Full Length Research Paper

The effects of a technology-aided learning environment on the improvement of a primary special education school

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The changes demanded by technology are reshaping people's expectations of education. These changing demands and expectations have introduced certain concepts, such as individuals who have become skilled at learning and the learning organization. Individuals and schools, as the most basic unit of educational organizations, should demonstrate a shift from traditional training toward becoming 'learning' or 'effective' schools in order to survive in the world today. This requires effective implementation of technology infrastructure in schools and the integration of technology into learning environments. This study aimed to examine the impact of technology-aided learning environments on the improvement of a primary special education school where students with hearing impaired attend. The study adopted qualitative research approach and used case study as a research design. Semi-structured interviews and observations were employed for collecting necessary data. The study sample comprised a school principal, a vice principal, a staff, thirteen teachers and four parents of the students in the school. The data were analyzed qualitatively by using a descriptive analysis through the qualitative analysis software MAXQDA©. It was found that themes such as cooperation and organization for school improvement, innovation and student achievement received the highest level of emphasis. The results of the study suggest that using technology aided learning environments, helped the school to improve, changed the way of teachers' functioning and contributed to their professional development. Progress in the social and academic performances of the students was also observed.

Key words: School development, technology, innovation, hearing impaired.

INTRODUCTION

Rapid changes and developments in the science and technology age change quickly the structure of the socities, and become an investigative power for re-designing the aims and methods of education (Bilgili, 2001). Educational organisations have crucial

responsibilities for adapting themselves to the changes around, and also make their students ready for these changes (Çalık, 2003). One of the recent concepts in the educational world today is "learning or effective school". In order to meet the needs of the today's society

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or individuals, schools have to transform themshleves from traditional school to learning or effective school notion (Drucker, 2000; Şişman, 2002; Fullan, 2007).

In the road of transforming schools into "learning or effective school", the idea of school improvement is an important concept and process. Sschool improvement aims to increase the quality of education and student success through employing effective teaching methods and activities (Fullan, 1992). School improvement has many focuses like acceptance of technological innovations brought into school context by school staff, developing suitable strategies and methods for the innovation, adoption change approaches by school staff, and evaluating the whole school focusing on end innovation process (Velzen, 1985; Barth, 1990; Harris, 2000; Hopkins, 2001; Clarke, Harris, and Reynolds, 2004).

Organisational changes in schools are affected from both the developments in science and technology and social renewal activities of the societies (Fullan and Hargreaves, 1998). In the change process, not only do factors of human or technology-sturcture change, but also all of these factors have to change and improve all together (Balcı, 2000). Since school staff might sometimes resist the change process as a result of the fact that innovation attempts may impact school culture and change the structure of the school, the innovations offered for improving schools should involve the views accepted by the schools and their staff. Therefore, in the process of change, it is crucial to look at the views and attitudes of individual to the reform (Fullan, 1992; Ellström, 2008).

Studies of school improvement in the literature have been focusing on the determination of the level of achieving the measures of the quality of education, taking precautions to possible preventing factors to school improvement, and employing effective learning activites (Dwyer et al., 1991; Fullan, 1992; Schein, 1992; Harris, 2000; Hopkins, 2001; Çalık, 2003; Harris and Lambert, 2003; Zeichner, 2003; Coutts et al., 2007; Heck and Hallinger, 2009; Mitchell, Reilly and Logue, 2009; Balkar, 2010; Aasen, 2013; Meijer et al., 2013; Pyhalto et al., 2011; Şahin, 2013). Focuses of some of these studies and projects are to improve the quality of education and to increase student academic and social success (Dwyer et al., 1991), to provive interaction between school staff (Pyhalto et al., 2011), to make cooperation among various disciplines (Aasen, 2013), and to adopt professional development and change and technology into classrooms (Coutts et al., 2007). In short, the main topics focused in school improvement studies are "change", "innovation", "cooperation and organization", "stakeholders", "infrastructure of school", "conception of teaching and learning", and "effectiveness" (Dwyer et al., 1991; Fullan, 1992; Schein, 1992; Harris, 2000; Hopkins, 2001; Çalık, 2003; Harris and Lambert, 2003; Zeichner, 2003; Coutts et al., 2007; Heck and Hallinger, 2009;

Mitchell et al., 2009; Balkar, 2010; Aasen, 2013; Meijer et al., 2013; Pyhalto et al., 2011; Şahin, 2013).

Education of students with hearing impaired and the project ALİS (Alternative Communnication System)

Educational systems can change, depending on the physical and cultural characteristics of a society and they should aim to provide the best possible education to all kinds of learners at all times. Education, which cannot be considered independent of emerging technologies, aims to offer equal opportunities to people, help them achieve equal skills, live in the community and educate individuals to be responsible (Özcan, 2010) as each individual has the right to an education. In the field of the education, the provision of appropriate modern technological support brings successful outcomes not only for the education of those people who do not have learning or pyhsical disabilities but also for the individuals with various disabilities (Koul et al., 2005; Takasaki, 2006; AlJa'am et al., 2009).

As a group, the hearing-impaired individuals face problems in using language and communicating with others, due to partial or complete lack of hearing (Etçi, 2013). Considering reading, comprehension, under-standing, speaking and listening skills are part of the learning process, literacy levels remain low among the learners with advanced hearing loss. Therefore they face challenges in learning. Hearing-impaired students are told to be behind their peers by at least five years because of this challenge (Kyle and Harris, 2006). Thus, special training is offered to teachers to eliminate this problem. In many developed countries especially in the United States, teachers providing education to deaf students prepare an Individualized Education Plan (IEP) for each student (Şılbır, 2011), and rearrange existing educational outcomes according to their characteristics in the framework of this plan.

A variety of learning activities that are offered to students within the IEP offers students opportunities such as self-expression skills, socializing and adaptation to the community, and ease of learning (Çiftçi, 2009). It is known that the integration of educational content with technology applied at this stage contributes to student learning (Doğru and Arslan, 2008). It is also reported that the technology-aided learning environment positively affects the social and linguistic development of hearing-impaired individuals. Şılbır (2011) found that using the software based on graphic symbols to develop sentence-writing skills for the hearing-impaired students increased their interest, motivation and success. Similar results were reported by Wicha et al. (2012). They found that using a software system including animations, interactive and graphic symbols, to teach English to hearing-impaired students (TCAD and TCAD+) increased hearing-impaired students' motivation and provided more

embedded learning.

Overall, the literature suggests that three important factors should be considered for the education of individuals with hearing impaired: the individual differences and special needs of hearing-impaired students, technology as a learning and teaching tool and learning materials emphasizing the benefits of visual elements. It is obvious that educators, researchers and teachers that bring together these three elements will make significant contributions to the educational environ-ment for the deaf people.

In Turkey, for the purpose of improvement and renewal in the field of education, many studies have been carried out on integrating technology into learning environments by establishing technology infrastructure in schools (Şişman and Taşdemir, 2008; Adıgüzel et al., 2011). By the Ministry of National education (MoNE), an educational information network (known as EBA) has been established for students, teachers and schools to use interactive teaching and learning materials and multimedia (Eğitim Reformu Girişimi (ERG), 2013). EBA also contains teaching and learning materials for students with special educational needs and their teachers.

There are also local research studies carried out by the universities. The Alternative Communication System (ALİS) is a project initiated to this end and conducted since the year 2010 in a state primary school for deaf people in Trabzon, Turkey. ALİS-T (Alternative Communi-cation System-Design) aimed at designing a graphic symbol system for an alternative communication system for the agglutinative structure of the Turkish language, as well as Turkish social, cultural and psychological characteristics (Examples of the graphic symbols are presented in Figure 1.). It encompassed the process of developing a dictionary, including graphic symbols, describing the everyday life of a character called ALİS, together with peers and adults (Aydın et al., 2012; Karal, 2014). Within this scope, the aim was to develop technology-aided learning environments/materials for the benefit of the deaf students. In line with this aim, another project started and going to be implemented up until December 2015 in the same school.

It is thought that integrating technology aided learning environmnets including materials and activites, and implementing in the school may bring changes in educational services and practices, resulting in an improvement in the school. This can be understood best by deeply investigating and exploring the views of the affected people like teachers, school administration, staff and parents from the implementation in the school. Moreover, in an innovation or reform process, it is crucial to determine the vıews of the affected people about the innovation in order to decide whether or not the innovations or reform attempts are successful or have improved the school. Therefore, the present study aimed to determine the effects of the technology-aided learning materials and environments provided by the ALİS project on the improvement of a primary special education school for the students with hearing impaireds from the perspectives of the school administrators, teachers, staff and parents.

METHODOLOGY

The research was designed as a case study research method since this is an appropriate method for explaining data in cause-effect relations and variability contexts (Çepni, 2009). Yin (2009) states that if a study of real life or current events is needed to be explored, a case study is the most appropriate method. Qualitative data collection techniques were used in this study to ensure long-term monitoring of the current situation and to obtain in-depth data.

Sample

The study group was selected using purposive sampling. Purposive sampling, known as judgmental, selective or subjective sampling, is a type of non-probability sampling technique, focusing on sampling techniques where the groups to be studied are based on the judgement of the researcher. It helps reserachers to select special cases which are rich in data and investigate them in detail depending on the purpose of the study (Patton, 1990; Büyüköztürk et al., 2010).

A primary special education school for students with hearing impaireds was selected for the study, the project known as ALİS which aimed to improve communication skills of students with hearing impaireds was conducted. In the study, the principal, vice principal, a member of staff, thirteen teachers of the school, teaching at diffeeent level and different subjects were purposfully selected for the semi-structured interviews. In addition, parents of four students attending the third and fourth grades were also interviewed. 12 out of 13 teachers were female. While six of them were special education teachers (T1, T2, T3, T4, T6 and T13), two of them were Turkish language teachers (T11 and T12) and the others were teachers of Preschool, Science, Social Studies, Arts, And Technology Design. The field of school administrators were Religious Culture and Ethics (A1) and Turkish (A2). A great majority of the teachers and school administrators had more than a ten years experience in teaching. For example, the head of the school had a 24-year experience. Four parents of the students from the third and fourth grade level were involved in the study. Two of them were female (P3 and P4) and the others were male (P1 and P2). Finally, a female staff member of the school, working as a cleaner was also included in the study in order to collect data from her about the innovation effects on the school.

Data collection and analysis

In the study, mainly qualitative data collection instruments were selected in order to observe the overall change in the school due to the fact that ALİS project had been in effect in the school over a long period of time. Semi-structured interviews with the participants and observation notes of the researcher were used as the data collection tools. Semi-structured interview questions were prepared by education specialists, considering the participant groups. The questions focused on certain factors from the literature related to school improvement, such as 'change', 'innovation', 'student achievement', 'cooperation and organization', 'stakeholders', 'school infrastructure', 'education-instruction approach', and 'effectiveness'. The questions regarding how these issues were embraced by members of the school were addressed to the participants in an informal setting and interviews were recorded electronically with their consent.
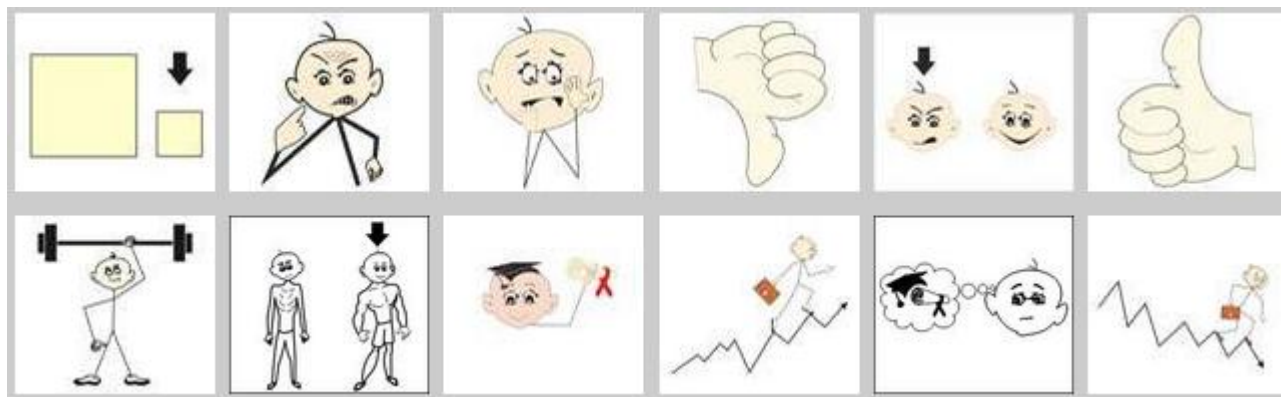
Figure 1. Examples of the graphic symbols.

During the project, in-class activities were observed for the duration of one year by the researcher within classroom settings in the school through video recordings and using an unstructured observation forms. The collected data from the interviews and obssrvations were analyzed with descriptive analysis (Yıldırım and Şimşek, 2003). This allows the identification of direction of the attitudes and values in defining the data and unveiling the participants' thoughts.

In describing the participants' ideas about school improvement, a relationship was established between the categories identified for school improvement and the described data. To avoid data loss during analysis, interview transcripts were analysed through several reading and coding activities and discussed by several specialists (Milne and Adler, 1999). Therefore, the codes obtained from interviews and observations associated with the categories were analyzed and evaluated by two experts for each observer and participant separately. The collected data were analyzed with the qualitative data analysis software MAXQDA©. Quotations from the interviews with the participantas were used in the text when necessary through using acronyms and numbers like T for Teachers; A for Administrators; S for Staff; and P for Parents and the numbers for indicating the order of the participant.

RESULTS

In this study, the views of teachers, administrators, staff and parents about the effects of the technology-aided learning environments used in learning and teaching activities ofr the studens with hearing impaired as a part of the ALİS project on the improvement of the school were collected. The participant' views on the improvement of the school were divided into eight main categories emerged from the analysis of the interview data. These categories were change, student acheievement, stakeholders, innovation, coopretaion and organisation, educational approach, effectiveness, and school infrastructure.

According to the findings, there was a common sense among the majority of the participants (T2, T3, T4, T5, T11, T12, T13, A1 and A2) about tha fact that the project ALİS had brought change to the school. This change were seen in different aspects of the school such as

teachers, their teaching ways, their beliefs about the curriculum, the teachers' ways of using technology, student achievement and motivation, school capacitiy and facilities, coopretian among school stakeholders and the effectiveness of the school as a whole, exemplified as:

"Previously, students were mostly given training based on memorization. But now we have started teaching lessons with animations and graphic symbol-based applications in full compliance with plans prepared in accordance with the individual characteristics of students." (T11)
"Changes happened first in the children, their happiness will be reflected to us after seeing the change and transformation in them. I think the project could create a targeted change and we are also pleased about that." (A2)

Changes in the other teachers and their teaching ways were also observed by the researcher, as expressed by a parent *"In my opinion, it influenced teachers some-what. The success of the teacher; if the teacher had not perceived it, the student wouldn't have been that successful." (P2)*. In observation notes, for example, the researcher wrote that the other teachers, other than the participant teachers, could also benefit from the project and used the content comfortably, noting "A *Turkish language teacher made continuous observations about the ALİS applications throughout the first semester. This semester, he also began to use the animations from ALİS in his class. In our project, our team did not intervene at all but he chose to use it because he found it effective."* One of the administrator also supported the researcher by stating;

"Subject teachers, especially those teaching in the secondary stage, are eagerly awaiting the project. They want the project to spread, not only the third and fourth grades, but also the second grade because our subject teachers have real difficulties in communicating with

children, particularly in abstract subjects such as the history of revolutions. In this regard, the project also needs to be accelerated and spread to other classes." (A2)

A great majority of the participants (T1, T2, T3, T4, T5, T10, T11, T12, T13; A1, A2, S, P1, P2, P3 and P4) indicated that the project contributed to school improvement from the student achievement aspect, as noted:

"The project has increased the students' interest in the course, there is more interest in visual materials. Both interest and academic level increased. …. I would say that sentence building increased most." (T12)
"There is an increase in the students' knowledge of objects, he can hear at 80% already, but this year he is much better. Now he knows objects well and uses words for them." (P2)
"She is trying to introduce us to the objects she learnt, for instance. Here she says … 'This is television, curtain, door, and window'. "(P1)

They reported that after the project implementation, the students' interest in lessons and their academic achievement increased. Some remarkable findings of the study include the increasing literacy skills of the students with hearing impaired in Turkish lessons, building more grammatically correct Turkish sentences, increasing students' reading and writing skills, reaching the stage where they could express themselves, being familiar with the concepts, and increased self-confidence and aware-ness. The teachers, staff and parents commented that the students were more motivated to and interested in the lessons as a result of implementation of the newly introduced method in class, as illustrated:

"….. motivation, interest and achievement increased. Two classes implemented this system, students have become more sociable and they shared with each other. "(T3)
"For example, we see students being able to understand better the concepts and make sentences, thanks to the project. Also in the use of Turkish suffixes, they are able to make sentences with three, four and five words. This is a great success. If the children had more of these facilities, if they reached a certain level from the first grade, it would be very different." (A1)
"Secondary school students look at ALİS as curiously as elementary students do. It draws the attention of all students." (S)
"The students' self-confidence increased. ….." (T4)
"He began to express himself more, he is conscious of what he has said." (P4)

The teachers also reported that their teaching way had been changed, putting more emphasis on building sentences with graphics, the integration of text graphics

into lessons, working with animation in line with course objectives, and the use of standardized pictures**.** The parents also stated that after project, their students started to transfer their knowledge to daily life more easily. The researcher also noted in his observation notes that an increasing tendency in the students' interest in the lessons as well as success in forming sentences.

Concerning the category stakeholders, while a few teachers (T1, T2, and T4) talked about it, the whole administrators were positive about the stakeholders' attitudes to the project and its effects, as indicated by a teacher *"Everyone was supportive. Including the principal first and foremost, they all reacted positively to the project. He believed good things would happen. Our colleagues provided support. Thanks are due to our governor of Trabzon as he did not leave us." (T4).* The teachers indicated that the parents had been using the graphic symbol system as well. In addition, they also emphasized the support by the school principal for the project and his willingness to contribute planning, implementation and evaluation stages of the porect activities in the school. Furthermore, the administrators especially remarked the support of the Trabzon Governor and the Ministry of National Education for the project and the school, as illustrated:

"The Ministry of Education supports the project but it must provide more financial and moral support. Feedback must be gathered immediately, perhaps all hearing-impaired individuals in Turkey are facing the same problems and can also bring solutions to their problems." (A2)

According to the teachers, the project created an environment where the teachers and student teachers from the faculty of education could share the scientific knowledge obtained from the project and conducted various studies to help them use the system. However, it was seen that participation of the other families whose children had disabilities into the teaching and learning activities of the project were limited.

In relation to the category of innovation, there were various views of the participants about the effects of the project ALİS. For example, all of the participant teachers pointed out that ALİS was an innovative environment for teaching Turkish language to the students using graphics and animation as it offered various opportunities in training and a learning environment which was a live-dynamic structure, open to development, a systematic structure, a communication system method, creating a common language with the use of visuals, etc. The participant administrators (A1 and A2) also noted that it was the biggest innovation brought to the school contributing to the education of the students with hearing impaired and supporting their personal development. Therefore, they suggested that its teaching materials and activities should be used in all of the classes in the

school. The school staff and all of the participant parents (P1, P3 and P4) also considered the project as an innovation in the school, helping students' personal development.

Almost all of the participants (T1, T2, T3, T4, T5, T6, T7, T9, T11, T12, T13, A1, A2, P1, P2, P3 and P4) reported that the project ALİS improved the cooperation and organisation in the school. It stimulated solidarity, mutual assistance, sharing and exchanging ideas among the teachers regarding teaching and learning of the students, determining course content, and experiences. During the implementation of the project, it was observed that the participant teachers exchanged ideas with each other as well as with the other teachers in the school: *"I exchanged views with my colleagues, I made use of their ideas. I shared my ideas about the project. "(T12).* The teachers also indicated that they had organized events at school for the planning, implementation and evaluation of the project and they endeavored to ensure participation in such events as shown below, saying *"We organize a lot of meetings. ….. Turkish Radio and Television (TRT) visited the school for the project. The Governor's Office paid a visit. We talked to our parents and our parents had a positive orientation." (T3)*

In addition, they emphasized the support provided by the school principal for the project and his voluntary contributions at the planning, implementation and evaluation stages in the school. It was noted that collaborating with the faculty members in charge of the project for implementing the project materials in the school and afterwards was one other gain for them, expressing *"Negotiations are held with the project team, our school principal and project teachers at the third and fourth grades. Participation from different fields can be useful. What could it be? They tell you about shortages and surpluses, namely, they are reporting. …" (A2).* They stated that this project really improved the relationship between the school and the university.

It also developed their organisational skills as they had already started organizing school events. It was reported by the participants that parent involvement in school life and the number of teacher-parent meetings increased. During the events, an intense process of exchanging ideas and views between the teachers and parents was observed, as illustrated by one of the parents (P2) "*We attended of course. We discussed what we can do, they were very keen on us"*.

One of the most important outcomes of the project was reported by a vast majority of the participants (T1, T2, T3, T4, T5, T7, T8, T9, T11, T12, T13, A1, A2, P2 and P3) was the fact that it definitely affected and changed the teachers' educational approach. They stressed the educational value of the "graphic-based applications" for teaching and learning of the hearing-impaired students, which was so difficult for them to make abstract concepts concrete. Seeing that the ALİS project materials containing many visual materials and making abstract

concepts concrete, they decleared that it became a part of their understanding of education as using visual objects in the training of the hearing-impaired students was necessary. They stated that they will use visual course materials in a systematic way any more since visual materials play a very important part in conceptualizing abstract themes.

"These symbols can be used in Turkish, Life Sciences and Mathematics lessons. I would like to use your stories addressing these problems for literacy skills in Turkish lesson and work with symbols, problems, operations, etc., regarding these. Because I am now teaching in kindergarten, I make a point of concepts such as the concept of color, the concept of number; I'm working on forming sentences to a certain extent because my students are very young, but I would like to start working from the first grade. "(T5)

The participants also emphasized that the project materials and applications created a fun and relaxed learning environment without boring the students and faclilitated teaching of the students with hearing disability for the teachers, as expressed by a parent *"I see it as a savior. Easier for children from mainstream education, it is more enjoyable, it seems more interesting to children. "(P3).* Despite to these benefits, there were some teachers who did not change their teaching ways and insisted on using their own visuals according to some of the parent oarticipants.

According to the observation notes of the researcher, technology based ALİS teaching and learning materials were intensively used in both the third and fourth grades. In these classes, various measurement and assessment methods were applied to determine the achievement levels of the students. Then, the lessons were reviewed by using the graphic symbols in the classroom. The participant teachers also used the project software to assign homework to students. Looking at these examples, it could be suggested that the project affected the educational approach of the teachers. It was clearly seen that the variety of applications of the project had supported the personal development of hearing-impaired students, contributing to their academic and social development of students. The researcher also wrote that during his observations, "*The students were being introduced the concept of multiple choice tests and being familiar with the tests of the project. The teachers also become familiar with the process and started to use activities of writing sentences*".

A large proportion of the participants (T2, T3, T4, T5, T7, T9, T11, T12, T13, A1, A2, P1, P2, P3 and P4) indicated that the project ALİS increased the effectiveness of the services presented by the teachers and the school. Technology-aided learning materials and applications of the project were definitely useful for the education of the hearing-impaired students and supported their personal

Figure 2. The painting by the Arts teacher with the visual items developed within the project.

development, as exemplified by a parent *"Well, obviously things are a bit more positive. And vocabulary gain was more, you know, he started to use more words, of course, there is a benefit compared to before. "(P4).* They helped the teachers solve teaching problems faced in teaching these students, improved the students'performances in Turkish language, especially and increased their motivation to and interest in the school.

"I think it is effective in the social field. Recognition of the environment is important for our students. In particular, recognition of the student's immediate surroundings, I think they know the environment better with graphics. Because this is something that develops the knowledge of students, it would be useful in the future of course." (T11)

Moreover, they indicated that the students' willingness to attend rehabilitation centres showed a decreasing tendency while their willingness to attend the school increased as a result of the project, as expressed by a parent *"He now really wants to go to school, he used to go to [X] rehabilitation centre, but he isn't going now." (P2).* Because of its effectiveness, the participants suggested that technology based teaching and learning materials and applications of the project and its results should be disseminated all over the schools for students with hearing-impaired; *"This study should be disseminated to all schools for students with hearing impaireds in our country" (A1).*

Some of the participant teachers and administrators (T1, T3, T5, T8, T12, A1, and A2) stated that the project contributed to improve the school infrastructure. For example, referring to the physical or furnishing changes in the school, in order to increase the visibility of the items developed in the project shown in Figure 2, an illustration was painted in the school corridor by an arts teacher, saying *"I created a visual work myself in the hallway as an art teacher. I did it for the popularization of ALİS among students and to demonstrate it to everybody. The principal asked me to prepare it and let me fictionalize the story. So I did it. It made the school come alive." (T8).*

Before the project, the school's technology infrastructure was inadequate and the teachers and students could not use technology in their lessons. However, after the project, both the project and the other stakeholders tried to supply relevant technology and hardware items to the school, as the participants believe in that the school should be provided with more opportunities and facilities so that the project could be much more efficient.

"The infrastructure of our school is not great but there are computers in our classrooms. We completed this job with the touchscreen that came in with the project. It was enough for two classes but when we took it to the other classes, it was certainly insufficient. But I do not think we will encounter any problems once we equip the smart boards. In this regard, all kinds of support is being extended by TÜBITAK, the Governor's Office and the

*Ministry of Education." (**A1**)*

*"It is critical to complete the school's technological infrastructure. In this regard, smart boards are important for the teaching of the subject. It's hard for me to manage the computer from the desk. But we create activities and interactive materials with smart boards. The internet is working, projections are working, technological infrastructure is ready at all times, this is important. It is essential that we fully and effectively use technology." (**T12**)*

In short, according to the participants, the project was beneficial for bringing about change to the school and improving the school from various aspects like student achievement and motivation, school infrastructure, teaching activities, personal and professional development, cooperation and organisation and school effectiveness in the school. They stated that technology aided learning materials and applications of the project made teaching and learning easier and more enjoyable for the students with hearing impaired and their teachers.

DISCUSSION AND CONCLUSIONS

This study aimed at determining the effects of the technology-aided learning environments of the ALİS project, as implemented in a primary school for the students with hearing impaired in Trabzon, Turkey. For this purpose, the views of the participating teachers, school administrators, staff and parents were determined. According to the findings of the study, a great majority of the participants put an emphasis on change, student achievement, cooperation and organization, innovation, educational approach, school infrastructure and effectiveness.

Student achievement, cooperation and organization, and innovation in terms of school improvement were the most frequently mentioned categories emerged from the data. The related literature also indicates that increasing student achievement is the focal point of school development (Balkar, 2010; Dwyer et al., 1991). Researchers suggest that in order to improve the quality of education and schools, schools and teachers should adopt innovative approaches, increase the use of ICT appropriate for the time, and develop strategies compliant with the systems referred to as innovation (Schein, 1992; Harris, 2000). In addition, Hopkins (2001) also states that cooperation for school improvement is necessary for planning for such innovation to be brought into school and allowing school members to have a say and negotiate in the creation of such plans. The findings of this study are congruent with the suggestions of Hopkins (2001), in which cooperation and organisation were emphasised by the great majority of the participants. A study by Pyhalto et al. (2011), also found that cooperation of school members with each other and professionals contributed to school improvement.

Another most highlighted issue in the study was the concept of "change". It was reported that there were great changes in both the teachers and students. It could be claimed that the project positively affected the teachers' teaching ways and professional practices, the students' personal development and academic performances, the school effectiveness and infrastructure and parents' attitudes towards their children education and schools, improving the school as a whole. This might mean that, the project ALİS not only developed teachers' teaching skills but also created a learning envireonment and culture for the teachers and students in relation to school improvement, as Bubb and Earley (2009) argued. The participants were aware of the fact that the teachers' skill development and the students' personel development, learning and motivation were being gradually developed during the duration of the project. This was a crucial isse for the planning of teachers' professional development and school improvement, as Fullan (1992) suggested that a vital component of school improvement and improvement in teachers' skills must be carried out as planned and scheduled; otherwise, it might result in failure due to not fulfilling one condition in the course of school development.

Being aware of the developments on their skills and students' performances can facilitate the change process in the school. Zeichner (2003) already remarked that teachers' having a broad perspective on both themselves and their students is closely related to the change in their professional identity. Moreover, a great majority of the participants indicated that change in the school was clear and noticeable, which made it easier to adapt the innovation being introduced by the teachers and students gradually, confirming improvement in the school, as Çalık (2003) and Başaran (1998) noted.

Increased student performance and achievement was another outcome and observation, reported by most of the the participants. According to the teachers, planning lessons including technology aided teaching and learning materials and activities of the project, implementing them in the classrooms and using assessment materials of the project ALİS brought in better results in the students. Another reason for increasing the students'achievement through the end of the project might be the fact that there were various teaching and learning activities where the students actively engaged in the lessons as the researchers stated that introducing active learning environments in schools would facilitate student learning, ultimately causing them to use different teaching methods in their future careers (Vygotsky, 1978; Schein, 1992). The participants and the researcher exemplified these positive changes in the students' performances by giving examples of the students' works like being able to create more grammatically correct sentences in Turkish, transferring their knowledge to everyday life and being

actively engaged in a social life. These better and positive changes all might imply that the project ALİS facilitated and increased the students' learning and personal development. These findings, therefore, might imply that the project ALİS contributed to the improvement process of the school and are congruent with the relevant literature, as Schildkamp et al. (2012) claim that student success should enhanced real school development.

The findings of the study showed that the implementation of the project in the school stimulated collaboration among the teachers, school management, and parents. It was seen that there more times where the participants exchanged, shared and discussed their ideas and experiences with each other, and showed mutual assistance and solidarity. These might be considered as important step stones for the efforts of improving schools and also be indicators for improved schools, as reported by the relevant literature (Aasen, 2013; Altun and Aydın, 2010). Mitchell et al. (2009) argue that exchanging experiences coluld help make the most appropriate decisions about the relationship between teaching practice and theory. Morever, it was seen that the support provided by the faculty of education, as a professional help to the school, increased both the teachers', school administrator's and students' motivation levels. This strong support by the faculty of education encouraged them to engage and participate more in the project ALİS. Meijer et al. (2013) underline that this kind of help from the professionals to teachers as well as other school members are crucial as it creates opportunities for them them to cooperate and exchange their knowledge and experiences with professionals.

Furthermore, there were other teachers rather than the participants, who were willing to take in implementing and applying the project materials in their classes. This dedication of these teachers expanded and disseminated the activities of the project within the school and helped the project appeal to various groups. Involving people various backgrounds in the project might be another reason for the improvement seen in the school. This is well matched with the views of Hopkins (2001) as he stated that it is important that different people take part in planning and scheduling for real school development, and people who participate in activities must be arranged at the same time with the organization of the learning environment.

To embrace and use the innovation, schools need to have appropriate physical infrastructure (Balkar, 2010; Şahin, 2013). Otherwise, innovative attempts might cause in unsatisfactory or unsuccessful results. Therefore, the researcher tried to improve the school infrastructure before and during the project in order to implement technology aided teaching and learning materiles of the study. In this sense, stakeholders like the school, the Ministry of National education, the Governor's Office and the university have undertaken initiatives to improve the conditions of the school. All these efforts targeted increasing the quality of the educational environment and facilitating the implementation of the innovation. These efforts to develop school capacity were compatible with the views of Harris and Lambert (2003) and Heck and Hallinger (2009), who emphasized the need to improve school capacity for the reform attempts.

Finally, integrating technology into classes by considering student characteristics, customizing education and applying innovative pedagogy seem to be indicators of developed schools. The objectives of the project were providing support for school improvement, offering an innovative education environment to students, and enhancing teachers' and students' use of technology. Considering the results obtained from the study, it could be stated that teachers adopted the innovative, graphic symbol-based work and that their skills increased in the use of technology. Teachers also reported their intentions to use graphic symbol-based work in their future lesson plans, which can account for changes in their educational approach. Coutts et al. (2007) explained this result indicating the fact that it is one of the basic issues of school development, that teachers adopt different teaching and learning methods and put these methods into practice over the long term. The participant teachers' intention to use and the adoption of technology aided teaching and learning materials and activities of the project which might be a strong indicator of their school improvement efforts and beliefs.

RECOMMENDATIONS

The present study aimed at determining the views of the teachers, school administrators, school staff and parents about the effects of an innovative attempt including technology aided learning materials and activities for the students with hearing impaired in a state primary school in Trabzon, Turkey. According to the results of the study, using these materials and activities in the lessons increased student achievement and personal development. However, the implementation was limited with only primary school classes. Therefore, use of these materials at different levels of classes and schools having students at various ages should be experimented in order to create a standart vocabulary of the students with with hearing impaired.

In general, the study caused in positive outcomes and gains like increased student achievement and personal development, changing educational approach in a positive way, increased collaboration among the stakeholders, increasing the effectiveness of the school, developing the infrastructure of the school, etc. The students responded to it positively. All these findings imply that the implementation of the project ALİS improved the school. However, the study was carried out in a state primary school in Trabzon, Turkey and the materials were developed by the researcher grown up in this city.

Moreover, at the implementation phases of the project in the school, being acquainted with most of the teachers and the principal of the school culturally facilitated the implementation and acceptance of the project by the the participants. Turkey has a huge population and differentiated cultures according to its geographical regions. Language development and vocabulary can be different in different cultures in Turkey and hearing impaired students grow up with different cultures and accents of Turkish language might respond these teachnology aided graphic symbols differently. As a result, school improvement process in terms of student achievement dimension may not be occurred. Therefore, the technology aided learning materials and activities developed by the project ALİS should be implemented and used in different school levels at different parts of Turkey in order to see its effects on the students and schools.

As Trabzon is a small city compared to the other big cities of Turkey, like İstanbul, Ankara, İzmir and Adana, there is a close and genuine friendly relationship among the stakeholders such as the school administration, local education authorities, the governship of the city, the university administration and academics, and parents facilitated the implementation of the project and presented positive contributions to the process of school improvement. Therefore, for future studies, in order for the innovations or reform attempts to be successful, this kind of close and friendly relationship should be established among the participants.

Finally, even though the project in the school has been continued from the year 2010 to 2015, it is better to conduct more follow up studies in order to see and decide whether there was a real improvment and how far its effects will survive and sustain in the school. At that time, it can precisely be said if the project was successful or not in terms of school improvement.

Conflict of Interests

The author has not declared any conflicts of interest.

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