.24	.81		4,36	-7,38	1,00	,62*
1	.27	.79		4,27	-8,93	1,20	,65*
10	.21	.78		4,39	-7,66	1,00	,58*
7	.31	.75		4,28	-8,53	,96	,66*
12	.26	.74		4,34	-7,39	,93	,61*
2	.38	.74		4,24	-9,26	1,12	,69*
9	.28	.65		4,30	-8,98	1,04	,58*
3	.36	.64		4,06	-8,80	1,11	,62*
6	.33	.60		4,08	-9,13	1,06	,61*
35	.36	.54		4,17	-7,74	,94	,57*
37			.80	2,33	,-94	1,36	-,03
38			.71	2,83	-2,48	1,10	,15*
36			.68	2,58	-1,21	1,44	,01
42			.67	2,97	-2,66	1,32	,15*
43		.29	.59	3,38	-4,56	1,24	,26*
Range	.34 - .79	.54 - .81	.59 - .80	2.33- 4.39	-.94 – -15.91	.93 - 3.04	Total
Eigenvalue	2.351	7.124					55.046
Variance %	27.23	20.14	7.67				55.046
Cronbach Alfa	.90	.92	.73				.93

*r: Item-total point correlation * the mark is meaningful in the .05 level.

Note: in terms of tracing easiness, factor loadings that are below.20 are not shown on the Table. F1: Process and ability of thinking; F2: Awareness; F3: Benefit

.35 and .26. Three sub-scales explain 55.046% of total variance. Cronbah Alpha coefficient of internal consistence relating to the whole scale is .93. Guttman Split Half values, that is calculated as the method of test half with the aim of getting opinions about stability of scale or consistence between its 2 half, are .86 for sub-scale "Thinking, process and skills"; .88 for sub-scale "Awareness"; .58 for sub-scale "Benefit"; and .82 for the whole

scale. When Table 1 is examined in terms of factor loadings, it is seen that factor loadings changes between .54 and .81. When it is regarded in terms of items loaded to more than one factor, it is seen that items have been usually loaded to the related sub-scales with the clear differences (generally .30 and more). Moreover, total points that persons from whom data are collected, are gotten from 30 items which are separately ordered from

Table 2. Correlation matrix with regard to sub-scales and total point of community service activities scale (CSAS), values of arithmetic mean, values of standard deviation.

	Thinking Processes and Skills	Awareness	Benefit	x	ss
Thinking Processes and Skills		,679**	,013	69,31	14,20
Awareness	,679**		-,006	42,55	8,09
Benefit	,013	-,006		14,11	4,53
Total	,936**	,839**	,222**	1,25	21,10

N=313 **p<0.01, *p<0.05

Table 3. Correlation matrix for community service activities scale (CSAS) total point and subscale, and CSA (Elma) total point and subscale.

	Thinking	Awareness	Benefit	CSAS Total	Socialization	Personal development	The way of lecture perception	Institution	Consultant	X	Ss	n
Thinking process and skills		,679**	,013	,936**	,550**	,633**	,622**	532**	,383**	69,31	14,20	313
Awareness	,679**		-,006	,839**	,651**	,583**	,539**	,474**	,122	42,55	8,09	313
Benefit	,013	-,006		,222**	,233	,216	,085	,431**	,109	14,11	4,53	313
CSAS Total	,936**	,839**	,222**		,747**	,767**	,713**	,683**	,343*	1,25	21,10	313
Socialization	,550**	,651**	,233	,747**		839**	639**	689**	110	17,27	4,57	124
Personal development	,633**	,583**	,216	,767**	839**		637**	583**	213	13,45	4,04	124
The way of lecture perception	,622**	,539**	,085	,713**	639**	637**		555**	323*	19,33	4,15	124
Institution	,532**	,474**	,431**	,683**	689**	583**	555**		122	9,74	2,36	124
Consultant	,383**	,122	,109	,343*	110	213	323*	122		4,70	1,84	124
CSA Total	,701**	,650**	,256	,855**	908**	,897**	843**	758**	352*	64,50	13,72	124

**p<0.01, *p<0.05

the lowest to the highest for each item; and groups of 27% for both up and down have been formed; then it has been examined if items can distinguished these 2 groups from each other or not. At the end of this examination, it has been seen that all the items, except for 36th and 37th items, could distinguish groups meaningfully ($p<0.01$). Arithmetic mean belonging to the remaining 33 items changes between 2.33 and 4.39, standard deviations changes between .93 and 3.04. The following are shown on Table 2;

1. Correlation matrix with regard to sub-scales and total point of Community Service Activities Scale (CSAS),
2. Values of arithmetic mean,
3. Values of standard deviation.

As seen on Table 2; the first one of sub-scales in CSAS shows meaningful relations ($p<0.01$, $p<0.05$) with the second and total point, the total aspect of scale correlates with all the sub-scales ($p<0.01$, $p<0.05$). The sub-scale "Thinking, process and skills" shows a meaningful relation with the other second scale as .679 and with the total point as .936. The total also shows a meaningful relation with the sub-scale "Awareness" as .839 and with

the sub-scale "Benefit" as .222. The values of arithmetic mean with regard to total and sub-scales of CSAS changes between 69,31 and 1,25. The values of standard deviation with regard to total and sub-scales of CSAS changes between 14,20 and 21,10.

Findings in relation to validity of CSAS connected with standard

In order to examine the validity of similar scales of CSAS, CSA (Elma, 2010 cited in 10) has been applied to 47 students in Faculty of Education with CSAS and the correlation between points got from each two scale has been analyzed. Findings reached at the end of this analysis are presented on Table 3.

As seen on Table 3, Elma et al. (2010) Community Service Activities Scale (CSA) and the ones also developed by others (2010) do not show a significant relation in the 3rd subscale Demir and Community Service Activities Scale (CSAS), in total. However, it shows significant relations ($p<0.01$, $p<0.05$) with the total grade in the 1st and 2nd subscales. At the same time, Elma et al. (2010) Community Service Activities Scale (CSA) and

Table 4. Summary of fit indices from confirmatory factor analysis.

X2	df	X2/df	RMSEA	SRMR	NNFI	GFI	CFI	AGFI
1244.73	489	2.54	0.070	0.085	0.97	0.81	0.98	0.78

Note: CFI = comparative fit index; GFI = goodness of fit index; RMSEA = root mean squared error of approximation. $p < .01$.

the ones developed by others shows a significant relation ($p < 0.01$, $p < 0.05$) with socialization, personal development, perception method of lesson, institution and consultant subscales of the same scale. Subscale of socialization shows a significant relation with thinking, process and skills, awareness; total subscales and subscale of personal development shows a significant relation with thinking, process and skills and awareness with the total subscales positively. Whereas subscale of perception method of lesson shows a significant relation with thinking, process and skills, awareness and the total subscales positively; subscale of institution shows a significant relation with thinking, process and skills, awareness, benefit and the total subscales positively.

Confirmatory Factor Analysis (CFA)

Lots of fit indexes are used in order to evaluate validity of model in CFA. Chi-square Fit Testing, Goodness of Fit Index (GFI), Amended Goodness of Fit Index (AGFI), Square Root of Average Error (RMR or RMS) and Average Square Root of Approximate Errors (RMSEA) are the most frequently used ones among them. In literature, the fact that (x^2/df) rate calculated by CFA is less than 5 may be seen as a demonstration of the good fit with real data of model (35). It is expected that rates of GFI and AGFI are to be more than 0.90 and rates of RMS or standardized RMS and RMSEA are to be less than 0.05. On the other hand, GFI rate's being more than 0.85, AGFI rate's being more than 0.80 and RMS rate's being less than 0.10 are accepted as a criterion for the model's fit with real data (Anderson and Gerbing, 1984; Cole, 1984; Marsh et al., 1988 cited in Gülbahar and Büyükoztürk, 2008).

During research, confirmatory factor analysis has been applied to test the accuracy of three-factor structure identified as a result of exploratory factor analysis. Confirmatory factor analysis, which has been done with the aim of analyzing how much three-factor model of CSAS adjusts with the acquired data, and the rate of chi-square, which is calculated for fit between model and data, have been claimed to be significant, $X^2 = 1310.77$, $df = 492$, $p < 0.01$. Some fit statistics calculated with the same analysis are like these: (X^2/df) = 2,66; RMSEA = 0,073; RMR = 0,085; GFI = 0,81; AGFI = 0,77; NNFI = 0,97; CFI = 0,97. Confirmatory factor analysis of three-factor model and the rate of chi-square calculated for model-

data fit have been proved to be significant with the first modification (done between M2 and M1), $X^2 = 1238,81$, $df = 491$, $p < 0.01$. Some fit statistics calculated with the same analysis are like these: (X^2/df) = 2,52; RMSEA = 0,070; RMR = 0,068; GFI = 0,81; AGFI = 0,78; NNFI = 0,97; NFI = 0,96; CFI = 0,97.

Confirmatory factor analysis of three-factor model and the rate of chi-square calculated for model-data fit have been proved to be significant with the second modification (done between M24 and M23) $X^2 = 1174,66$, $df = 490$, $p < 0.01$. Some fit statistics calculated with the same analysis are like these: (X^2/df) = 2,39; RMSEA = 0,067; RMR = 0,085; GFI = 0,81; AGFI = 0,79; NNFI = 0,97; NFI = 0,96; CFI = 0,98. Confirmatory factor analysis of three-factor model and the rate of chi-square calculated for model-data fit have been proved to be significant with the third modification (done between M21 and M20) $X^2 = 1244,73$, $df = 489$, $p < 0.01$. Some fit statistics calculated with the same analysis are like these: (X^2/df) = 2,54; RMSEA = 0,070; RMR = 0,085; GFI = 0,81; AGFI = 0,78; NNFI = 0,97; NFI = 0,96; CFI = 0,98. As shown in Table 4.

Thinking, process and skills, awareness and results of t-test of given answers with respect to benefit aspect according to gender variable of teacher applicants who have attended to the research are given on Table 5.

According to the results of analysis; in terms of gender, it is seen that perception of social service applications of teacher applicants, thinking, process and skills ($(t_{251}) = 1.73$; $p < 0.01$), awareness ($(t_{259}) = 1.83$; $p < 0.05$) and ($(t_{227}) = 2,04$; $p < 0.05$) in total have become different. When the arithmetic means are analyzed, it is seen that female students have had higher marks in terms of thinking, process and skills ($x = 72,10$), awareness ($x = 44,29$) and ($x = 1,31$) in total. Therefore, a significant difference has been revealed in these three aspects for the benefit of female students. ANOVA results of thinking, process and skills, awareness and the answers regarding to benefit aspects of the teacher applicants who have joined research are presented on Table 6 according to the variable of department where they have studied.

As seen in Table 6, according to the departments where students have studied; the levels of social service perceptions that they perceive, the thinking, process and skills $F(5,239) = 2,710$; $p < 0.05$, awareness $F(5,247) = 5,571$; $p < 0.05$, benefit $F(5,267) = 2,447$; $p < 0.05$, and in total $F(5,217) = 3,688$; $p < 0.05$ shows a significant difference. According to results of LSD test that has been done in order to learn what groups differences between

Table 5. The results of t-test with regarded to gender according to sub-dimensions of community service activities scale (CSAS).

Sub-dimension	Gender	N	X	S	df	t	p
Thinking process and skills	Female	110	72,10	16,65	251	1.73	.084
	Male	143	69,03	11,50			
Awareness	Female	109	44,29	6,73	259	1.83	.068
	Male	152	42,55	8,06			
Benefit	Female	119	13,92	4,78	280	-0.70	.944
	Male	163	13,96	4,43			
CSA Total	Female	99	1,31	21,99	227	2.04	.042
	Male	130	1,26	17,69			

Table 6. The results of ANOVA regarded to the of the department according to sub-dimensions of community service activities scale (CSAS)

Sub-dimensions	The source of	KT	df	KO	F	P	Difference (LSD)
Thinking process and skills	Inter-groups	2638,049	5	527,610	2,710	,021	
	In-group	45555,685	234	194,682			Science T.T.*-Primary School T. T.
	Total	48193,733	239				
Awareness	Inter-groups	1400,665	5	280,133	5,571	,000	
	In-group	12168,303	242	50,282			Primary School T. T. - Pre-school T. T.
	Total	13568,968	247				
Benefit	Inter-groups	247,775	5	49,555	2,447	,034	
	In-group	5305,628	262	20,250			
	Total	5553,403	267				
Total	Inter-group	6730,091	5	1346,018	3,688	,003	Science-Primary School T. T.
	In-group	77368,038	212	364,944			Social T. T.- Primary School T. T.
	Total	84098,128	217				Primary School T. T.- Turkish Language T. T. Primary School T. T.- Pre-school T. T.

* Teacher Training

departments are among, it is understood that there is a significant difference on behalf of Classroom Teaching.

RESULT AND DISCUSSION

In the process of Social Service Applications (SSA), a lot of fit indexes are used. These fit indexes are; Chi-Square Fit Test (X²), Goodness of Fit Test (GFI), Amended Goodness of Fit Index (AGFI), Comparative Fit Index (CFI), Normalized Fit Index (NFI), Non-Normalized Fit Index (NNFI), Average Square Root of Approximate Errors (RMSEA) (Hoe, 2008; Sanders et al., 2005; Şimsek, 2007). These below are indicators that structure of factor is consistent in general:

- Chi-Square Fit Index is not meaningful
- The rates of CFI, NNFI, NFI are higher than .90
- The rates of GFI, AGFI are higher than .75
- The rate X²/df is 3 or less than 3
- The meaningfulness level of RMSEA is 0, 07

In consequence of analysis of third modification in DFA, the rates X²= 1244.73, df= 489, X²/df= 2.54, RMSEA= 0.70, NNFI= .97, CFI= .81 and AGFI= .78 have been acquired. It has been proved that 33 items in scale shows a valid structure on students in Faculty of Education according to the results of confirmatory factor analysis done for examining authentic factor structure, supported with expert opinions, of CSAS. These rates shows that data suitability of model is sufficient (Kahn, 2006;

Kelloway, 1998; Klein, 1998; Corral and Calvet, 2000; Heubeck and Neill, 2000; Sümer, 2000; Lewis et al., 2002; Olivares et al., 2004; Sanders et al., 2005; Ingles et al., 2005; Şimsek, 2007; Hoe, 2008). According to Klein (1998) and (Wiersma 2000 cited in Johnson et al., 2007), reliability is consistency of assessment instrument in any measurement. The method of reliability that is mostly used in researches is the calculation of cronbach alpha (7, 32, 18). At the end of the study, a reliable assessment instrument of 33 items, which includes 3 factors in total and in which cronbach alpha reliability coefficient calculated as 0,93, is obtained.

CONCLUSION

In the direction of features of items in factors, it is stated that the first factor is "thinking, process and skills", the second factor is "awareness" and the third factor is "benefit". This scale is reliable and valid with its obtained results. In addition, it has the quality to be the first assessment instrument whose confirmatory factor analysis has been done and developed in our country with the aim of identifying perception of students in Faculty of Education about social service applications.

According to the results of validity and reliability studies that have been done in research with students in Faculty of Education; the scale has got such features that it can measure, with a structure of 3 factors, how students in Faculty of Education perceive the ability of social service applications. When it is taken into account;

1. It has a valid and reliable structure,
2. The results obtained in the main practices of the scale can provide necessary feedbacks on the subject in which the students perceive themselves in relation to social service applications,
3. The developed assessment instrument may be analyzed at a meta-analytic level in practices and studies in different samples that will be done in future,
4. It is thought that CSAS may be used in experimental and descriptive studies in order to identify that students in Faculty of Education perceive themselves in terms of social service applications.

Conflict of Interests

The authors have not declared any conflict of interests.

REFERENCES

- Bringle R, Hatcher JA (2009). Innovative practices in service-learning and curricular engagement. *New Directions for Higher Education* 147:37-46.
- Bernadowski C, Perry R, Del Greco R (2013). Improving preservice teachers' self-efficacy through service learning: lessons learned. *Int. J. Instr.* 6(2):67-86.
- Corral S, Calvet E (2000). Machiavellianism: dimensionality of the mach IV and its relation to self-monitoring in a Spanish sample. *Spanish J. Psychol.* 3(1):3-13.
- Çokluk Ö, Şekercioğlu G, Büyükoztürk Ş (2010). Multivariate statistics for the social sciences: SPSS and LISREL applications. Pegem Academy: Ankara.
- DeVellis RF (2003). *Scale development: theory and applications*. Second Edition. Thousand Oaks: Sage Publications.
- Diñçer CF (2006). Workshop on function of education faculties and of community service in terms of Educational Sciences. Ankara University Faculty of Educational Sciences Press: Ankara.
- Dorman JP, Knightley WM (2006). Development and validation of an instrument to assess secondary school students' perceptions of academic tasks. *Educ. Stud.* 32(1):47-58.
- Draper AJ (2004). Integrating project-based service-learning into an advanced environmental chemistry course. *J. Chem. Educ.* 81(2):221-224.
- Duckenfield M, Wright J (1995). *Pocket guide to service-learning*. Clemson SC: National Dropout Prevention Center.
- Elma CK, Kiroğlu A, Long K, Tigris EM, and Palavan Ö (2010). Course in candidate teachers' perceptions of community services. *Theory Pract. Educ. Adm.* 16(2):231-252.
- Gökce N (2011). Social sciences teachers' reviews on the applications of community service. *Int. J. Human Sci.* 8(2):176-194.
- Gülbahar Y, Büyükoztürk Ş (2008). Translation of the evaluation preferences into Turkish version. *Hacattepe University J. Educ.* 35:148-161.
- Hatcher-Skeers M, Aragon E (2002). Combining active learning with service learning: A student-driven demonstration project. *J. Chem. Educ.* 79(4): 462-464.
- Heubeck BG, Neill JT (2000). Confirmatory factor analysis and reliability of the Mental Health Inventory for Australian adolescents. *Psychol. Rep.* 87:431-440.
- Hoe SL (2008). Issues and procedures in adopting structural equation modeling technique. *J. Appl. Quant. Methods* 3(1):76-83.
- Horzum B, Bektas M (2012). Authentic learning community service and satisfaction lesson are teachers' attitudes toward impact of course. *Kastamonu Educ. J.* 20(1):341-360.
- Ingles CJ, Hidalgo MD, Mendez FX (2005). Interpersonal difficulties in adolescence: a new self-report measure. *Eur. J. Psychol. Assess.* 21(1):11-22.
- Johnson B, Stevens JJ, Zvoch K (2007). Teachers' perceptions of school climate: A validity study of scores from the revised school level. *Environ. Questionnaire* 67(5):833-844.
- Kahn JH (2006). Factor analysis in counseling psychology research, training and practice principles, advances and applications. *Counseling Psychol.* 34(5):684-718.
- Kalaycı Ş (2009). *Applied SPSS multivariate statistical techniques*. Fourth Edition, Asil Press: Ankara.
- Kalivas JH (2008). A service-learning project based on a research supportive curriculum format in the general chemistry laboratory. *J. Chem. Educ.* 85(10):1410-1415.
- Kelloway EK (1998). *Using Lisrel for structural equation modeling: a researcher's guide*. United States of America: Sage Publications.
- Kelly MJ (2013). Beyond classroom borders: incorporating collaborative service learning for the adult student. *Adult Learn.* 24(2):82-84.
- Klein SP (1998). Standards for teacher tests. *J. Pers. Eval. Educ.* 12(2):123-138.
- Lamberton RM (2012). *Fostering spiritual development in college students through a summer service-learning program*. Unpublished master thesis, The Faculty of the School of Education In Partial Fulfillment of the requirements for the degree of Master of Arts in Counseling, Moraga: California.
- Lewis CA, Francis LJ, Shevlin M, Forrest S (2002). Confirmatory factor analysis of the French translation of the abbreviated form of the revised Eysenck Personality Questionnaire (EPQR-A). *Euro. J. Psychol. Assess.* 18(2):179-185.
- Olivares J, Garcia-Lopez LJ, Hidalgo MD, Caballo V (2004). Relationships among social anxiety measures and their invariance: A confirmatory factor analysis. *Eur. J. Psychol. Assess.* 20(3):172-179.
- Öğülmüş S (2006). Contribution of education faculties to social life in the context of community service. Ankara University Faculty of

- Educational Sciences Publications: Ankara.
- Rizzolo MC, Friedman C, Lulinski-Norris A, Braddock D (2013). Home and community based services (HCBS) waivers: a nationwide study of the states. *Intell. Dev. Disabil.* 51(1):1-21.
- Rubin DL, Matthews PH (2013). Learning Outcomes Assessment: Extrapolating from Study Abroad to International Service-Learning. *J. Higher Educ. Outreach Engagement* 17(2):67-85.
- Saran M, Coates G, İnal ZF, Aksoy Z (2011). Responsible for the development of social awareness in universities hood: A study on the course Ege University, community service applications. *Yaşar University J.* 22(6):3732-3747.
- Sanders RD, Allen DN, Forman SD, Tarpey T, Keshavan MS, Goldstein G (2005). Confirmatory factor analysis of the Neurological Evaluation Scale in unmedicated schizophrenia. *Psychiatry Res.* 133:65-71.
- Shiarella AH, McCarthy AM, Tucker ML (2000). Development and construct validity of scores on the Community Service Attitudes Scale. *Educ. Psychol. Meas.* 60:286.
- Simons L, Cleary B (2006). The influence of service learning on students' personal and social development. *College Teaching* 54(4):307-320.
- Simons L, Fehr L, Hogerwerff NBF, Georganas D, Russell B (2011). The application of racial identity development in academic-based service learning. *Int. J. Teach. Learn. Higher Educ.* 23(1):72-83.
- Sönmez ÖF (2010). Social studies teachers' attitudes towards public service applications, class-size, evaluation of recovery. *Black Sea J. Soc. Sci.* 2(2):53-71.
- Stewart T (2012). Community-based service-learning for youth empowerment in palestine. *Educ. Forum* 76:25-40.
- Sümer N (2000). Structural equation modeling: basic concepts and best practices. *Turkish Psychological Articles* 3(6):49-74.
- Şimsek ÖF (2007). Introduction to basic principles of structural equation modeling and LISREL applications. *Equinox: Ankara.*
- Tabachnick BG, Fidell LS (2001). *Using multivariate statistics.* Fourth Edition. Harper Collins Publishers: New York.
- Tucker ML, McCarthy AM, Hoxmeier JA, Lenk MM (1998). Community service learning increases communication skills across the business curriculum. *Bus. Commun. Q.* 61:89-100.
- Uğurlu Z, Kırıl E (2011). Prospective teachers of the course, its processes and its applications in service to the community views on the achievements. *The 2nd International Conference on New Trends in Education and their Implications* pp.720-734.
- Yılmaz K (2011). Social responsibility and community service lecture of education faculties: A qualitative research. *Theoretic Educ. Sci.* 4(2):86-108.

Full Length Research Paper

Elective drama course in Mathematics education: An assessment of pre-service teachers

Sagirli, Meryem Özturan

Education of Faculty, Erzincan University, Erzincan, Turkey.

Received 21 January, 2014; Accepted 10 June, 2014

This study aimed to evaluate a newly introduced elective course “Drama in Mathematics Education” into mathematics education curriculum from the viewpoints of pre-service mathematics teachers. A case study was employed in the study. The study group consisted of 37 pre-service mathematics teachers who were enrolled in a Turkish state university’s faculty of education. The participants’ written opinions were gathered about the course and the use of drama in teaching mathematics and the data were subjected to content analysis. Findings indicated that pre-service teachers think that the course is useful as it has many personal, professional and social benefits for them and the drama can be used in almost all subjects of mathematics.

Key words: Drama, Mathematics Education, Drama in Mathematics Education.

INTRODUCTION

In Mathematics Education, like other subjects a variety of methods and techniques are used in order to make learners play an active role in their learning instead of being just listeners and playing a passive role. Some of these methods and techniques commonly used in mathematics education are plain lecturing, question-answer, teaching by discovery, discussion, teaching by analysis, teaching through modules, demonstration and practice, teaching by script, teaching by games, project-based teaching, collaborative teaching and problem-based teaching (Altun, 2012; Uğurel, 2003). On the other hand, game-based teaching methods are the umbrella term used for role playing, drama, pedagogic games, teaching by games and teaching by script (Kaplan et al., 2011). These methods and techniques overlap each

other in terms of creating real or fictional environments for the target information, skill or attitude and of using some role-plays and games in that environments.

Drama is one of the game-based methods and techniques and its application area is gaining wider acceptance. It can be defined as a “game-like” process in which individuals make sense of and dramatize an experience, an event, an idea, an educational unit or an abstract concept or a behaviour in a group setting with the techniques like improvisation and role playing. In a drama activity, the individuals review their expectations, emotions and experiences by reformulating their former cognitive patterns (San, 1994). Drama is a method that makes students be more active in class, makes it possible to create opportunities for students to express their

E-mail: msagirli2@gmail.com Tel: 90 506 779 52 53.

Author agree that this article remain permanently open access under the terms of the [Creative Commons Attribution License 4.0 International License](https://creativecommons.org/licenses/by/4.0/)

mathematical thoughts in class. It helps them to understand mathematical concepts and overlap them, as suggested by the mathematics curricula (Akkus, 2006). In addition, this method is a good way for children to explore the concepts, acquire the knowledge and improve their thinking-skill (Johnson, 2002).

Many researchers have been interested in the use of drama in Mathematics Education and given certain suggestions about the educational benefits of the drama. For example, Carter and Westaway (2005), state that there should be a direct link between real life and Mathematics, and the students, who have certain negative attitudes towards Mathematics as a hard, boring and disliked subject (Duatepe and Çilesiz, 1999; Hatipoglu, 2006; Ornek, 2007; Ozsoy and Yuksel, 2007), can change their attitudes. Also, Crawford and Witte (1999), claim that Mathematics Education based on actively involved activities helps students to direct their energy to create solutions for the problems. These problems could be in real-life by providing arguments on solution strategies with their peers by using materials and by supplying them to develop their own terms by working in small groups. The studies show that drama positively contributes to students' attitudes, and especially, it ensures direct learning accompanied by doing entertainment (Erdogan, 2008), linking mathematics with the daily life (Carter and Westaway, 2005), concretizing abstract mathematical concepts (Erdogan, 2008), as well as indirectly improving social life skills and skills specified in mathematics curricula (Kara and Cam., 2007).

Not only does the drama has positive effects, but also it has improved skills in Mathematics Education and in social life. Particularly, the drama positively influences the skills which the mathematics teaching program aims to improve in students such as reasoning, communicating, relating and problem solving, as well as students' attitudes towards and abilities in mathematics and their academic achievements (Duatepe, 2004; Erdogan and Baran, 2009; Hatipoglu, 2006; Ornek, 2007; Sezer and Ozturk, 2011; Tas, 2008; Yegen, 2003). The use of the creative drama technique is influential especially in endowing students with the skills of working in groups, establishing and maintaining relationships with others and self-controlling (Kara and Cam, 2007). Since the drama is a group activity, it contributes to the improvement of establishing communication, critical thinking, and being aware of responsibilities within a group. All these results overlap each other in terms of students' attitudes towards group-works on specific subjects, their discussion, communication and observation (NCERT, 2006).

Drama has been already added in the teaching programs of schools at different education levels in many developed countries, it is included in these programs either as a teaching method for teaching certain subjects or as a stand-alone course for the personality

development of students. In spite of the emphasize in the curricula of Mathematics Teaching Program (MEB, 2013) which proposes that students should be actively involved in learning process and teachers should create real-life learning environments, there is not any guideline in the curricula for mathematics teachers and even sample drama activities in the course books for the teachers to apply in the classrooms. Although, the role of teachers and teacher qualifications in making drama effective is mostly stated in a number of studies (example, Aytas, 2013; Karadag et al., 2008; Kerekes and King, 2010; Okvuran, 2003), the drama course has been a neglected course and only accepted as an elective course in some Teacher Education Institutions in Turkey. Therefore, there is not enough information about how to use drama as a teaching method (Erdogan, 2011), and there are obstacles to use drama effectively in mathematics education.

Most of the research about the use of the drama in mathematics education (see Paksu and Ubuz, 2010; Sengün and Iskenderoğlu, 2010) are based on quantitative data and they generally analyze the effect of drama over students' academic achievement, attitude, creativity and communication skills. However, those studies are mainly based on kinder garden, primary school and secondary school education. Then there is a need for analyzing tertiary level based studies in the literature. Another point is the lack of research about teacher perspectives in the use of Drama as most of research were just conducted with students' participation. Although, there are some studies considering teachers' viewpoints (example, Erdogan, 2011; Tezer and Aktunc, 2010), those studies focused on the teachers' opinions over active learning strategies rather than the use of the drama (Salman, 2009). There are very few studies based on pre-service teachers. In one of these studies, Güneysu and Temiz (2012), evaluated just the use of role-play in pre-service education rather than the Drama activity which involves learners actively participation in the whole process by stating the subject, writing the scenario and making the role-play.

In sum, there is not enough information about how to use Drama as a teaching method, and Drama is not taught adequately at tertiary level. There is a need for gathering opinions of pre-service teachers on Drama, subjects on which Drama can be used, the pedagogical effects of the use of the Drama in Mathematics Education.

For this purpose, the course "Drama in Mathematics Education" was offered for the first time as an elective course in the department of Elementary Education Mathematics Teaching in the Faculty of Education at a Turkish university. Determining the opinions of pre-service teachers who selected the course named "Drama in Mathematics Education" was aimed in this study. The sub-problems of the study in line with the above purpose were as follows;

1. What are the opinions of the pre-service teachers who selected the course named "Drama in Mathematics Education" about the use of the drama method in mathematics education?
2. What are the opinions of the pre-service teachers who selected the course named "Drama in Mathematics Education" about teaching mathematical subjects in which the drama method should be used?
3. What are the opinions of the pre-service teachers who selected the course named "Drama in Mathematics Education" about the benefits of the drama method in mathematics education to themselves?
4. What are the opinions of the pre-service teachers who selected the course named "Drama in Mathematics Education" on the possible inclusion of the course in the curriculum of the Elementary Education Mathematics Teaching undergraduate program?

METHODOLOGY

In this study, a case study from qualitative research models was adopted in order to deeply handle the problem. Mcmillan (2000), defines the case study as a method in which one or more events, media, programs, social groups or other interconnected systems in a thorough way, and suggests that its purpose is to come up with detailed descriptions about a situation. Then, the case study is a widely recognized inquiry method of investigating a phenomenon about real life context and it enables valuable insights on exploring new ideas about that situation (Merriam, 2007; Yin, 2003).

Study group

The study group of the research comprised 37 third-grade pre-service Mathematics teachers who took the Drama course at a university located in the eastern part of Turkey. During the participant selection process, the students who took the course and accepted to voluntarily provide written opinions were considered as the criteria.

Application

The "Drama in Mathematics Education" was a single term elective course. It was taught in two hours per week (26 hours in 13 weeks). In the first three weeks, the pre-service teachers were informed by the researcher on the subjects of teaching Mathematics methods and techniques, role-plays, educational games, drama techniques, the significance of Drama in Mathematics Education, components and dimensions of Drama. Then, sample plays-scenarios-scripts were read, screened and some basic exercises were held in the class with the participants. In the fourth week, the pre-service teachers were given a certain time and asked to form groups that would consist of at least two people. The sequence of the groups was determined by random selection. In that week, sample activities for review were distributed and one more week for deciding the content of their activities was given to the participants. During this process, the participants were free to review the literature provided by the researcher or to create their own activities by writing and constructing on their own as a group. In the week of the course, the activity of the each group was checked by the researcher for suitability for the objective, and necessary corrections were made.

At the end of that week, the groups, their turns and activity topics were finalized.

In each of the sixth, seventh, eighth, ninth, tenth and eleventh weeks; two groups presented their activities within a time period of 20 to 40 minutes. It was ensured that the activity topics would fit to the levels of elementary education fifth, sixth, seventh and eighth grades. Each group procured on their required materials for their activities such as scenery, costume and music. Some groups preferred to have activities which were consist of more than one short scenario. Each week, the researcher controlled the scripts of that week's presenters one final time, in order to reduce or eliminate the possibility of moving away from the purpose of the course. In the twelfth week of the course, the participants were invited to give their written opinions according to the pre-determined interview questions. A sample activity prepared by a group was shown below:

Name of the Play: Make Your Choice

Learning Domain: Permutation and Combination

Objective: Seeing where one encounters the subjects of permutation and combination in the daily life.

Players: Fatma, Yasemin, Aysegul, Father, Mother, Sister 1, Sister 2

Location: Outside the training centre, home

Time: Sunday afternoon

Scenario:

(Three friends who just left the training centre on a Sunday would like to do something but cannot decide where to go.)

FATMA: Come on friends; let's go somewhere today.

YASEMIN: Yes, we are very tired of studying. The school on weekdays and the training centre on the weekend; we should spare some time for ourselves.

AYSEGUL: You go, guys; I want to go home and rest.

FATMA: Come on Aysegul, we know you will go home and study.

AYSEGUL: Well, OK. I am coming, too.

YASEMIN: OK, where should we go?

FATMA: Firstly let's eat something, aren't you hungry? After then, we can arrange something.

AYSEGUL: I agree girls! Let's eat first. I remember that there is a nice play today; we can go to the theatre.

YASEMIN: No, I have already seen it. I think we should do something else.

FATMA: Then, we can go to cinema to watch a new movie of Brad Pitt. Girls, its trailer was awesome and the actor was very handsome.

YASEMIN: No. Girls, the winter season has just begun, I think we should go shopping.

(These three friends agree to eat first; however they also need to decide where to go after eating. If, among the four alternatives, eating is certain, then how many different choices can they make out of the remaining three?)

(They decide to go to the movies [Fatma's suggestion] ruling out play [Aysegul] and shopping [Yasemin].)

(They buy three tickets for three side-by-side seats. Now, they cannot decide who should sit on which seat.)

FATMA: I want to sit in the middle.

YASEMIN: I want to sit beside Aysegul.

AYSEGUL: Girls, I never sit on the sides, just so you know.

(They try each option one by one, and finally sit in the following order: Fatma, Aysegul and Yasemin.)

(The movie ends and everyone heads home. It is time for dinner when Fatma arrives at home.)

(Fatma has a family of six.)

FATHER: Come on my daughter, we are waiting for you.

FATMA: I am coming after washing my hands, Dad.

(Fatma comes to the table.)

FATMA: Mom, I want to sit beside you this time.
 MOTHER: Oh, but your sister is only two years old, she needs me while eating.
 FATMA: Ah, yes Mom, I could not think of it. You know, we learned a subject in the training centre today through which we can easily make this arrangement. I guess its name was circular permutation.
 SISTER1: Dad, I want to sit on your place.
 FATHER: No way! This has been my place for years.
 SISTER1: Oh Dad, is there such a rule?
 FATHER: Oh you young people!
 SISTER1: OK Dad!
 FATMA: OK, so let me help you. Now; me, my sister and mom sit in this order. Sister, dad and sister line up this way. I guess this is what everybody wanted.
 MOTHER: Oh good girl, how easy you managed this. See, you have been complaining about the use of mathematics in the real life.
(Dinner ends.)
 MOTHER: Now, you should help me out.
 FATMA: But I got very tired today.
 MOTHER: What did you do today?
 FATMA: We wanted to do something with the girls after the training centre. Yasemin wanted to go shopping, Aysegul offered to watch a play, and I suggested to see the film which I had been wondering about. But first, we need to eat. After eating, we made the decision on where to go, and we decided to go to the movies. There again, we struggled to decide who should sit where. Bu then; we sat in this order: I, Aysegul and Yasemin.
 MOTHER: Well, it seems you had a nice day. But you will still help me out!
 SISTER1: If Fatma does not help, I don't either!
 MOTHER: One of you will help me clear the table, another wash the dishes and the other put up the dishes.
 FATMA: I am clearing the table!
 SISTER1: I don't want to wash the dishes. So, I will put them up.
 SISTER2: Oh, I am washing the dishes again!
(One of the sisters figures out that the subject of selective combination that she has learnt at school should be used here and tells it to the family.)
(Everything is done and everybody goes into their rooms.)
(They spend a month like this: The mother only takes care of her children, the father complains about it. They start a serious discussion. The mother leaves the house. The father, who can stand this situation only for a couple of months, participated in a "marriage broker show" on TV and invites the mother. She has two choices: Reunite or not. She has to choose one of them. She decides to reunite. Thus, she picks one of the two choices.)

Data collection instrument

The data in this study was collected through a written interview protocol including structured questions. The protocol included four research questions which were determined with two experts from mathematics education area. These questions were as follows:

1. Do you think using the Drama method in Mathematics Education is useful? Please explain in detail with your reasons.
2. What subjects do you think using the Drama method in Mathematics Education is useful on? Please explain in detail with your reasons.
3. Please explain the skills (personal, professional and social) which you think using the Drama method in Mathematics Education is useful in improving.
4. Do you think the course "Drama in Mathematics Education" should be included in the Mathematics Teaching Undergraduate

Program as a compulsory or an elective course? If yes, what should be its weekly course hours? Please explain in detail with your reasons.

Data analysis and presentation

37 participants' written opinions were transferred to the computer environment. Then, those texts were subjected to content analysis to obtain the concepts and relations which explain the collected data (Yıldırım and Şimşek, 2008). During the data analysis process, third experts worked together. Two experts created their own codes and categories for each question. With face to face discussions, the experts talked about the differences about their ratings, and generally reached a 95% consensus. In some cases, a third expert accompanied the discussions and helped the finalization of the codes and categories. During the presentation of study findings, frequencies related to each code and category were presented in tables according to the questions. In addition, some sample excerpts were given to support the findings in tables. The students' excerpts were coded as X1, X2, X3, and so forth according to the interview sequence.

FINDINGS

In this section, the study findings were presented in tables and sample excerpts of the participants were given according to the findings.

Findings on the first research question

Table 1, showed the findings obtained through the analysis of the first question "Do you think using the Drama method in Mathematics Education is useful? Please explain in detail with your reasons." This question answered to the first research question: *What are the opinions of the pre-service teachers who selected the course named "Drama in Mathematics Education" about the use of the drama method in mathematics education?* Findings were presented in Table 1.

As Table 1 showed, responses of the two pre-service teachers (X21 and X34) were left out of assessment as they were not relevant to the question. The remaining 35 students had positive opinions on the use of drama in mathematics education. The following order of frequency of the codes was obtained after analysing the responses that the participants gave to the question "Why?": Entertaining, lasting, endearing, informative, concretizing, attention-grabbing, visual, comprehensible, daily life, discovering skills, cooperative learning and different point of view. The code "entertaining" in this table emerged as a result of the analysis of the responses given by the participants who thought that Drama made Mathematics entertaining. An example is the following stated by X28:

"... Mathematics is perceived by students as frightening. Therefore, drama will make this course more entertaining and informative".

Table1. Findings on the first sub-problem of the research.

Codes	Student names that form the codes	Frequency
Entertaining	X5, X7, X9, X10, X11, X12, X18, X20, X22, X23, X24, X25, X26, X27, X28, X29, X30, X31, X35	19
Lasting	X3, X5, X10, X13, X14, X15, X20, X23, X25, X27, X32	11
Endearing	X8, X19, X23, X29, X30, X36, X37	7
Informative	X9, X10, X24, X26, X28, X31, X36	7
Concretizing	X2, X5, X6, X18, X22, X31	6
Attention-grabbing	X4, X15, X32, X32	4
Visual	X3, X13, X15, X20	4
Comprehensible	X12, X14, X17, X23	4
Daily life	X1, X12, X26, X37	4
Discovering skills	X16, X22	2
Cooperative learning	X16, X33	2
Different point of view	X2	1

The code “lasting” in the Table 1 emerged as a result of the analysis of the responses given by the participants who stated that drama was effective in rendering permanent what was learned in the mathematics course. An example of this issue was stated by X23:

“...Activities performed in the course of drama both render the class entertaining and provides an educational environment in which learning is more permanent”.

The codes “endearing” and “informative” in the Table 1 emerged as a result of the analysis of the responses given by the participants who stated that drama has a role to endear mathematics and to make it easier to teach. Examples to these two codes are the following stated by X9:

“...It enables us to easily and entertainingly learn a course that is hard and serious as mathematics” and stated by X8: *“...It is a very useful method to endear Mathematics to students”.*

The code “concretizing” was formed by the participants who expressed that the mathematics course that involves abstract concepts is concretized through drama. Two examples are the following stated by X18:

“...Mathematical subjects are concretized in the mind thanks to the drama method” and by X22: *“...through Drama, abstract and boring subjects become concrete and entertaining”.*

The code “attention-grabbing” was formed by the participants who expressed that attentions of students in the mathematics course can be attracted through drama. The code “visual” emerged as a result of the analysis of

the opinions of the participants who stated that drama adds a sensory organ to the process of learning by appealing to the eyesight. An example is the following stated by X2:

“...Learning by seeing will be more effective in students”.

The code “comprehensible” was formed by the participants who think that comprehending Mathematics becomes easier through Drama, whereas the code “daily life” was formed by the participants who stated that Drama makes students aware of the uses of Mathematics in their daily life. An example to the latter code is the following stated by X1

“...Being able to see the functions of mathematics in the daily life”.

The code “discovering skills” was formed by the participants who argued that individuals who possess certain skills that they are not aware of it can discover these skills through drama. The code “cooperative learning” was formed by the participants who think that students find in Drama the opportunity to work and share with their peers leads to widening their social lives. Finally, the code “different point of view” was formed by the following expression stated by X2:

“...I think that students become capable of thinking better and their perspectives are widened when mathematics is taught through drama”.

Findings on the second research question

Table 2, showed the findings obtained through the Eight

Table 2. Findings on the second research question.

Subject(s)	Students names that form the codes	Reason(s)
All subjects	X9, X10, X11, X23, X24, X26, X31, X34	Efficiency (X9, X10, X31), Elementary subjects are superficial (X11), Concretizing (X26), -(X24, X34)
Every subject that is difficult to comprehend	X17, X28, X29, X30, X33, X35	Giving meaning (X17), Concretizing (X28, X29), Instructiveness (X28), Making course pleasurable (X30), Facilitating comprehension (X30), - (X33), Associability with the daily life (X35)
Abstract subjects	X2, X4, X12, X15, X21, X28	Concretizing (X2, X4, X12, X15, X28), Making easier (X21), Instructiveness (X28)
Subjects that are encountered in the daily life	X20, X37	Improving creativity (X20), Facilitating learning (X37)
Numbers	X36	Concretizing (X36)
Whole numbers	X5, X25	Suitable for games (X5), Concretizing (X25)
Fractions	X8, X18, X25, X27	Associability with the daily life (X8, X27), Concretizing (X25), Suitable for material use (X18)
Sets	X5	Suitable for games (X5)
Patterns and Tessellations	X5	Suitable for games (X5)
Algebraic expressions	X22	Suitable for visualization (X22)
Problems	X13, X16	-(X16), Associability with the daily life (X35)
Functions	X25	Concretizing (X25)
Permutation-Combination-Probability	X1, X6, X13, X27	Facilitating comprehension (X6), Associability with the daily life (X13, X27)
Geometry	X8, X19, X22, X32, X36	Associability with the daily life (X8), Suitable for visualization (X22, X32), -(X19), Concretizing (X36)
Geometrical objects	X1	-(X1)
Geometrical concepts	X14	Suitable for games (X14)
Area-volume calculations	X5, X18	Suitable for games (X5), Suitable for material use (X18)
Triangles	X5	Suitable for games (X5)

analysis of the second question “*What subjects do you think using the Drama method in Mathematics Education is useful on? Please explain in detail with your reasons.*” The question sought answers to the second research question: *What are the opinions of the pre-service teachers who selected the course named “Drama in Mathematics Education” about teaching mathematical subjects in which the Drama method should be used?*

Findings were presented in Table 2, participants stated that the Drama method can be used in all mathematical subjects as they think that the drama allows them to create activities, it helps them to concretize learning subject and elementary school subjects are easy subjects to teach. On the other hand, six participants stated that Drama can be used in every subject difficult to comprehend as it gives meaning to and

concretizes concepts, as it is instructive and renders the class pleasurable, as it makes comprehension easier and it links subjects with the daily life. Three participants think that drama can be used while teaching abstract concepts for its features of concretizing, facilitating and instructiveness. On the other hand, two participants stated that drama should be used for teaching subjects that are relevant to the daily life as it

Table 3. Findings on the third research question.

Dimensions	Codes	Students names that form the codes
Personal	*Self-confidence/Confidence	X4, X5, X7, X11, X12, X13, X15, X18, X20, X22, X23, X24, X25, X27, X28, X31, X33, X34, X36
	*Skill of writing and executing a play	X6, X14
	*Creative thinking	X20, X22, X37
	*Acquiring different points of view	X20, X35
	*Skill of role-playing and imitating	X16, X30
	*Reasoning/Problem-solving	X21
	*Imagination and creativity	X9
Professional	*Different teaching methods and techniques	X10, X11, X13, X15, X22, X23, X27, X28, X32
	*More effective teaching	X2, X3, X8, X12, X19
	*Self-confidence of the educator	X20
	*Understanding students and lowering the self to their levels	X2
	*Skill of endearing the course	X37
	*Classroom management	X12
Social	*Areas of use of mathematics in the daily life	X26
	*Ability to express oneself in front of people	X1, X4, X5, X7, X9, X11, X12, X18, X21, X26, X29, X33, X34
	*Socialization	X7, X5, X8, X12, X15, X21, X25, X36
	*Establishing communication	X14, X19, X36
	*Working in groups and cooperation	X25, X26, X37
	*Respecting others' opinions	X26

enables students to be more creative and it facilitates learning. Participants who responded outside these codes specified certain learning domains while reasoning their responses. The learning domain of geometry is the one with the highest frequency (5 participants) as it is linked with the daily life, and it allows for visualization and concretization. The code concretizing, on the other hand, is the reason expressed by the participants with the highest frequency (15 participants).

Findings on the third research question

Table 3, demonstrated the findings obtained through the analysis of the third question *"Please explain the skills (personal, professional and social) which you think using the Drama method in Mathematics Education is useful in improving."* The question sought answers to the following third research question: *What are the opinions of the pre-service teachers who selected the course named "Drama in Mathematics Education" about the benefits of the Drama method in Mathematics Education to themselves?* Findings were presented in Table 3.

Table 3, showed that students mentioned three different types of development: personal, professional and social. The item of development which the participants

emphasized most under the heading "personal" is the code self-confidence/confidence. Participants in this code stated that they acquired self-confidence or their self-confidence increased. An example is the following stated by X20:

"...First of all, I gained self-confidence; I realized that I could do whatever I want, because we performed in front of the entire class".

The number of participants who stated their creative thinking skills had improved is three. Each of the codes "skill of writing and executing a play", "acquiring different points of view", and "skill of role-playing and imitating" were expressed by two participants. On the other hand, the codes "reasoning/problem-solving" and "imagination and creativity" had one respondent each. Nine of the participants who pointed to a professional development formed the code "different teaching methods and techniques". This code means that Drama helped them to learn a new Mathematics teaching method or technique. An example is the following stated by X27:

"...I have learned a very unique and good method that will enable me to simplify mathematics while teaching it to children".

Table 4. Findings on the fourth research question.

Codes that emerged as a result of the question "Should it be included?"	Codes that emerged as a result of the question "What should be its weekly course hours?"	Student names that formed the codes
Yes, it should be included	3-4, 2, -, 4, 2	X1, X5, X21, X22, X33
Compulsory	3, 2, -, -, 3, 4, 3-4, 4, -,3, 3, 4, 2, 2, 2	X3, X6, X8, X9, X17, X19, X23, X24, X26, X27, X28, X30, X32, X35, X37
Elective	-, -, 4, 4, 2, 4, 2, 2, -, 2, -, 2, -, 2	X2, X7, X8, X10, X11, X12, X13, X14, X15, X20, X25, X29, X31, X34, X36

Five participants, on the other hand, who stated that they had learned how to provide a better and higher quality of education, formed the code "more effective teaching". The following response of X20 formed the code "self-confidence of the educator":

"I feel like a real educator, because I made efforts for an effective teaching". Similarly, while the following statement of X37 formed the code "endearing the course": *"...It showed us the ways to endear the course to our students";* the following statement of X26 formed the code "areas of use of mathematics in the daily life": *"...It showed me that mathematics is not only theoretical but it is also used in the daily life".* The code "classroom management" was formed by X12's statement *"...It improved my ability to control the class"*, whereas the code "understanding students and lowering the self to their levels" was formed by X2's response *"...It enabled us to understand students and lower ourselves to their levels"*. Under the category of "social", 13 participants formed the code "ability to express oneself in front of people". An example is the following stated by X29: *"... Now, I feel more comfortable with my circle of friends and I can express my opinions more freely and comfortably"*. The code "socialization" was formed by the responses of nine participants. An example is the following stated by X15: *"... I socialized more with people around me"*. Other codes emerged under this category are "establishing communication", "working in groups and cooperation" and "respecting others' opinions". X26's following response serves as an example for these three codes: *"...It taught me how to share works with my friends, how to respect others' opinions, how to fulfil my task, and how to be comfortable in front of other people"*.

Findings on the fourth research question

Table 4 demonstrated the findings obtained through the analysis of the fourth question *"Do you think the course "Drama in Mathematics Education" should be included in the Mathematics Teaching Undergraduate Program as a compulsory or an elective course? If yes, what should be its weekly course hours? Please explain in detail with*

your reasons." The question answered the fourth research question: *What are the opinions of the pre-service teachers who selected the course named "Drama in Mathematics Education" on the possible inclusion of the course in the curriculum of the Elementary Education Mathematics Teaching undergraduate program?* Findings were presented in Table 4.

As Table 4, demonstrated the following three codes emerged as a result of the analysis of the fourth question: "Yes, it should be included", "Compulsory" and "Elective". The first group was formed by the participants who did not specify whether it should be compulsory or elective. The code "compulsory" was formed by the responses of fifteen participants who think that the drama course should be a compulsory course. While five participants stated that the course should be taught in three weekly hours, four suggested that the number of hours should be four, and four people said it should be two. On the other hand, two participants had no opinion on this issue. The code "elective" was formed by the responses of fifteen participants who think that the drama course should be an elective course. Five of these fifteen participants stated that the number of weekly hours should remain at two, whereas three of them suggested that it should be four. Five participants did not present any opinion on this.

The code that emerged as a result of the responses of the participants who formed the code "elective" is "volunteerism", because these responses suggest that the drama course can achieve its objective only if it is carried out on a voluntary basis. An example is the following stated by X10:

"...I think this course should remain as an elective course, because it requires willingness and curiosity. It would not be entertaining when people are not willing to take it".

Responses of the participants who formed the code "compulsory" suggest that this is a course that must be taken by every pre-service teacher. Two examples are the following stated by X35:

"...It should be compulsory, because every pre-service teacher should see that they can teach Mathematics by

using different ways and by rendering it more pleasurable; and stated by X24: *“...I think it should be a compulsory course, because now Mathematics Education is mostly given through activities and links to the daily life. The drama course will endow pre-service teachers with relevant skills and knowledge”*.

RESULT AND DISCUSSION

Drama is one of the modern teaching methods/techniques used in Mathematics Education. In this study, aiming at determining pre-service Mathematics teachers' thoughts on the use of Drama course in Mathematics Education showed that students are in favour of use of the Drama in Mathematics. The participants specified the following reasons and codes by indicating that Drama is an entertaining, lasting, endearing, informative, concretizing, attention-grabbing, visual, comprehensible activity and it is related to daily life, which helps them discover their skills, enhances cooperative learning in the class and gives different insights about the life.

The following codes emerged in the study carried out by Uğurel (2003), with pre-service teachers on the advantages that drama activities would provide in teaching: increasing interest, enhancing motivation, learning by entertainment, ensuring long-lasting and fast learning, improving attention and increasing communication. These codes are largely similar to the codes obtained in the current study. Moreover, similar findings were obtained in the study carried out by Erdogan (2011) in order to evaluate the opinions of teachers and instructors who use creative drama as a method in mathematics education. According to Erdogan (2011), creative drama is an effective method which can be used in Mathematics Education, as it mentally and physically incorporates learners into the learning process. However, the idea of Annarella (2000) which is “drama is one of the most effective methods to teach the goals of the teaching program” also supports the findings of the current study. In addition to these studies, Tezel and Aktunç (2010) supporting the idea of use of Drama in Mathematics found that while teacher extensively used the Drama in their teaching at the beginning, they digressively used Drama in the following years.

The result of the second research question showed that 22 of the participants think that Drama can be used in teaching Mathematical subjects (all subjects [8], subjects which are difficult to comprehend [6], abstract subjects [6], and subjects encountered in daily life [2]). In addition, 15 participants stated that drama can be used in the following learning domains: numbers (numbers, whole numbers, fractions, sets), algebra (patterns and tessellations, algebraic expressions, problems, functions), statistics and probability (permutation, combination and probability), geometry (geometrical objects, geometrical

concepts, triangles), and calculations (area and volume calculations). The sub-domain “fractions” under the domain “numbers” (4 participants) and the domain “geometry” (5 participants) constitutes the areas where drama can be used in mathematics education.

The names of learning domains and sub-domains which emerged in the codes expressed by the participants were used in a number of studies in the literature. Some of them are as follow. In the study conducted by Soner (2005) with elementary education third-grade students, a statistically significant difference in the favour of the experimental group was found between the mean achievement score of the group, in which the subject of Adding-Subtracting in Fractional Numbers was taught using the drama method and the achievement score of the group, in which the same subject was taught in the traditional way. It was observed in another study that the subject of trigonometry taught using enacting activities had a significant positive influence on the Mathematical achievements of elementary school eighth-grade students, on the level of subject's permanence in mind, and on students' attitudes towards mathematics (Ornek, 2007).

The study carried out by Duatepe and Akkus (2006), was aimed at exemplifying the use of Creative Drama as a method in Mathematics Education. The findings of the study indicated that drama played a significant role in teaching mathematical concepts in the favour of the control group. In another study (Hatipoglu, 2006), the influence of the Drama method on students' achievement levels in elementary school fifth-grade Mathematics course subjects was examined by being compared the achievement levels of control and experimental groups through the assessment instruments prepared for 10 acquisitions selected from the Units “Numbers in Life” and “Geometric Figures”. The study found significant differences in the favour of the experimental group in 8 of 10 Mathematical Achievement Tests used for 10 acquisitions. Ozsoy (2003), used the creative drama method while teaching the elementary education eighth-grade subject of “Properties and Volumes of Right Prisms”, and observed that it positively influenced student success. In the study carried out by Ekinozu (2003), with the aim of determining the influence of teaching the elementary education subjects of permutation and probability through dramatization upon academic achievements, it was determined that the Drama method and the plain lecturing method equally affect students' achievements, whereas the permanence of the learning of students in the group in which the Drama method was used as well as their attitudes towards mathematics were found to be significantly higher than those of the group in which the traditional teaching method was employed.

As seen in the examples given from the relevant literature, the drama method yielded positive results with respect to certain variables. In this respect, the fact that

the participants in the current study listed subject names related to each learning domain and even that they think it is applicable to all subjects is in harmony with existing studies. In this context, it is highlighted that the participants were familiar with the names of subjects related to the learning domains in mathematics as they were taught these subjects and domains in the content of the course named "Special Teaching Methods" in the curricula. However, one of the reasons lying beneath the emergence of this result might have been the fact that the activities performed in the drama course had been implemented for almost all learning domains. On the other hand, in a research conducted with teachers and university professors (Erdogan, 2011), it is emphasized that the use of drama in all learning domains of Mathematics can create problems in applications.

The results of the third research question indicated that the participants think that the use of Drama in Mathematics Education improved their certain personal (27 participants), professional (18 participants) and social (20 participants) characteristics. The category of "personal" here refers to cognitive (creative thinking, reasoning, problem-solving, imagination and creativity and writing a play), affective (self-confidence/confidence, acquiring different points of view), and psychomotor (role-playing and imitation, performing a play) domains. On this issue, Adiguzel (2006), says that the most important advantage of Creative Drama as a learning method is drama's being integrated with cognitive, affective, social and kinaesthetic skills, and Dupont (1992), states that one of the purpose of Creative Drama in Education is to affect and stimulate all of the cognitive, affective and psychomotor behaviours of individuals. The codes that emerged under the category of "professional" are as follow: different teaching methods and techniques, more effective teaching, self-confidence of the educator, understanding students and lowering the self to their levels, skill of endearing the course, classroom management and areas of use of Mathematics in the daily life. On the other hand, the followings are the codes that emerged under the category of "social": ability to express oneself in front of people, socialization, establishing communication, working in groups and cooperation, and respecting others' opinions. The most serious improvement occurred in the code "self-confidence/ confidence) (19 participants). Other notable codes are as follow: "ability to express oneself in front of people" which was formed by 13 participants, and "different teaching methods and techniques" which were formed by 9 participants.

Responses given by the participants for the third research question are in line with the relevant literature. Yenilmez and Uygan (2010), determined that the impact of Creative Drama on the self-efficacy beliefs of seventh-grade students towards geometry was significantly positive. Tas (2008), in the study carried out with classroom

teachers, observed that the teachers strongly agreed that the use of Drama in the Mathematics course contributes to students' skills of problem solving and reasoning. Ozsoy and Yüksel (2007), maintain that Creative Drama socializes students and improves their listening and self-expression skills, and most importantly, it enhances creativity. In the study carried out by Kara and Cam (2007), aiming to determine the effect of Creative Drama on the acquisition of the social skills of working in groups, initiating and maintaining a relationship, and self-control in the course, it was observed that the Creative Drama method is influential on all constructs above. Debreli (2011), investigated the influence of drama-based teaching on the achievement levels of seventh-grade students in the subject of "Ratio and Proportion" as well as on their attitudes towards Mathematics.

CONCLUSION

In this study, the finding that the experimental group students performed better than control group students led to the conclusion that education based on of Creative Drama allows for active participation, working in co-operation and self-awareness. In addition, McCaslin (2006, p.22) defines Creative Drama as a way of learning and self-expression, a technique of therapy, a social activity, and a form of art. In the study of Guneysu and Temiz (2012) which is about pre-service teacher's perceptions on vocabularies and metaphors about before and after drama course showed that "self-esteem and a teaching technique" are most frequently expressed concepts by the students after taking drama course.

The findings of the fourth research question showed that almost all participants (35 of 37 participants) think that the Drama course should be a part of Mathematics Education either as a compulsory or elective course. According to Okvuran (1993), inclusion of Drama courses in all levels of education might establish the contemporary education system and contribute to the process of training teachers and students who feel the need and excitement for self-improvement. Pre-service teachers' knowledge of the Drama method will advance if these learners follow relevant resources and practice drama more frequently. Therefore, pre-service teachers at all levels of Faculties of Education should be given the opportunity to benefit from Drama courses offered both inside and outside these faculties. Then, advances related to these courses should be conducted in the faculties. Particularly, Pre-Service Mathematics teachers should be provided with the required opportunities to experience and learn the contributions that Drama activities are to make to Mathematics courses.

Conflict of Interests

The author have not declared any conflict of interests.

REFERENCES

- Adıguzel O (2006). Yaratıcı drama kavramı, bileşenleri ve aşamaları. *Yaratıcı Drama Dergisi* 1(1):24-27.
- Akkus O (2006). Yaratıcı dramanın matematik eğitiminde kullanılması: kümeler alt küme öğrenme alanındaki uygulama. *Yaratıcı Drama Dergisi* 1(1):59-74. <http://kaynakca.yaraticidrama.org/?p=21>
- Altun M (2012). İlköğretim 2. kademe (6, 7, 8. sınıflarda) matematik öğretimi (8. Baskı). Bursa, Alfa Aktüel Yayıncılık.
- Annarella LA (2000). Theatre in the classroom: A creative way to teach and learn. (ERIC Documentation Reproduction Service No. ED 445 357).
- Aytas G (2013). An alternative method for learning and teaching: creative drama. *Adıyaman University J. Social Sciences Institute*. 6(12):35-54.
- Carter C, Westaway L (2005). The mathematics allergy: is drama in education the much-needed antidote? *The Mathematics Education into the 21st Century Project: Reform, Revolution and Paradigm Shifts in Mathematics Education*, Johor Bahru, Malaysia (pp.65-69).
- Crawford M, Witte M (1999). Strategies for mathematics: Teaching in context. *Educ. Leadersh*. 53(3):34-39.
- Debreli E (2011). The effect of creative drama based instruction on seventh grade students' achievement in ratio and proportion concepts and attitudes toward mathematics (Unpublished master's thesis). Middle East Technical University, Ankara, Turkey <http://etd.lib.metu.edu.tr/upload/12613261/index.pdf>
- Duatepe A (2004). The effects of drama based instruction on seventh grade students' geometry achievement, van hiele geometric thinking levels, attitude toward mathematics and geometry. Middle East Technical University, Ankara, Turkey. <https://etd.lib.metu.edu.tr/upload/3/12605351/index>
- Duatepe A, Akkus O (2006). Yaratıcı Dramanın Matematik Eğitiminde Kullanılması: Kümeler Alt Öğrenme Alanında Bir Uygulama, *Yaratıcı Drama Dergisi* 1(1):89-95.
- Duatepe A, Cilesiz Ş (1999). Matematik tutum ölçeği geliştirilmesi, Hacettepe Üniversitesi Eğitim Fakültesi Dergisi 16-17:45- 52.
- Dupont S (1992). The effectiveness of creative drama as an instructional strategy to enhance the reading comprehension skills of fifth grade remedial readers. *Read. Res. Instr.* 31(3):41-52.
- Ekinözü I (2003). İlköğretimde Permütasyon ve Olasılık Konusunun Dramatizasyon İle Öğretiminin Başarıya Etkisinin İncelenmesi. Yayımlanmış. Yüksek Lisans Tezi, Marmara Üniversitesi Eğitim Bilimleri Enstitüsü, İstanbul. <http://kaynakca.yaraticidrama.org/?p=74>
- Erdogan Y (2011). Specification of views, problems and suggestion of primary school teachers, mathematics teachers and instructors at university who use drama as a teaching method in mathematics education (Unpublished master's thesis). Ankara University, Ankara, Turkey.
- Erdogan S (2008). Drama ile matematik etkinlikleri. Ankara, Nobel Yayın Dağıtım.
- Erdogan S, Baran G (2009) A study on the effect of mathematics teaching provided through drama on the mathematics ability of six-year-old children. *Eurasia J. Math. Sci. Technol. Educ.* 5(1):79-85.
- Güneysu S, Temiz S (2012) Perceptions about drama before and after drama in education. *Procedia – Soc. Behav. Sci.* 46:2046-2050.
- Hatipoğlu YY (2006). İlköğretim 5. sınıf matematik dersi konularının öğretiminde drama yönteminin öğrenci başarısına etkisi. (Yayımlanmamış yüksek lisans tezi). Gazi Üniversitesi, Ankara.
- Johnson C (2002). Drama and metacognition. *Early Child Development Care*. 172:595-602.
- Kaplan K, Unal I, Demir A, Kasap Y, Bozkaya C (2011). Öğretmen Adayları İçin KPSS eğitim bilimleri öğretim yöntem ve teknikleri Ankara, Beyaz Kalem Yayıncılık.
- Kara Y, Cam F (2007). Effect of creative drama method on the reception of some social skills. *University of Hacettepe, J. Educ. Faculty* 32:145-155.
- Karadağ E, Korkmaz T, Caliskan N, Yüksel S (2008). Teacher as a drama leader and scale of sufficiency of educational drama application: reliability & validity analysis. *Gazi University J. Educ. Faculty* 28(2):169-196.
- Kerekes J, King KP (2010). The king's carpet: drama play in teacher education. *Int. J. Instr.* 3(1): 39-60.
- Koc M, Dikici H (2002). Eğitimde dramanın bir yöntem olarak kullanılması. <http://ilkogretim-online.org.tr/vol2say1/ou1/ou1.pdf>
- McMillan JH (2000). Educational researching. *Fundamentals for the Consumer* (3rd ed.) New York: Longman.
- MEB (2013). Milli Eğitim Bakanlığı Talim ve Terbiye Kurum Başkanlığı, Ortaokul Matematik Dersi (5, 6, 7 ve 8. Sınıflar) Öğretim Programı. http://mevzuat.meb.gov.tr/html/21482_0.html
- Merriam S (2007). *Qualitative research and case study applications in education*. New York: John Wiley.
- McCaslin N (2006). *Creative drama in the classroom and beyond*. (8th ed.). New York: Pearson Education.
- NCERT (National Council of Educational Research and Training), 2006. Position paper national focus group on teaching of mathematics. Internet document retrieved from http://www.ncert.nic.in/new_ncert/ncert/rightside/links/pdf/focus_group/math.pdf
- Okvuran A (1993). Yaratıcı drama eğitiminin empatik beceri ve empatik eğitim düzeylerine etkisi. (Yayımlanmamış yüksek lisans tezi). Ankara Üniversitesi, Ankara.
- Okvuran A (2003). Efficiencies of drama teacher. *Ankara University, J. Educ. Sci.* 36(1-2): 81-87.
- Ornek S (2007). Trigonometrik kavramların canlandırma yöntemiyle öğrenilmesinin öğrencilerin matematik başarılarına etkisi. (Yayımlanmamış yüksek lisans tezi). Marmara Üniversitesi, İstanbul.
- Ozsoy N, Yüksel S (2007). Drama in mathematics education. *Dokuz Eylül University J. Buca Educ. Faculty* 21:32-36.
- Özsoy N (2003). İlköğretim Matematik Derslerinde Yaratıcı Drama Yönteminin Kullanılması. BAÜ Fen Bilimleri Enstitüsü Dergisi 5(2):112-119. <http://fbe.balikesir.edu.tr/dergi/20032/BAUFBE2003-2-12.pdf>
- Paksu AD, Ubuz B (2009). Effects of drama-based geometry instruction on student achievement, attitudes, and thinking levels. *J. Educ. Res.* 102(4):272-286.
- Patel R (2013). Innovations in teaching of mathematics. Internet document retrieved from <http://waymadedu.org/StudentSupport/Rachnamadam.pdf>
- Salman MF (2009). Active learning techniques (alt) in a mathematics workshop; Nigerian primary school teachers' assessment. *Int. Electronic J. Math. Educ.* 4(1):23-34.
- San İ (1994). "Daha çağdaş, daha demokratik, daha hoşgörülü bir eğitim için" drama ve öğretimi bilgisi. *Türk-Alman Kültür İşleri Kurulu Yayın Dizisi*, 5, 9.
- Sezer T, Öztürk DSG (2011). The effects of drama in helping five-year-old children acquire the concepts of number and operation. *Educ. Res.* 2(6):1210-1218.
- Soner S (2005). The effectiveness of drama technique in teaching addition – subtraction operations in mathematics in primary schools (Unpublished master's thesis). Abant İzzet Baysal University, Bolu, Turkey.
- Sengün Y, İskenderoğlu T (2010). A review of creative drama studies in math education: aim, data collection, data analyses, sample and conclusions of studies. *Procedia Soc. Behav. Sci.* 9:1214-1219.
- Tas F (2008). Teachers' opinions about the contribution of drama technique to primary school 1st-5th grades maths courses basic skills (Unpublished master's thesis). Abant İzzet Baysal University, Bolu, Turkey.
- Tezer M, Aktunç E (2010). Teacher opinions in the implementation of the drama method in mathematics teaching. *Procedia Soc. Behav. Sci.* 2:5836-5840.
- Uğrel İ (2003). Ortaöğretimde oyunlar ve etkinliklerle matematik öğretimine ilişkin öğretmen adayları ve öğretmenlerin görüşleri. (Yayımlanmamış yüksek lisans tezi). Dokuz Eylül Üniversitesi, İzmir.
- Yegen G (2003). Yaratıcı drama. *İlköğretim-Online Öğretim Uygulamaları Serisi* 2(2):1-4.
- Yenilmez K, Uygan C (2010). The effects of creative drama method on 7th grade students' self-efficacy beliefs on geometry. *Kastamonu Educ. J.* 18(3):931-942.
- Yin RK (2003). *Case study research: Design and methods* (3rd ed).

Thousand Oaks, CA: Sage.
http://books.google.com.ng/books/about/Case_study_research.html?id=BWea_9ZGQMwC

Full Length Research Paper

New pedagogical literacy requirement resulting from technological literacy in education

Abdullah Adigüzel

Department of Education Sciences, Faculty of Education, Harran University, Turkey.

Received 25 April, 2014; Accepted 13 June, 2014

The aim of this study was to determine the recent pedagogical literacy requirements in the technologically supported lessons. In this study, case study which is one of the qualitative research methods was used. The participants of the study included 12 voluntary classroom teachers who were in service in three different private primary schools during the spring term of 2011 to 2012 academic year. Participants stated that the teaching methods and techniques were not regularly carried out in the technologically supported lessons. According to the teachers, the biggest problem in the technologically supported lessons is the insufficiency of face-to-face communication with the students. Participants emphasized that students could learn well with different learning activities and different examples because of having different individual characteristics, different learning speed and learning capacity.

Key words: Instructional technologies, learning, literacy, new pedagogy, pedagogical, pedagogical literacy, teacher, teaching, technological, technological literacy.

INTRODUCTION

Knowledge is a vital source for the world economies in the 21st century. Knowledge is also an important factor for technological and scientific change (Korkut and Akkoyunlu, 2008). Various studies were conducted to design models in order to develop more efficient and productive education approaches via using learning technologies. So, instructional technologies have become indispensable for teachers and students in the teaching-learning process. Learning environments have flourished by means of instructional technologies (Mishra and Koehler, 2006). PowerPoint presentations with projection support and smart boards have become regular fixtures of classes. In addition, teachers started to make use of

such social networking sites as Facebook and such web applications as Wiki and Blog with the objective of education (Chou, 2011).

In the process of integration of technology to education, serious educational problems aroused in terms of teacher, student and the learning environment. Most of these problems resulted from not being supported by instructional technologies with appropriate pedagogical approaches (Bass, 2000). On the other hand, inclinations of students to technology, their demand for use of instructional technologies in lessons and their expectations are regarded as the factors that trigger the use of technology in classes (Çağiltay, 2007 and Yılmaz, 2007).

E-mail: aadiguzel@harran.edu.tr

Author agree that this article remain permanently open access under the terms of the [Creative Commons Attribution License 4.0 International License](http://creativecommons.org/licenses/by/4.0/)

Teachers can significantly integrate the developments in their own fields, contemporary approaches and teaching methods via using information technologies. This way, teachers can achieve productive implementations (Şahin, 2011).

The concept of literacy can be summarized as the ability of reading and writing in a certain language (Polat, 2005). However, Houff (2002) stated that the changes in life expanded the dimensions of literacy. Nowadays, technology is quite dominant and ways of knowledge education and learning have changed. It is more preferred that teachers can acquire the necessary knowledge when required, use the knowledge appropriately for the purpose instead of a teacher who is equipped with excessive knowledge (Adigüzel, 2011). In a report that was prepared by American Library Association (ALA), it was stated that teachers should be literate in every domain. It was also pointed in the report that measurements of technological and pedagogical literacy should be taken into consideration (ACRL, 2003). The responsibility of providing interactive and participative environments to the students in the process of teaching affects the roles of the teachers within the process. The role of the teacher is converted from the model who knows and teaches everything into the model who learns together with the students and lead them (Kurbanoğlu and Akkoyunu, 2007). Similarly, Kurbanoğlu and Akkoyunlu (2007) pointed that a teacher should constantly improve himself and have the potential of finding, using and choosing the most appropriate ones out of the various teaching approaches and methods, new technologies and changing source types.

The integration of technological-pedagogical information enabled the new approach which is composed of technological, pedagogical and content knowledge and described as TPCK (Technological Pedagogical Content Knowledge) to be used in the teaching-learning process. This approach is a combination of technological, pedagogical and content knowledge. This combination anticipates integrating teaching technologies, learning activities and setting to work together (Thompson and Mishra, 2008). It is not possible that the technology can be efficient in the teaching-learning process without evaluating its appropriateness to the field and when it is abstracted from pedagogical understanding (Shulman, 1986). The combination of technological, pedagogical and content knowledge anticipates using the approaches based on the thoughts of Shulman (1986) and flourished technological support to gain achievement in the teaching-learning process. This combination states that alternative and appropriate pedagogical approaches should also be used (Mishra and Koehler, 2006). Instructional technologies include all the factors that are effective within the teaching process. These factors are pencils, papers in the classes, smart and interactive boards, digital technologies, internet access and course software. On the other hand, pedagogy includes such factors as management

and assessment works, lesson plans, teaching environments, the characteristics of students, teaching methods and quality of teacher. Field information includes all the skills and knowledge that should be gained by the students (Baran et al., 2011).

The roles of this triple combination in the teaching-learning process are the selection of instructional methods and technologies appropriate to the course content and providing the integration of subject area, technology and pedagogy (Şahin, 2011). The teacher should carry out the following activities while using the instructional technologies in the teaching-learning process (Angeli and Valanides, 2005). The first technologically supported description of the knowledge and skills that will be gained by the students and the attribution of instructional technologies. Second, choosing the appropriate technologies to the determined knowledge and skills and supporting these instructional technologies with the suitable pedagogical approaches. Third, providing a combination of the determined knowledge and skills, instructional technologies and the pedagogical approaches that will be used in the teaching process. Nowadays, courses without the support of instructional technologies have not been thought. However, it is also clear that technology is not enough by itself for a qualified education. Requirement of getting the most out of the opportunities provided by the instructional technologies and supporting this technology with appropriate pedagogical approaches emerges. In the teaching-learning process, the requirement of a significant combination of subject field, instructional technologies and pedagogical approaches enabled the teachers to gain skills in the technological and pedagogical literacy and to improve themselves.

Teacher's teaching the technologically supported lesson and embracing suitable pedagogical approaches oblige them to have the technological and pedagogical literacy skills. This situation also requires the teachers to have the knowledge and skills to make an efficient combination of instructional technologies, pedagogical approaches and content knowledge. In other words, having basic knowledge and skills in these fields are required for the teachers. This study was aimed at determining the recently emerging pedagogical literacy approaches and technological approaches that the teachers had in the lessons with technological support.

The aim of the study

The aim of this study was to determine the technological literacy levels of the classroom teachers related to their efficiency in using the instructional technologies in the teaching-learning process. This study also aimed to determine the recent pedagogical literacy requirements in the technologically supported lessons. With this general aim, the answers of the following questions were

Table 1. Participant codes and distributions of the participants according to the schools.

Participants	Participant code	The number of participants
Teachers of Primary School A	KAO	4
Teachers of Primary School B	KBO	4
Teachers of Primary School C	KCO	4
Total		12

searched:

1. What are the instructional technologies that the teachers mostly used in the teaching-learning process?
2. What are the technological literacy levels of the teachers related to the used instructional technologies?
3. What are the pedagogical levels of the teachers related to the regularly using the teaching methods and techniques, establishing a healthful communication with students and taking into consideration the individual differences of the students?

METHODOLOGY

In this study, case study which is one of the qualitative research methods was used. The thoughts on the requirement of the classroom teachers' efficiency in using instructional technologies in the teaching-learning process, the technological literacy levels and recently emerging pedagogical literacy approaches were discussed in this study.

Working group

The participants of the study included 12 voluntary classroom teachers who were in service in three different private primary schools in the spring term of 2011 to 2012 school years. Private primary schools were selected for this study, because; all of the lessons taught technologically supported these schools. These teachers were determined via maximum variety sampling method. Maximum variety sampling method formed relatively small sample. The aim of this method was to reflect the variety of the individuals who were part of the discussed problem in the sample (Yıldırım and Şimşek, 2008). As a result of the informal interactions of the researcher and pre-interviews, it was stated that these characteristics were important for the explanation of the case (Ekiz, 2009). First of all, the managers of the selected schools were interviewed. The aims and the subject of the study were explained to the managers. Then, the teachers who voluntarily attended to the study and taught all the lessons technologically were interviewed. Information on the aims and the subject of the study and the interview method was given in the interview. Participant of the study included 58,4 % female (n=7) and 41.6 % male (n=5). The working group of the study is shown in Table 1.

Data collecting tool

In this study, the data was collected via semi-structured interview form. Different classifications were carried out in the literature related to the interview technique which is one of the qualitative research methods. Fielding (1996) classified the interviews as "standardized", "semi-standardized" and "not standardized".

Minichiello et al. (1990) classified the interview method as; structured, semi-structured and not structured. The opinions of the teachers were received in the preparation process of the interview form. The related literature was searched. In the light of the obtained data, the interview form was prepared. Classroom teachers and four faculty members of educational sciences examined this form and the form was finalized in terms of their opinions. Interview form included five open-ended questions. During the interview, explanatory questions were also asked to the participants to make explicit and flesh out the answers of the previously prepared questions when required. The interviews lasted nearly 25 to 30 minutes. The whole of the interviews were recorded. An inductive analysis which is one type of the content analyses was used to analyze the obtained data within the study.

Validity and reliability

In the study, the procedures below were followed to provide reliability and validity: While preparing the interview form conceptual frame was designed to increase the internal validity (persuasiveness) of the study related to the subject at the end of the literature examination and opinions of teachers. The opinions of teachers after the interviews were put in writing via this conceptual frame. Then, this text was resent to the related teachers and they were asked to control the text. The themes which were included in the conducted content analyses were determined as broad as involving the related concepts. The permission was taken from the school management before the interview. Only the voluntary teachers were interviewed. All the findings were given directly without interpretation to increase the internal validity (persuasiveness) of the study. The process of the study and the conducted works in this process were tried to be explained to increase the external reliability of the study. In this context, the model of the study, working group, data collecting tool, data collecting process, analyses and interpretation of the data were described in detail. The researcher described the conducted works in detail within the study to increase the external reliability of the study. In addition, the researcher should keep the raw data and coding so that other people can investigate.

Data analysis and interpretation

Content analysis method was used in the data analysis that was collected via interview method. The data was described via content analysis. The facts that could be hidden in the data were revealed (Yıldırım and Şimşek, 2008). The descriptive analysis of the data was conducted according to the following operations:

1. All the interviews were prepared without any semantic change. The lists of the interviews were made according to their sequence in the form.
2. A thematic frame was formed based on the collected data. The codes were given to the determined themes.
3. In terms of the thematic frame, the data were read. Percent and frequency values of the themes were calculated. These themes

Table 2. Mostly used instructional technologies by the participants.

Instructional technologies	School	School	School
	A	B	C
1. Projection supported PowerPoint presentation	2	3	3
2. Using smart board	3	3	3
3. Using tablet computer	2	2	2
4. Making use of social networking sites as Facebook etc. with lesson purpose	2	1	2
5. Making use of web applications as Blog, Wiki etc. with lesson purpose	1	1	2
6. Making use of abstract class applications (Second Life, Forterra etc.) in the lessons	2	1	1
7. Students' making use of e-mail applications with communication and homework purpose	1	1	1

3 Always, 2 Sometimes, 1 Never

were grouped under main topics. Sub-themes were formed under these main themes. The percent and frequency value was calculated for each teacher.

FINDINGS AND INTERPRETATIONS

In this chapter, the technological literacy levels of the classroom teacher were determined primarily. These technological literacy levels were related to the instructional technologies that the teachers mostly used. Then, the opinions of the teachers about the recent pedagogical literacy approaches that appeared in the technologically supported lessons were respectively presented together with the main and sub themes.

The instructional technologies that the teacher mostly used in the teaching learning process

The instructional technologies that the classroom teachers mostly used in the learning activities are shown in Table 2. As is seen in Table 2, classroom teachers in the three private primary schools that attended to the study use smart boards actively. Similarly, it is seen that the tablet computers were sometimes used in the private schools to be comply with the system that would be designed via FATİH Project (FATİH-The Movement to Increase Opportunities and Technology Improvement Project). The commonly used instructional technologies were "Smart Board" and "Projection Supported PowerPoint Presentation" in all of the schools that were selected as samples. Instructional technologies of "Abstract Classes", "Social Networking Sites" and "Such Web applications as Blog, wiki and E-mail" were less use. Participants stated that they made use of such social networking sites and web applications as Facebook, Blog, and Wiki etc. for some lessons, researching, delivering homework and controlling student activities.

Main themes on the technological literacy and pedagogical literacy

The opinions of the participants about the technological

literacy and recently appeared pedagogical literacy are shown in Table 3 as main themes. In table 3, numerical values of main themes are shown. These main themes included the opinions of the participants on the technological literacy levels of the teachers and different pedagogical approaches of the teachers in the learning activities. One of the themes out of the determined four themes was related to technological literacy while other three themes were related to pedagogical literacy. In this context, 17 opinions out of 64 were related to technological literacy, while other 47 opinions were related to the pedagogical literacy. Participants stated that the attention of the students should be focused on the subject of the course instead of the technology that is used in the presentation of the course. Participant also stated the requirement of a healthy communication between the teacher and students together with taking the individual differences of the students into consideration. They also stated that teachers should be pedagogically literate on the individual differences of the students.

Opinions on the technological literacy levels of the teachers

Participants stated that they sometimes face problems about the teachers' making use of instructional technologies in the teaching-learning process and these problems caused communication gaps in the teaching-learning process. However, it was emphasized that if the education teachers received are related to the use of instructional technologies, the technological literacy skills of the teachers increased, then this problem could be solved. As shown in Table 4.

This study which was on the technological literacy levels of the teachers and their skills in using the technology in the learning activities included 12 participants. These 12 participants stated 24 different opinions. According to 9 opinions, the education which was received to learn using the instructional technologies and the applications were insufficient. According to 7 opinions, there had been problems about using technology resulted from the physical infrastructure and equipments. According to 8 opinions,

Table 3. Main themes on the technological literacy and pedagogical literacy.

Main themes	School	School	School
	A	B	C
	f	f	f
1. Having the ability of sufficiently using the instructional technologies	6	5	6
2. Ability of using suitable teaching methods and techniques	6	7	5
3. Ability of establishing interactive communication with the students in the class	5	5	4
4. Ability of taking the individual differences of the students into consideration in learning activities	4	6	5
Total	21	23	20

Table 4. Opinions on the technological literacy levels of the teachers.

Main theme	Sub-themes	f	%
Having the ability of efficiently using the instructional technologies	1. Deficiency in education and practice on using the instructional technologies	9	37.50
	2. Physical infrastructure and equipment shortage	7	29.17
	3. Shortage of technical service for the possible problems to intervene immediately	8	33.33

shortage of technical service that would interfere in possible problems negatively affected the lessons. In the following paragraphs, opinions of three distinct participants on this issue are explained:

1. "We acquired various skills in use of the instructional technologies via various in-service instruction activities. We received education especially in the use of tablet computers and smart boards. We sometimes use tablet computers in the lessons to be comply with FATIH Project. However, we consistently use the smart boards in the lessons. Smart boards are highly detailed instructional technologies that offer several alternatives in the teaching-learning process. We only acquired the skills for elementary operations of this technology. We can face problems when we want to make detailed use of this technology or we can make a mistake. Then the lesson is interrupted and the attentions of the students are distracted" (KAO-3).
2. "Some problems about the use of instructional technologies can occur because of the poorness of physical infrastructure of the school building and shortage of technological equipments. This situation negatively affects the productivity in the lesson" (KCO-2).

Opinions on the regular use of teaching methods and techniques

As a result of the interviews, it was determined that alternative teaching methods and techniques were not used in the technologically supported lessons. It was concluded that teachers had to be content with only the instructional approaches that the instructional technologies offered. It was concluded that this situation

made the lessons monotonous and caused the decrease of productivity. Participants stated that they tried to carry out various pedagogical approaches to deal with this situation (Table 5).

In the technologically supported lessons, 12 participants offered 43 distinct opinions on the condition of regular use of teaching methods and technologies. According to 12 opinions, the manner they use instructional technologies while carrying out learning activities is always the same. According to another 11 opinions, instructional technologies add visual quality and diversity to the learning activities; but, its life-based learning and experience is restricted. According to another 8 opinions, examples from the real life and activities that enable the individuals to express themselves are limited. According to 13 opinions, any other teaching methods and techniques except for the learning approaches that the instructional technologies offer are not used. In the following paragraphs, opinions of three distinct participants on this issue are explained:

1. "The manner of using the instructional technologies is always the same while carrying out learning activities. All of the learning activities are carried out with smart boards and visuality equipments. Any different activity and application for the students is out of question. So, the students get bored and their attentions get lost. We, the teachers, focus on our presentation more than the students" (KAO-1).
2. "Instructional technologies are student-focused at the beginning of the lesson; but, then they get monotonous. The technology that is used in the lessons is simple and boring according to the students. So, we try to arrange the learning activities with the aim of making the learning of the students effective" (KBO-2).

Table 5. Opinions on the ability of using appropriate teaching methods and techniques.

Main theme	Sub-themes	f	%
Condition of using the appropriate teaching methods and techniques	1. The manner of using instructional technologies is always the same while carrying the learning activities.	12	27.91
	2. Instructional technologies add visual quality and diversity to the learning activities; but, the life-based learning and experience area is restricted.	11	25.58
	3. Pedagogically different teaching methods and techniques except for the learning approaches that are offered by the instructional technologies are not used.	13	30.23
	4. Instructional technologies do not sufficiently contribute to the affective learning, showing empathy, interpreting, fictionalizing etc. skills of the students.	7	16.28

Table 6. Opinions on establishing effective communication with students in the class.

Main theme	Sub-themes	f	%
Ability of establishing effective communication with the students in the class	1. It is hard to establish face-to-face, eyes-to-eyes communication with students.	9	45
	2. Cue, feedback and editing activities are not enough.	5	25
	3. It gets hard to determined learning levels of the students; because, the students have difficulty in expressing themselves.	6	30

3. "Instructional technologies cause the skills of the students to be blunted; because, the technology does everything for them. I see that students have difficulty in expressing themselves verbally. They can quickly solve the problems that are written on board; but, they cannot explain how they solve" (KCO-4).

Opinions on establishing effective communication with students

At the end of the interviews with the participants, it was concluded that a healthy communication could not be established in the technologically supported lessons. It was also concluded that sufficient leading, cues, feedback and editing were not provided in the learning activities. The teacher who turned his back to the students while using the smart board emphasized that he could not establish face-to-face communication and eye contact with the students. The tendency of the students in bad behaviors in the lessons without a healthy communication was especially emphasized. As is seen in Table 6, 8 participants gave 20 distinct opinions related to establish a healthy communication with students in the technologically supported lessons. According to 9 opinions, it is hard to establish face-to-face and eyes-to-eyes communication with the students. According to 5 opinions, cue, feedback and editing activities are not enough. According to 6 opinions, it gets hard to determined learning levels of the students; because, the students have difficulty in expressing themselves. In the following paragraphs, opinions of three distinct participants on this issue are explained:

1. "We use the smart boards very often in the learning-teaching process. While making presentation with the smart boards and other equipments, our face and attention is always directed to the projection area. This is why we barely establish face-to-face communication with students. So, students can show different behaviors (KCO-2).

2. "An effective communication with the students is essential to be a qualified teacher. Eye-contact takes the student in the magnetic field of the teacher. In another words, the teacher can teach anything with an effective communication and eye-contact in the teaching-learning process. Teacher's strongly focusing on the instructional technologies in the teaching-learning process prevents the effective communication with the student (KBO-3).

3. "Instructional technologies are always an obstacle between the teacher and the student in the teaching-learning process. The teacher and the student cannot understand each other because of the instructional technologies" (KAO-3).

Opinions on taking the individual differences of the students into consideration

Participants stated that the individual differences of the students were not sufficiently taken into consideration and the lessons were taught according to the average student level. Participants also emphasized that this situation caused the compliance problems between the students who had different individual characteristics. It was observed that some of the students learned a lot from the lesson while some of them learned little from the

Table 7. Opinions on taking the individual differences of the students into consideration.

Main theme	Sub-themes	f	%
Taking the Individual differences of the students into consideration within the learning activities	1. Learning activities that are conducted together with instructional technologies are same for all students.	5	27.78
	2. The individual differences of the students as curiosity, interest, skill and preference are not taken into consideration in the technologically supported lessons.	5	27.78
	3. There are students with distinct quickness and capacity of learning in the lessons and learning is not acquired in the same level.	4	22.22
	4. Students with technological curiosity and skill to use and students without this skill are in the same class and they try to acquire learning via the same activities.	4	22.22

same lesson. As is seen in Table 7, 12 participants gave 18 opinions on the taking of the individual differences of the students into consideration in the technologically supported lessons. According to 5 opinions, learning activities that are conducted together with instructional technologies are same for all students. According to other 5 opinions, the individual differences of the students as curiosity, interest, skill and preference are not taken into consideration in the technologically supported lessons. According to 4 opinions, there are students with distinct quickness and capacity of learning in the lessons and learning is not acquired in the same level. According to the last opinion, students with technological curiosity and skill to use them and students without this skill are in the same class and they try to acquire learning via the same activities. In the following paragraphs, opinions of three distinct participants on this issue are explained:

1. "In the learning activities that are conducted with instructional technologies, the individual differences of the students are not taken into consideration. So, some of the students cannot understand the lesson and have difficulty in learning. I try to find examples from daily-living to support these students. So, I try to satisfy their shortages" (KBO-2).
2. "Students are different from each other in terms of individuality. In other words, students are different from each other in terms of interests, need, curiosity, motivation and skills. It means that students learn through different learning activities and examples. Education-purpose course software should be prepared according to the theory of multiple intelligences and individual differences of the students" (KCO-1).
3. "There are students who know, show interest and use the instructional technologies that are used in the learning activities while there are students who are strangers to these technologies. This situation affects active attendance of the students. The interest and attendance to the lesson of the students who have skill in using the instructional technologies are higher than the other students" (KAO-1).

DISCUSSION AND CONCLUSION

In today's education world, the learning activities are supported with technology in almost all the government and private educational institutions. However, the scopes, functions and dimensions of these technologies differ from institution to institution. Teaching the lessons with the technological support revealed the requirement of using the recent pedagogical literacy skills and technological literacy in the learning activities. The following conclusions were arrived based on the obtained data in the study. All of the participants stated that they mostly used smart boards and PowerPoint presentations. All of the classes included smart boards and the smart boards were used through the teaching-learning process. Participants also stated that they made use of such social networking sites and web applications as Facebook, Blog, Wiki etc. to research, give homework and control the student works in some lessons. According to this conclusion, it can be said that the technological literacy levels of the teachers were high. Chou (2011), emphasized that web applications as Blog and Wiki were effective in socializing of teachers and students, sharing the feelings and opinions and creating abstract working groups, common targets and values.

All the participants received education on how to make use of the instructional technologies primarily PowerPoint presentation and smart boards. It was also stated that the teachers were skillful at this domain. In other words, technological literacy levels of them were high. However, participants emphasized that they sometimes faced problem because of the smart boards' being complex, functional and shortages of physical infrastructure, technological equipment and technique service. Çelik et al. (2009), concluded that the teachers perceived themselves as unqualified however, their levels of competence were high in terms of using education software in the study that they conducted on the computer literacy levels of the teachers. Yıldırım (2007), stated that the attitudes of the teachers towards the use of the technology were negative and they lack knowledge and skills on how to

use the instructional technologies. Participant stated that the teaching methods and techniques were not regularly carried out in the technologically supported lessons. They also stated that all the learning activities were carried out with smart board and other visual equipments. So, it was emphasized that the teacher generally focused much on technology than the students. Participants stated that the instructional technologies which were interesting to the students at first became boring then and caused distraction of the student attention. Yaşar and Gültekin (2007) emphasized the requirement of knowing how and where to use the instructional technologies and knowing the educational characteristics of them in their study.

According to the teachers, the biggest problem in the technologically supported lessons is the insufficiency of face-to-face communication with the student. It was determined that the communication with the student to whom the teacher turned his back while making exercises on the smart board was lost. It was emphasized that instructional technologies should be made functional so that the teacher could communicate with the students in the teaching process. So this problem will be solved. Yaşar (2001), explained the functions of the instructional technologies makes the interaction easier between the learner and the learned. Adigüzel and Berk (2009) determined in their study that the teachers had positive attitudes and requirement of knowledge about using the instructional technologies. Participants emphasized that the students could learn well with different learning activities and different examples because of having different individual characteristics, different learning rate and learning capacity. They also stated that all the presentations, course software and similar applications should be prepared according to the individual characteristics of the students. Participant emphasized that the students' knowing the instructional technologies and having the skill in using the instructional technologies positively affected their active attendance to the lesson. Tuncel et al. (2011), stated that the instructional technologies contributed to the learning environment especially at the point of materializing abstract learning. Varış and Karadeniz (2012) stated that, teachers' use of information technology for purposes could be enhanced by preceding the necessary skill of dynamic information technology literacy factor by integrating creative pedagogical use of information technology content in teacher education courses an in-service training programs.

According to the conclusions of the study, it is seen that the use of instructional technologies is indispensable while carrying out learning activities in today's education understanding. Moodley (2013), stated that there are numerous benefits when specific aspects for professional development directly addresses the curriculum and teacher gaps in knowledge; when teachers are involved actively and collaboratively with each other. Zhu (2013), stated that the relationship between organisational culture features, teachers' reactions and implementation of technology-enhanced learning can enhance learning

outcomes. According to Horzum (2013), it is an expected outcome that deep learners who have high meta-cognitive qualities feel competent in TPACK, which is a required higher order thinking skill for putting together the technology, pedagogy and knowledge. Effective use of technology is an important priority in the educational institutions that pioneer to the scientific and technological development. So, especially teachers are required to have high technological literacy levels. However, the truth is only instructional technologies are not sufficient for the individuals to learn in the desired level in the teaching-learning process. According to the results of this study, the instructional technologies that are used in the teaching-learning process should be supported with appropriate pedagogical approaches and teachers should have high levels of pedagogical literacy are quite important in terms of the reaching the targets of the education. By means of having enough knowledge and skills about the instructional technologies and pedagogical approaches, teachers can effectively facilitate students' learning. This can lead to significant economic gains by reducing the cost and time invested in the teaching-learning process.

SUGGESTIONS

The Following suggestions were offered based on the conclusions of the study. In today's world (technological era), all of the sharers of the educational institutions (manager, teacher, student and support service performers) should know the instructional technologies and have the skill to use them. In other words, opportunities should be offered to provide the sharers with desired levels of technological literacy. Instructional technology, knowledge and skills of the teachers should be updated continually. Teachers should have high levels of pedagogical literacy skills in addition to the technological literacy skills. This is important in terms of leading the individual and teaching what the technology cannot teach. So, new pedagogical approaches that will provide productive technologically supported lessons should be gained to the teachers. All the technologically prepared teaching materials and arranged teaching activities should be prepared according to the individual differences of the students. The activities related to the teaching-learning process should be carried out together with a healthy combination of technological, pedagogical information and content knowledge.

Conflict of Interests

The author(s) have not declared any conflict of interests.

REFERENCES

- ACRL- Association of College and Research Libraries (2003). Information Literacy Web Site. The Standards: Step-by-step. ALA

- (American Library Association). Website:<http://www.ala.org/ala/acrl/acrlissues/acrlinfolit/infolitstandards/stepbystep1/stepbystep>. Accessed 20.01.2013.
- Adigüzel A (2011). The Development of the Scale of Information Literacy, Dicle Üniversitesi Ziya Gökalp Eğitim Fakültesi Dergisi (Open Access Online Peer Reviewed Journal), 17:15-28.
- Adigüzel OC, Berk Ş (2009). The Methods of Reaching Information of the Teacher of Vocational and Technical Secondary Education. *Electronic J. Soc. Sci.* 8(29):64-75.
- Angeli C, Valanides N (2005). Preservice Elementary Teachers As Information and Communication Technology Designers: And Instructional Systems Design Model Based on and Expanded View of Pedagogical Content Knowledge. *J. Comput. Assisted Learn.* 21:292-302.
- Baran E, Chung HH, Thompson A (2011). TPACK: An Emerging Research and Development Tool for Teacher Educators. *Turkish Online J. Educ. Technol.* 10(4):76-89. <http://www.editlib.org/p/53332/>
- Bass R (2000). Technology, Evaluation and the Visibility of Teaching and Learning. *New Directions Teach. Learn.* 83(47):43-54.
- Chou CM (2011). Student Teachers Socialization Development by Teaching Blog: Reflections and Socialization Strategies. *Turkish Online J. Educ. Technol.* 10(2):76-82.
- Çağiltay K (2007). Habits and Prospects for the Use of Technology in Teaching College: A Descriptive Study. *Akademik Bilişim'07 - IX. Akademik Bilişim Konferansı Bildirileri* 31 January - 2 February 2007 Dumlupınar University, Kütahya.
- Çelik F, Kocaman F, Önal AS (2009). Burdur Province Central District Elementary Teachers' Computer Literacy Levels. *Mehmet Akif Ersoy University J. Faculty Educ.* 9(17):52-71.
- Ekiz D 2009. *Scientific Research Methods*, Ankara: Anı Publications.
- Korkut E, Akkoyunlu B (2008). Foreign Language Teacher Candidates' Information and Computer Literacy Perceived Self Efficacy. *H. U. J. Educ.* 34:178-188.
- Fielding N (1996). *Qualitative Interviewing. Introduction to Social Research*, London: Sage. K. Punch (Ed.) pp.166-167.
- Horzum MB (2013). An Investigation of The Technological Pedagogical Content Knowledge of Pre-Service Teachers, *Technology, Pedagogy and Education*, 22(3):303-317.
- Houff S (2002). LAWS for Literacy. *Teacher Librarian*, 29(3):16-19.
- Kurbanoğlu S, Akkoyunlu B (2007). Effectiveness of Information Literacy Program Applied To Initial Teacher Training Students and Relation between Information Literacy Skills and Perceived Computer Self Efficacy. *H. U. J. Educ.* 22:98-105.
- Minichiello V, Aroni R, Timewell E, Alexander L (1990). *In-Dept Interviewing: Researching People*. Punch KK (ed.), *Introduction to Social Research*, London: Sage, pp.166-167.
- Mishra P, Koehler M J (2006). Technological Pedagogical Content Knowledge: A New Framework for Teacher Knowledge. *Teachers College Record* 108(6):1017-1054.
- Moodley V (2013). In-service teacher education: asking questions for higher order thinking in visual literacy. *S. Afr. J. Educ.* 33(2):1-18.
- Polat C (2005). *Development of Information Literacy Programmes in Universities: The Case of the University of Hacettepe* Hacettepe University Institute of Social Science Information and Documentation Department of Management, Unpublished PhD Thesis. Ankara.
- Shulman LS (1986). Those Who Understand: Knowledge Growth in Teaching. *Educ. Res.* 15(2):128-141. http://www.fisica.uniud.it/URDF/masterDidSciUD/materiali/pdf/Shulman_1986.pdf
- Şahin İ (2011). Development of Survey of Technological Pedagogical and Content Knowledge (TPACK). *Turkish Online J. Educ. Technol.* 10(1):86-103.
- Thompson A, Mishra P (2008). Breaking News: TPACK Becomes TPACK, *J. Comput. Teacher Educ.* 24(2):78-102.
- Tuncel M, Argon T, Kartallıoğlu S, Kaya S (2011). İlköğretim matematik öğretmenlerinin derslerinde araç-gereçleri kullanma sıklığı ve bu sıklığı etkileyen faktörler. 2nd International Conference On New Trends In Education and Their Implications, 27-29 April, 2011 Antalya-Turkey. SiyasalKitabevi, Ankara, Turkey. <http://www.iconte.org/FileUpload/ks59689/File/183.pdf>
- Varış Z, Karadeniz Ş (2012). Examining Primary School Teacher's IT Literacy and Use of IT for Instructional and Professional Development Purposes. *Educ. Sci.* 37(166):52-67.
- Yaşar Ş (2001). *Teaching to learn usage. Instructional Planning and Evaluation*. Eskişehir, Turkey: Anadolu University Open Education Faculty Publications. In M. Gültekin (ed.), pp.201-230.
- Yaşar Ş, Gültekin M (2007). Sosyal bilgiler öğretiminde araç gereç kullanımı. *Sosyal Bilgiler Öğretimi* (Ed. Cemil Öztürk). Ankara: Pegem Yayınları.
- Yıldırım S (2007). Current Utilization of ICT in Turkish Basic Education Schools: a Review of Teacher's ICT Use and Barriers to Integration. *Int. J. Instr. Media* 34(2):171-186. http://www.academia.edu/350458/Current_utilization_of_ICT_in_Turkish_basic_education_schools_a_review_of_teachers_ict_use_and_barriers_to_integration
- Yıldırım A, Şimşek H (2008). *Qualitative research methods in social sciences* Ankara: Seçkin Publishing.
- Yılmaz M (2007). *Technology Education in Elementary Teacher Training*. *J. Faculty Educ.* 27(1):155-167.
- Zhu C (2013). *Organizational Culture and Technology-Enhanced Innovation in Higher Education, Technology, Pedagogy and Education* 22(3):1-15.



Educational Research and Reviews

Related Journals Published by Academic Journals

- African Journal of History and Culture
- Journal of Media and Communication Studies
- Journal of African Studies and Development
- Journal of Fine and Studio Art
- Journal of Languages and Culture
- Journal of Music and Dance

academicJournals