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DIGITALIZATION OF THE EDUCATION SYSTEM OF THE REPUBLIC OF AZERBAIJAN

Master's thesis

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Author’s declaration of originality

I hereby certify that I am the sole author of this thesis. All the used materials, references to the literature and the work of others have been referred to. This thesis has not been presented for examination anywhere else.

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Abstract

Information and Communications Technology play a huge and significant role in the field of education. This is why many developed countries have invested a lot in this sphere and present the best results all over the world. Nowadays many developing countries started following this trend, however, there are few success stories.

The following thesis aims at identifying the current situation of the education system of the Republic of Azerbaijan at the school level, detecting the current barriers to the digitalization process and implementation of ICT in the field of education. The goal of the thesis is to develop an approach for digitalization of the education system with new e-services and find out the possible solutions on how to overcome the existing barriers. Moreover, solutions on how to introduce e-learning to teachers and encourage them to implement ICT for teaching purposes are proposed in the thesis.

The research in the current thesis is based on a 1) case study approach, 2) interview analysis, and 3) survey analysis. In the case study approach, Estonia and Azerbaijan are compared and some Estonian e-solutions are selected as possible methods of digitalization of the education system in Azerbaijan. Moreover, interview and survey analysis helped to identify the current situation and existing barriers, based on which author made recommendations. The author also proposes My e-School platform, in a form of subjective decision, since a deep study of platform functionalities is recommended for future research.

Keywords: Education, ICT, digitalization, e-learning, e-teaching, Azerbaijan.

This thesis is written in English and is 84 pages long, including 7 chapters, 8 figures and 21 tables.

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This thesis is dedicated to my family.

I would like to express my gratitude to my parents, Rafiq and Nargiz as well as my sister Narmin, who always supported me, believed in my abilities and helped me become a dignified person I am now. Thank you for all your love, support and help you give me throughout my life.

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List of abbreviations and terms

ICT	Information and Communications Technology
GDP	Gross Domestic Product
OECD	Organization for Economic Cooperation and Development
PISA	Programme for International Student Assessment
SPSS	Statistical Package for the Social Sciences
DOI	Diffusion of Innovation Theory
UTAUT	Unified Theory of Acceptance and Use of Technology
MM	Motivational Model
TAM	Technology Acceptance Model
TRA	Theory of Reasoned Action
TPB	Theory of Planned Behavior
MPCU	Model of Personal Computer Utilization
SCT	Social Cognitive Theory
ID	Identification Document
eID	Electronic Identification Document

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1 Introduction

In the rapidly growing and changing world technology plays a significant role. Today, technology has advanced so that it influences nearly every aspect of our world, starting from environmental effects to the political, economic, and social life of all people on our planet. The society is totally absorbed by technology. People cannot imagine their lives without using modern devices including mobile phones, computers, TV as well as navigators. Being a solution to many spheres, technology is considered to be an opportunity, as it eases human life and creates new perspectives for improvement and achievement of an ideal. Nowadays, education is the very field that needs to be totally based on digital technologies. Many countries face problems arising from people's trust during the e-Government implementation process (Digital Democracy: Concepts, Methodologies, Tools and Applications, 2012). Trust is the first threat to e-Governance implementation. It can be trust in the government itself or trust in technology. As studies show mainly older generation over 50 is not comfortable with e-services and do not tend to believe that digital devices and e-services are there to ease the human life (Weerakkody & Choudrie, 2005). In order to decrease the unawareness among citizens and the number of digitally uneducated people and make the introduction of new e-services easier and quicker, governments should first start implementing them in the educational field.

Education is the most important growth driver in all aspects of our life and, therefore, investment in it is very significant and crucial for development (Power, 2014). The quality of education may vary from country to country because of different school management systems and this results in average achievement levels among students (Woessmann, 2016).

In the case of Azerbaijan, the author of the thesis believes that the whole education system of the country needs reformation. All school data is mainly paper-based and not

available in digital format. The existing system of electronic journal[1] is implemented but not in all schools across the country and not all parents are using it due to its fee. Later in this thesis availability of this journal or similar e-platform will be analysed based on survey results. Considering this information and personal experience in teaching, the author believes that the education system has gaps and needs improvements. Thus, a research question and two sub-questions are proposed to research the current thesis:

RQ - *How to digitalize the education system of the Republic of Azerbaijan?*
SQ1 - *How to improve the existing education system with new e-services?*
SQ2 - *How to introduce e-Learning to teachers and overcome the current barriers to the digitalization of the education system of Azerbaijan?*

This thesis aims at defining the current situation of the education system of the Republic of Azerbaijan, namely at the school level, identifying the existing barriers to the digitalization process and ICT (Information and Communications Technology) implementation in education. As a result of the research done for the thesis, solutions are proposed by the author of the work, and recommendations are made in accordance with the research results. The proposed solutions will help develop the education system and accelerate its digitalization process with a new e-service.

The author of the thesis uses several terms such as e-learning, digital learning, online learning, and it is suggested for readers to consider them as a one term meaning "the process of learning with the help of technology".

The thesis is divided into 7 chapters, starting with Chapter 1 giving the introduction to the thesis. Chapter 2 of the thesis outlines the theoretical framework. It also provides a literature review of studies done on the current topic before. Chapter 3 describes the research methodology and research design. Moreover, it gives a whole overview of data collection and analysis methods. Chapter 4 presents a case study approach applied for the education system comparison and later identify which e-solutions of Estonia can help to improve the education system of Azerbaijan. Chapter 5 provides the research results, their analysis, and the conclusion of findings. In Chapter 6 the author gives

[1] Electronic journal is a program implemented by the Ministry of Education to keep records of attendance and grades in schools of Azerbaijan according to the Curriculum Program.

recommendations and proposes a solution thus answering the research questions of the thesis. Recommendations for future research are also made in this chapter. Finally, Chapter 7 concludes and provides a summary of the thesis research.

1.1 Background

Azerbaijan is the country with a population of more than 10 million. After declaring its independence from the USSR, Azerbaijan faced many political and economic problems, but over the last 10 years, the country has developed a lot in many fields. Azerbaijan is making big steps towards e-Governance. However, for developing countries implementation of ICT in the education sphere is still a challenge. The yearly budget allocated for education in Azerbaijan has started to decrease since 1995 when it constituted 17.6% of total expenditures and in 2007 fell to 11.9% (Azerbaijan Economists' Union and UNICEF, 2008). Therefore, the Ministry of the Republic of Azerbaijan is hindered to implement new systems in educational institutions. According to the statistics of the Republic of Azerbaijan Chamber of Accounts during 2015-2017, the money spent on education constituted about 9-10.4% (Republic of Azerbaijan Chamber of Accounts, 2016). In 2018 the budget allocated for the education expenditures is 2 billion out of AZN 20.127 billion which constitutes 9.94% of the total budget (Baghirova, 2017). Therefore focusing on the introduction of technology, applying it to the method of teaching, and establishing teacher-pupil-parent relationship would be more realistic for educational institutions in Azerbaijan as a first step.

On October 24, 2013, a State Strategy for Education Development in the Republic of Azerbaijan was approved by the Decree of the President of the Republic of Azerbaijan. According to this paper, significant progress has been made in the Education System of the country and the infrastructure of general education across the country has been improved (Decree of the President of the Republic of Azerbaijan , 2013). Since 2013, the State Strategy has not been updated yet. It is stated that remote rural schools have been provided with new programs, however, there are still many cases of schools with poor infrastructure, no internet access, and a lack of teachers. While all the world carries on talks about lifelong quality education for everyone, many schools in remote regions of the country need safe conditions for students first of all.

Currently, the whole education system in Azerbaijan is not heart-warming. There is a system of an electronic journal, but mainly in central schools. However, in general, there is no school data available in the digital format. All the data is mostly saved and shared within schools in the old-fashioned paper-based system which is not efficient anymore.

1.1.1 Thesis motivation and problem statement

Many countries around the world come across the digitalization process of all the fields as the main concept of development. Digitalization, in a wide context, is the process of transforming society to e-society and offering all services available in digital form (Al-Shafi, 2009). The Education System digitalization should become a priority for everyone. All countries should invest in the education sphere, considering the fact that technology affects all aspects of our everyday life and has become a priority for all developed countries. Moreover, a lot of money has already been invested in new technologies for education (Saba, 2009).

The motivation for this thesis is driven by a personal teaching background. The main aim of choosing this topic for the Master's thesis is the problems occurring in the education system of the Republic of Azerbaijan. ICT is widely recognized in the country and used in educational institutions, different e-projects take place in teaching/learning processes, however, the system still needs improvement and not all schools are equipped with technology. The integration of ICT in education is still the biggest challenge for all schools across the country, mainly in remote areas. The working experience includes almost three years at two schools: private and public. The system at these two institutions is completely different. The private one is well equipped but lacking teachers' motivation and digital skills, while the system in the public school, which is involved in various e-projects, requires reformation. Since children attend classes to obtain knowledge to implement it in future life and career, the knowledge they gain should be directly linked to ICT, because nowadays it is a part of society. Schools should provide students with proper education and knowledge so it is easy for them to become outstanding representatives of society in the future. Using digital devices and web tools in class should not be magic for students, the use of ICT should be transformed into the usual activity. E-learning can change the way education is used to be. It can change the attitude of teachers, school administrators, students, and parents

towards the learning and teaching processes and construct a new level of relationship within the institutions.

1.1.2 Necessity and importance of the topic

The topic of the current paper is of high importance and has become much more relevant due to the COVID-19 pandemic crisis. It is believed that ICT can complement, enrich, and change the learning and teaching processes for the better (UNESCO, n.d.). UNESCO considers there are many ways technology can make access to education quicker, support teacher development, enhance the learning quality and its relevance, and also can help improve the administrative process within the educational institutions (UNESCO, n.d.). ICT provides different tools to store and manage information, communicate, organize the learning and teaching processes within an educational institution. It helps to improve teaching-learning processes by replacing chalkboards with interactive digital boards as well as using smartphones or computers during class time. With digital devices in education, students are given the freedom to express themselves, can enhance creativity and thinking skills. The classes, we used to have in the past, with students sitting in a row, listening to teachers, and taking down notes can change a lot now. Moreover, more and more new teaching methods are implemented in developed countries. For instance, there is a new approach called “Flipped classroom” which nowadays prevails. It should be accepted that this type of approach gives the opportunity for more interactive activities than the common one. It is worth to mention that technology also benefits students with special needs as well as at-risk students. Many researches have been done to test technology benefits for teaching and learning (Saba, 2009). The results have shown that students using technology in studies score more than those who do not. However, a wider scale of benefits should be considered, such as students can perform better than in traditional classes, the overall attitude towards learning and teaching has been changed and how it helps to provide a more student-centric approach (Saba, 2009).

Transforming the processes of learning to e-Learning and teaching to e-Teaching governments ensures good education to all students at the same level, no matter what family background they have. Therefore, giving students equal rights to obtain knowledge, governments promote their lifelong learning and better prepare them to deal

with ongoing technological change in society nowadays with the help of technical, communicative, interpersonal and creative skills.

So, this is why the current paper is not just asking if the country benefits from implementing ICT at schools but looking for specific ways of digitalizing the education system of Azerbaijan by detecting the barriers and overcoming them.

The current education system of Azerbaijan does not provide equal education rights to all the children in the country and does not meet the modern needs of society. Therefore, we are far from "the lifelong quality education for everyone" concept.

It is worth to mention that state schools across the countries are free of charge and all students can mostly borrow books from school libraries. So, from the first sight, it seems that parents do not have to spend a lot on buying study materials and pay tuition fee. However, there are still families understanding the real situation in the education sphere and trying to send their children to the best schools, which sometimes means paying the tuition fee, spending a lot of time on travelling from home to the school in the city centre.

One of the most important reasons why the education sphere is suffering in Azerbaijan, to the same extent as many other sectors in the country, is corruption. It affects all people of society without leaving any hope for a better future. According to the Corruption Perceptions Index Azerbaijan was given 30 points on a scale from zero (highly corrupt) to 100 (very clean). Looking at the data of 2017 and 2018, it can be seen that 3 years ago the situation was even better if not that positive at all, since among 180 countries that were assessed Azerbaijan ranked the 126th (Transparency International, 2019).

Corruption is a two-way process, meaning that both citizens and authorities take this situation for granted and believe that money can buy anything, including grades, diplomas, positions, or any other achievements. For instance, there are families with superior positions in society, having good jobs and many acquaintances whose children may attend the class without books and unprepared at all and even worse fearlessly declare that it is useless because they are not taught anything at schools. This also happens at other educational institutions, such as colleges, universities in many different

forms and, thus, most youngsters prefer to live and study far away from their nearest and dearest to obtain deep knowledge and then finally decide not to come back, and, of course, this is another reason why there is a lack of truly professional experts in fields in the country. Highly educated and professional experts would not agree to work for a salary which is lower than average monthly expenses.

Another reason for bad education performance across the country is that teachers are one of those who earn least of all, those who lose their motivation day by day, those who have no other choice than to teach private students at home after school official hours. Thus, it can even be concluded that teachers have less leisure time to spend with families. Moreover, when it comes especially to the education sector, the young generation who has just graduated from university with fresh knowledge, high motivation, and new methodology would not prefer working as a teacher at school. Only the minority will do so if they do not care how much they are paid because the average monthly salary is approximately 240 AZN (approx. EUR 125.89) when the minimum living cost across the country is 180 AZN (approx. EUR 94.42) (The Constitution of Azerbaijan, 2018). There are several categories of how teacher's salary is calculated. For example, if you hold Ph.D., your salary will be only 60 AZN higher (approx. EUR 31.49)[1]

Last but not the least, little budget spent on the education system negatively affects the quality of the education scholars obtain. Teachers or scholars are not the ones to blame. According to expenditure on education as a percentage of GDP (Gross Domestic Product), UNESCO provides data that Azerbaijan spent only 2.47% of GDP on education in 2017, whereas this index was at a maximum of 6.06% in 1992 (UNESCO, 2020). Every government should allocate enough money on developing and improving the education system as a whole. This includes providing everyone safe conditions and high-quality education regarding the region and family background, instead of making students stressed about passing test-based university entrance exams or semester sessions, that does not help prepare them for real life and job-related tasks at all.

Therefore, the current paper aims to offer a new approach to education with the help of new technologies, revealing how every single teacher, student, parent, school, and

[1] https://azedu.az/az/news/15988

government can benefit from a newly proposed method. Nowadays, in the world of emerging technologies, it is really important to understand that a child of Gen Z or Gen Alpha cannot be forbidden to use a mobile phone or any other device at school, it is even hard to limit their usage. Instead, a digital device should be turned into a useful learning tool and this should be considered as a new approach to learning and teaching process.

If countries, especially developing ones, start detecting real barriers to quality education, the education system will be totally changed for better, students will not have to dream of studying abroad because of poor education in their home country and teachers will be happier about the job they are doing. This is when education restores its real value in society.

2 Theoretical framework

This chapter discusses the theoretical framework. An overview of similar studies and researches done before on the current topic are also presented in this part of the thesis.

The main concepts that the current research is aiming at are as follows:

1. Teacher perception matters in ICT implementation at the school level.
2. ICT should be implemented in the teaching and learning process
3. Quality education is for everyone.

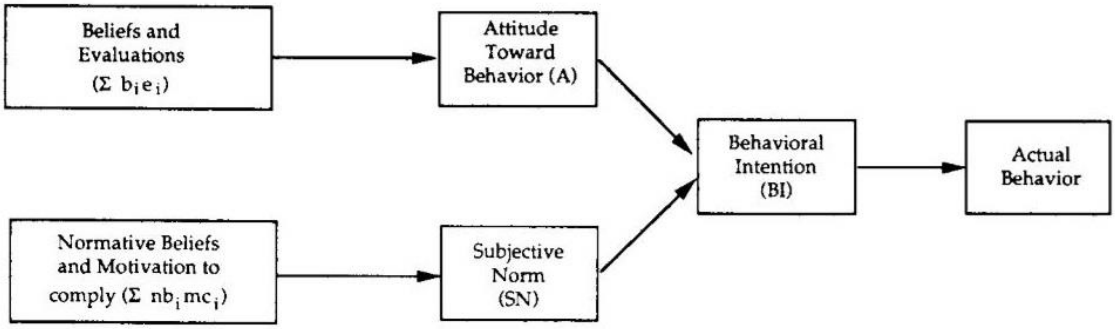
As it was already mentioned, ICT can enrich the learning and teaching processes for the better. UNESCO considers there are many ways technology can make access to education quicker, support teacher development, enhance the learning quality and its relevance, and can help improve the administrative process within the educational institutions (UNESCO, n.d.). With the help of digital devices integrated into the learning process students are given the freedom to express themselves, thus enhancing creativity and thinking skills.

Teachers' perceptions and motivation in ICT use are two of the main determinants of successful ICT integration in teaching-learning activities (Al-Awidi & Aldhafeeri, 2017) (Qasem & Viswanathappa, 2016). Al-Awidi & Aldhafeeri also mention in their paper that there are factors that affect teachers' readiness to adopt the technology. These factors include teachers' characteristics, contents knowledge, technological considerations, and organizational capability.

If consider that ICT is in the core of all three concepts mentioned above, the *Technology Acceptance Model* (TAM) by Fred D. Davis (1986) is chosen as a basis for the theoretical framework of the thesis.

It is worth mentioning that TAM is constructed based on the *Theory of Reasoned Action* (TRA) by Fishbein and Ajzen (1975) in Figure 1 to apply it specifically to the use and acceptance of information systems (Davis, Bagozzi, & Warshaw, 1989).

Figure 1. Theory of Reasoned Action.



According to TRA in Figure 1, a person's performance of a specified behaviour is determined by a person's behavioural intention (BI) to perform the behaviour, when BI is determined by a person's attitude (A) and subjective norm (SN) (Davis et al., 1989).

Fred D. Davis referred to reasons why people tend to reject IT. He mentioned in his study that there may be several reasons that could affect people's perception of technology. However, in the research he conducted, two main factors were selected as the most major ones. They are referred to as *perceived usefulness* and *perceived ease of use*. In the current research of the thesis, the survey that is conducted among teachers will also detect what teachers' perception about technology is and how easy they find it to use and implement in the teaching process. The analysis will be made based on teachers' responses. In case they use technology, the way it helps them in the teaching process will be detected, in case they do not tend to use technology in the teaching process, the reasons will be studied, and recommendations will be made. Fred D. Davis gives the following definitions of perceived usefulness and perceived ease of use. Perceived usefulness is defined here as "the degree to which a person believes that using a particular system would enhance his or her job performance." Perceived ease of use, in contrast, refers to "the degree to which a person believes that using a particular system would be free of effort." (Davis F. D., 1989).

Figure 2. Technology Acceptance Model.

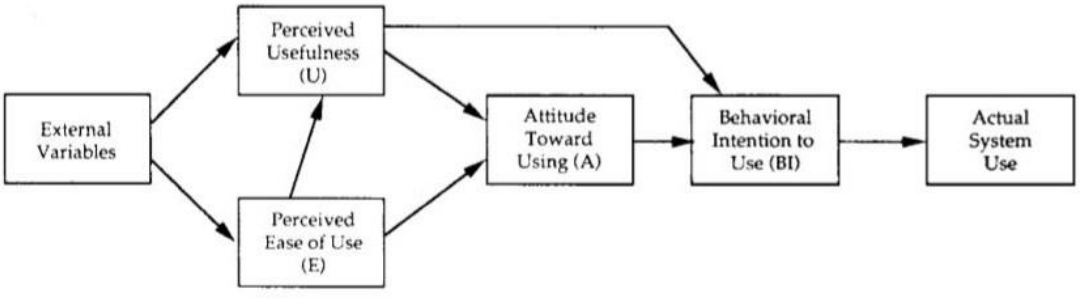
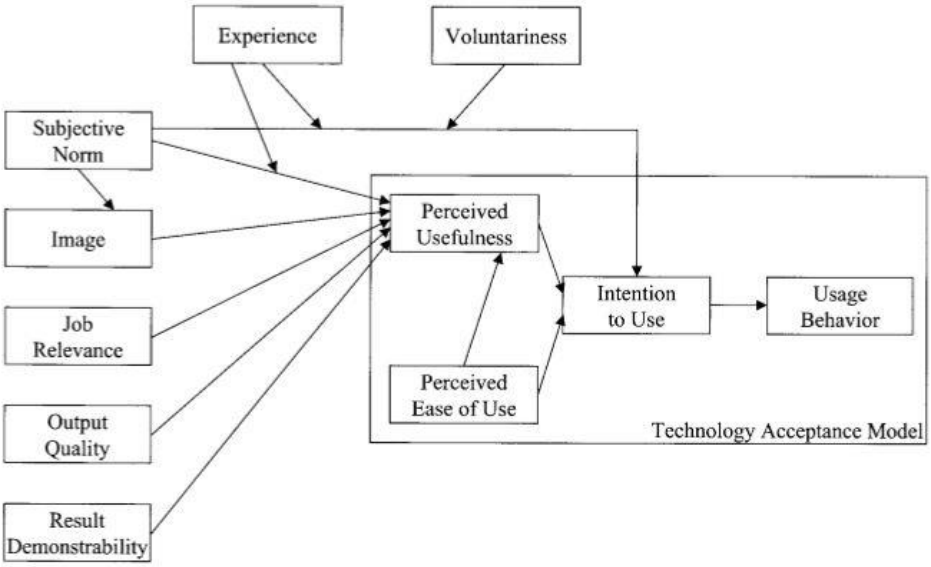


Figure 2 (Davis et al., 1989) supports the idea of the current topic that teachers' attitudes towards using ICT extensively depend on two variables such as Perceived Usefulness (U) and Perceived Ease of Use (E). It is seen from the Figure 2 that U depends on E, thus, if a teacher would believe that using ICT is not difficult and does not require a lot of effort, which in its turn depends on a teacher's digital skills, then a teacher could consider that using ICT for teaching purposes would enhance the performance.

In 2000 Viswanath Venkatesh and Fred D. Davis extended TAM to TAM2 as in Figure 3 by adding theoretical constructs such as subjective norm, voluntariness, and image (social influence) and job relevance, output quality, result demonstrability, and perceived ease of use (cognitive instrumental). (Venkatesh & Davis, 2000).

Figure 3. Technology Acceptance Model 2.



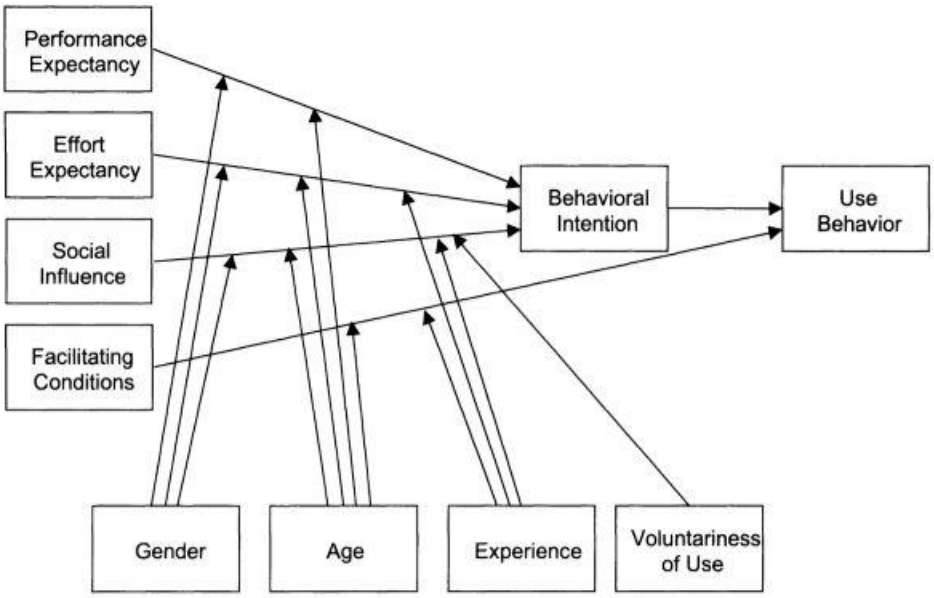
For instance, it is possible to define teachers' ICT use according to two categories such as mandatory and voluntary use. Venkatesh and Davis in their work in 2000 highlighted that this most probably occurs in mandatory rather that voluntary usage and, moreover, define one of variables as voluntariness (Venkatesh & Davis, 2000).

Diffusion of Innovation Theory (DOI), developed by E.M. Rogers in 1962, explains how a new idea (innovation) is adopted by people over time (Rogers, 2003). This theory can be applied specifically since the current thesis is dedicated to digitalization of the education in Azerbaijan and implementation of new technology in teaching-learning process is the main aim of the paper and hence, the process of implementation of new e-

solutions should be considered. Roger defines the diffusion of innovation as "process by which an innovation is communicated over time among the participants in a social system" (Rogers, 2003). The model is represented in S shape graph with 5 adopter categories such as: innovators, early adopters, early majority, late majority and laggards. It is also worth to mention that the process of innovation adoption described by Roger consits of several steps including awareness of the innovation need, the decision either to adopt or reject it, initial experience of testing this innovation and, finally, its continued acceptance. In his model Roger also identifies five factors that can influence the acceptance process. These factors are as follow: relative advantage (identifies to what extent the innovation is better than the existing product/service), compatibility (verifies if the innovation matches the values, experiences, and needs), complexity (tests if the innovation is easy for use), triability (defines if and how the innovation can be tested before acceptance) and observability (checks for a posibility to give tangible results) (Rogers, 2003).

In 2003 eight existing Information Technology acceptance models were studied with the aim to discuss and compare their extensions, detect most significant ones and, based on results of the research, offer a unified model integrating all significant extensions. A proposed model is called *Unified Theory of Acceptance and Use of Technology (UTAUT)* (Venkatesh et al., 2003). The models that are unified under UTAUT include: TRA, TAM, the motivational model (MM) (Davis, Bagozzi, & Warshaw, 1992), the theory of planned behavior (TPB) (Ajzen, 1991), combination model of TAM and TPB (Taylor & Todd, 1995), model of personal computer utilization (MPCU) (Thompson, Christopher, & Jane, 1991), DOI, and the social cognitive theory (SCT) (Bandura, 1986). As a result of the research four main constructs are significant and influence user acceptance and user behaviour: performance expectancy ("the degree to which an individual believes that using the system will help him or her to attain gains in job performance"), effort expectancy ("the degree of ease associated with the use of the system"), social influence ("the degree to which individual perceives that others believe he or she should use the new system"), and facilitating conditions ("the degree to which an individual believes that an organizational and technical infrastructure exists to support the use of system") in Figure 4 (Venkatesh et al., 2003).

Figure 4. Unified Theory of Acceptance and Use of Technology.



According to Figure 4 (Venkatesh et al., 2003), it can be seen that performance expectancy is influenced by gender and age; effort expectancy – by gender, age, experience; social influence – by gender, age, experience and voluntariness of use; and finally, facilitating conditions are moderated by age and experience.

Moreover, a study "Equality in education" by Kathleen Lynch and John Bakerin (2005) should be mentioned. One of the inequalities studied By Lynch and Bakerin is the equality of resources (Lynch & Baker, 2005). It is believed that the basis for inequality of education lies in income inequality which is directly linked with one's capacity to afford equal education (Lynch & Baker, 2005).

Thus, transforming the processes of learning to e-Learning and teaching to e-Teaching governments should also ensure good education to all students at the same level, no matter what family background they have. Therefore, giving students equal rights to obtain knowledge, governments promote their lifelong learning and better prepare them to deal with ongoing technological change in society nowadays.

Last but not least theory to consider and apply to the current thesis is ***Digital Transformation***. It is the process underlie in the core of e-Government construction. Nowadays when technology has emerged and governments experience digital turn, they have realised the importance of making services more efficient and available (Al-Shafi,

2009). Digital transformation is a process of transforming society into e-society and offering transparent and available public services, improved communication, and constant access to information (Al-Shafi, 2009).

2.1 Literature review

Education is key to a brighter future. If education could have been a long path from birth to eternity, which part of it would be the most significant one? Many researches have been done on this issue and some studies have shown that a student who attends preschools feel more comfortable in primary schools, performs better, is more self-confident which means a strong future society (Entwisle, 1995). This means that if countries start developing and improving the education system, they have to start with preschools and primary schools which are a guarantee for the whole education adventure.

These days knowledge creation has become more important than the economy and society based on mass production (UNESCO, 2011). However, since ICT emerged, not all the countries have been equally provided with it, and societies around the world are deprived of ICT implementation in all sectors, especially education. This may result in the lack of highly skilled professionals and, thus, the new labour market needs, and requirements are not met. Possessing a variety of skills in comparison with the past is considered to be a huge success for employees. These competencies may include collaboration, creativity, and problem-solving. Moreover, an employee needs to be persistent, curious, and initiative. For instance, in the USA the number of jobs requiring more analytical and interpersonal skills than cognitive ones has increased (World Economic Forum, 2015). All of these above-mentioned skills are perceived with the help of ICT since it allows both teachers and students to become more interactive, productive, and capable.

Although there are still many countries that concern about investing in ICT to integrate it into the education system, some studies show that students who have a chance to use a computer for their studies achieve higher results. Nevertheless, there are also studies that have revealed a negative or no relationship between computer use and achievement (UNESCO, 2011).

Schools in developing countries face a lot of different barriers to ICT use in education such as corruption, lack of professionals, outdated curricula, low budget, and others. These countries' societies will continue to live the low-level quality life until this is solved. If looking into the data of the United Nations Development Programme 2013, it can be seen that Education Index allocates each country score on different categories, such as Education index, Government expenditure on education (% of GDP), Literacy rate, and others. It is very odd that the literacy rate in Azerbaijan is indicated as 99.8% considering the fact that 76.9% of the population lives in other cities than Baku, where most of the schools in remote areas do not have even safe conditions in the school building. The overall score for Azerbaijan Education Index is 0.7 as of 2013 whilst Estonia scores 0.859 while the difference between education at schools and at universities is extremely huge (United Nations Development Programme, 2013).

The survey conducted by the European Union in 2013 identifies significant factors influencing successful ICT implementation in the teaching and learning process. One of them is how well schools at the European Union level are equipped with new technologies. "The benchmark for a highly digitally equipped school" means that a school should have relatively high equipment levels, fast broadband (10 mbps or more) and high 'connectedness' (e.g. having a website, email, a virtual learning environment and a local area network)" (European Union, 2013). The survey revealed that only 37% of students from 4th, 24% from 8th, 55% from 11th, and 50% of vocational students of 11th grades have an opportunity to study at such schools. Considering the fact that some EU member countries, such as Netherlands, Germany, and Denmark are among top 10 countries with high Education Index scoring 0.850, 0.872 and 0.863 accordingly, this benchmark is worse in developing and less developed countries and the issue of equal lifelong quality education for all should be approached in a more serious manner.

The policymakers who doubt usefulness and benefits of new technologies implemented in the education sector should review their hesitation and accept the fact that many researches on this subject have already been done and proved that ICT has the potential to improve the teaching and learning process in many different ways. For instance, a study was conducted at the Harvest Park Middle school and it revealed that students' performance, the quality of their work in writing tests is positively affected by using computers for studies (Gulek & Demirtas, 2005). However, this is not the only benefit

ICT can give students. New technologies potentially have the capacity to help students with special needs as well (Saba, 2009).

Moreover, attendance tracking, grades, and general feedback on students' success are very important for parents. A traditional way of doing it is manually filling in the journals and diaries, attend parental meetings. However, this is not relevant to the 21st century and does not fully meet the needs of modern society. Apart from this, such an old-fashioned system can be a tedious process and lead to errors because of different issues. Nowadays, in the 21st century, in the age of technology and science many digital forms of information management have been created and implemented and from now on the goal is to get rid of the old-fashioned paper-based system and integrate a modern one everywhere and for everyone. To make the management of student's information more efficient, accelerate the communication between teachers and parents of the students minimizing the gap between them, and decrease teachers' workload automation of the school system is needed (Kohpare, Shambharkar, Raut, & Awachat, 2017). Parents are the most significant and valuable part of a child's life. In contrast to teachers, parents act like prime educators until their child goes to kindergarten or school and after still continue contributing to their development and education as a whole (Ceka & Murati, 2016) Thus, it is very important for teachers to create a strong relationship with parents and school-home partnership (Ramirez, 2001). By involving parents in the school life of students, teaching, and the learning process becomes much easier and more effective. For achieving good results in this, constant parental control over children and their achievements should be provided. This includes supporting children in doing homework and in this way being involved in their school life. When children get the needed parental support, they are more likely to succeed in education and the future (Ceka & Murati, 2016). A study has shown that parental involvement helps to create a sense of community between home and school. This community is built on good teacher-parent relationship and communication, which in its turn helps to create and improve school climate (Clay-Susan, 2005). Research of New Zealand schools' data was done in order to identify the relationship between school-based activities and positive relationship with parents (Brownlee, 2015). Moreover, it has also revealed that creating and developing a school-home partnership and a teacher-parent relationship is a teachers' responsibility.

There are different ways of communicating with parents. Graham also identified many possible ways of communicating with parents falling into two groups such as one-way communication and two-way communication (Clay-Susan, 2005). They included the following kinds of ways of contacting parents and building relationship with them as report cards, e-mail messages, making phone calls home as well as parent-teacher conferences. One more possible way to share feedback with parents about a student in a school diary. However, this is not always efficient enough since teachers may face the cases when students leave their diaries at home or pretend so. In order to avoid these problems, new technological methods should also be used for the communication process with parents. Internet technology is one of the newest tools used for communication (Clay-Susan, 2005). For instance, the school website containing a lot of updated information about school events can also be used for sharing resource links, class schedules, and so on. It is a commonly known fact that the Internet is a very applicable tool that serves to make homework more interactive and individualized and, moreover, helps to involve parents in the process (Salend, Duhaney, Anderson, & Gottschalk, 2004). Before technology reshaped our life, the communication between teachers and parents was limited to parental meeting hours, but now it allows enhanced opportunities for this (Brewer & Kallick, 1996). In her research, Graham mentioned videotaping of student performances for presenting to families as one of the convenient tools. However, she also assumes that this may bring to some privacy issues of today's e-government society and it is very important to ensure that confidentiality of personal information is kept. Moreover, she offers the creation of digital portfolios for students, that can be regularly updated with learning plans as well as progress and shared with families (Clay-Susan, 2005). Developing the idea of Brewer and Kallick from 1996, Graham believes that technology gives a novel opportunity to link school and home thus creating strong relationship and constant communication with families.

Still, it is worth considering that there is an issue of the digital divide in the world and as Ramirez noted in his paper, many parents may possess poor technological knowledge. Not only parents but also many teachers are still uncomfortable with technology. So it is very important not to assume that all students and parents have access to technology at home and balance the use of "technology-based" and "paper-based" ways of communication (Ramirez, 2001).

It is noteworthy that many studies were conducted on the barriers to implementing ICT in the education system. The previous studies revealed that many factors may influence the use of ICT by teachers for teaching purposes such as knowledge and skills, motivation, workload as well as time and, for instance, to overcome the knowledge and skills barrier, teachers participate in ICT training provided by governments (Semerci & Aydın, 2018). However, the implementation of ICT in education does not totally depend only on teachers, their knowledge, or skills. Many other factors such as school and national level may also have a huge and significant impact on this process (Semerci & Aydın, 2018). In 2018 Semerci and Aydın made a research on teachers' attitudes towards ICT and its interrelation between different variables such as teachers' gender, age, teaching experience, ICT experience, skills, and training. It is noteworthy that one of the significant results was the interrelation between teachers' ICT anxiety and their ICT training experience. The interrelation between these two variables revealed that teachers who never participated in any ICT training feel more anxious and uncomfortable with ICT use and its implementation for teaching purposes in comparison with those who did. Therefore, teachers, holding the most important position in the education process, need to improve their ICT skills by attending training which in its turn will enhance their attitudes towards ICT use in teaching and smoothly integrate it into the education system.

Besides training provided by governments, teachers may find ways to develop their skills on their own. If consider that in one class there might be students who are not good enough at a specific subject and showing negative attitudes towards technology use in class, then teachers need to find out how to make them like this subject with the help of implementing new technologies and methods. A similar study was conducted by Kevser Erdener and Mehmet Ali Kandemir in 2019. The purpose of the research was to detect factors influencing student attitudes towards the use of an interactive whiteboard in mathematics classes. Authors advised teachers to examine the cause of Maths anxiety and offer new solutions for their students (Erdener & Kandemir, 2019).

Moreover, a professional learning project was organised by the research team from the School of Education at Deakin University, Australia with a group of 16 teachers from primary and secondary schools (Narelle Wood, et al., 2020). The aim of the project was giving a chance for teachers to learn how their students use technology and for what purposes. The project motivated teachers to work in cooperation with students, learn

about their practices and expectations, and based on that prepare new curriculum activities in accordance with students' knowledge, preferences, and experience (Narelle Wood, et al., 2020). The use of different platforms and websites increased and teachers realised the role new technology takes in their students' lives.

Since case the study approach is applied to the current thesis, it is also noteworthy that ICT implementation at schools is studied at the national level of Estonia. For instance, the Digital Turn workgroup is created at the Ministry of Education and Research which is responsible for supporting digital technology use at schools and studying teachers', students', parents', school management's attitudes towards ICT (Lorenz & Laanpere, 2016). The study revealed that there are different challenges on the way to digital turn such as involvement, resources as well as lack of support and analysis.

As another example, a study was conducted to find out teachers' perceptions and motivation to use ICT in learning activities in Indonesian schools. The study proposed to improve teachers' digital skills by conducting trainings, applying ICT-based curriculum as well as financially supporting schools to create necessary infrastructure (Mahdum, Hadriana, & Safriyanti, 2019).

The change in the approach to education, school management, and school-home communication cannot happen at once. It requires time, money, and efforts (Albugami & Ahmed, 2015). Countries need to take measures and prepare society for a great modification for the sake of a better future.

3 Research methodology

This part of the master's thesis is dedicated to the research methodology which will help address and seek the answers to the research questions. The research strategy, method, approach, and methods of data collection, the selection of the sample, the method of data analysis, the ethical considerations, and the research limitations of the paper are discussed here.

The subject of the master's thesis is the Education System of the Republic of Azerbaijan and the ways to improve it by digitalization.

As for the research method, qualitative and quantitative research approaches will be used. Both primary (teachers' and parents' survey) and secondary data (previous studies, researches on the topic, and statistics of the Ministry of Education of Azerbaijan) will be used during approaching the subject. To answer the research questions, research objects such as teachers' and parents' perspectives will be used, comparison of education systems of Estonia and Azerbaijan in a form of a case study approach will be made. Estonian digital solution will be analysed and recommended as a system design sample to implement in Azerbaijan since Estonia already has different projects regarding e-services in Azerbaijan.

A qualitative interview is one of two methods of primary data collection used for the current research. The interview results will help support the theoretical framework created during the literature review. The questions will be open-ended to support the evidence of the importance of ICT implementation in the education system.

A survey is a second method to get the primary data required for this research. The main goal of the teachers' survey is to (1) identify teachers' perception about ICT implementation in education, (2) check their ICT background and readiness to integrate ICT into teaching methods and techniques and (3) identify the current situation of digital education in the country and barriers for its development. A parents' survey aims

to (1) measure the satisfaction level with the current education system, (2) expectations regarding further improvement regarding the teaching-learning process, and (3) check readiness to pay a fee for an additional digital service at school. The surveys will be conducted with the help of the FourEyes web service.

After checking the ICT background, possible recommendations on how to improve and fill the gaps will be made.

Based on the research results a need for a joint e-platform is revealed. The proposal of a joint e-platform is made by the author of the thesis in the recommendation part. The prototype of the platform can be found in Appendices.

However, it should be noted that the proposal is constructed only based on interview and survey results and detailed study of the platform is required which is also recommended by the author. Since there is not existing joint e-platform that could meet all expectations and needs, a comparison between an existing platform and the proposed one is not possible.

3.1 Research objectives

The main goal of this research is to develop an approach for digitalization of the education system of the Republic of Azerbaijan with the help of new e-service, by encouraging teachers to implement ICT in their teaching methods, therefore overcoming the existing barriers. Another objective of the current paper is to introduce a possible solution for the digitalization of the education system. For achieving these goals surveys are conducted with both parents and teachers in order to get an overview of the current situation in the education system of the country, detect the barriers that prevent implementing ICT in education and find out what both teachers and parents expect regarding future development.

3.2 Research questions

The central research question of this paper is the following: *How to digitalize the Education System of the Republic of Azerbaijan?*

This question will help to (1) identify the ways of digitalizing the education system, (2) find out if there are barriers to the implementation process, what they are, and (3) how to overcome them.

From the main research question, the following two sub-questions are deduced:

- How to improve the existing education system with new e-services?

With the help of this auxiliary question and based on research results new e-services for teaching-learning as well as communication processes will be provided.

- How to introduce e-Learning to teachers and overcome the current barriers to the digitalization of the education system of Azerbaijan?

Since teachers are the most important element of the education system, the correct method of e-Learning introduction should be defined and the most responsible stakeholder of ICT implementation will be identified.

This sub-question will also help identify current barriers to the digitalization process of the education system and provide solutions on how to overcome them.

3.3 Data collection

Data collection is carried out with the help of surveys and interviews.

To get in-depth detailed information on how the education system is seen from the teachers' perspectives, two interviews with teachers from two different schools (public and private) have been conducted via Skype. The interviewees were given a choice to participate either anonymously or giving permission to publish their names and positions they hold. As a result, one of the interviews is published anonymously. Interviewee 1 is Matanat Akhadova, an English teacher at a public school in Baku, a head of the Foreign Languages Department, and at the same time an e-Twinning[1]

[1] eTwinning launched in 2005 as the main action of the European Commission's eLearning Programme. eTwinning provides a safe, online environment to engage with partner schools, work on projects and communicate with professionals in the educational field through the use of Information and Communication Technologies (ICT). It also offers free opportunities of online Professional Development for teachers. www.etwinning.net

Ambassador of Azerbaijan. Interviewee 2 is a teacher of Russian language and Literature from a private school in Baku whose identity will be kept anonymous throughout the thesis.

Thematic analysis for qualitative interview data is applied. First of all, the transcripts of the interviews have been prepared. Since the interview with the teacher from a public school was conducted in Azerbaijani and no qualitative data analysis software supporting this language was found, the transcript was prepared manually. However, the second interview with the teacher from a private school was conducted in Russian and, therefore, Nvivo Transcription Software was used by the researcher. Since in this phase only transcriptions and no analysis were done, these methods can be considered as equal and therefore it is not influencing the data integrity. After the transcriptions of the interviews were ready, they were both translated into English and thoroughly read for identifying and generating the initial codes. When all the data have been coded, it was sorted in relevance to each potential semantic theme (descriptive labels). The themes are closely linked with the research questions of the current papers. After the themes are formed, reviewed, and defined, the final report/analysis is prepared. Transcripts and recordings of the interviews are available and saved in a private cloud for future required access.

With the aim to make a comparison between teachers' and parents' views and expectations, *two surveys* were conducted, separately for teachers and parents which also gave a possibility to analyse the situation from two side perspectives.

The surveys were distributed electronically with the help of online survey software FourEyes. Data were collected during the period from March 2020 to April 2020. Survey participants were informed that participation is voluntary, and the researcher guarantees the anonymity and confidentiality of the data, which was used for scientific purposes only.

In connection with COVID-19, all schools were closed in the country and the surveys were distributed via all possible channels to reach out as many teachers and parents as possible. Moreover, the aim was to get teachers and parents from different parts of the country and schools involved in the study which in turn allows making a generalization. Totally 143 responses were received from teachers and 351 from parents. The data is

exported from FourEyes and kept in .csv format. The IBM SPSS statistical analysis software was used to analyse the collected data. Surveys mostly consisted of multiple-choice questions; however, some open-ended questions were added as well for letting participants share their thoughts and ideas. Several bias such as social desirability, demand characteristics, extreme or neutral response as well as no-response bias should be taken into consideration, and moreover to keep the statistics accurate, there is a "no answer" variable in each table below for those who skipped any question.

All interview and survey questions are available in Appendices.

After the surveys and interviews are conducted, the results of both of them are analysed and the conclusion is made. Barriers to implementing new technology and digitalization of the Education System in Azerbaijan are revealed and suggestions on how to overcome them are made.

3.4 Ethical considerations

The following ethical considerations were put into place for the research period:

1. Confidentiality in both surveys and interview will be protected.
2. The name and the position of the interviewee will be published only under agreement and permission.
3. Interview transcripts are available only for authorized persons on their request.

4 Case study approach

The below chapter presents a case study approach with a purpose to compare the education systems in one developed and developing countries' case studies of Estonia and Azerbaijan, respectively. This part of the master's thesis especially emphasises the case of Estonia which is advanced in e-governance development and positioned as an indicator of a successful case with digital solutions in the education system. Moreover, Azerbaijan is presented in the chapter with all applied solutions in the current situation. Therefore, after the current situation is identified and in following chapter the research results are analysed, The case study approach will help and support proposed solutions and recommendations in answering the research question on how to improve the existing education system with new e-services.

4.1 Estonia

According to the Programme for International Student Assessment (PISA), Estonian pupils are the best in Europe (Estonian World, 2019). This is a recent study conducted in December 2019. This happens mostly because PISA is following the most important education trends and the focus is to dedicate to science, which is the most significant part of today's economy and society. The idea is not only providing quality education using technology integrated into the process, but to prepare young people to face the challenges in real life, to teach pupils to analyze, find causes and present own ideas, and teach them to apply their skills and knowledge in real-life situations (Estonian World, 2019).

The government highlights the importance of digital skills in the government policy and budget every year and there is a strong partnership between government and private sectors for developing digital skills (eGovernance Academy, 2018). It is also stated that there is no separate curricula for ICT in Estonia and ICT in education is managed according to Lifelong Learning Strategy 2020: digital focus as one of the five main goals - National programme „Digital Focus" 2016-2020 (Republic of Estonia: Ministry

of Education and Research, 2018). Moreover, there is a national curriculum: general digital competency and cross-curricular topic called "Technology and Innovation “and schools are autonomous in decisions on how to teach ICT skills to students.

The Estonian Lifelong Learning Strategy’s general aim is ‘‘to provide everybody in Estonia with life-long learning opportunities that are tailored to their needs and capabilities, to enable them to pursue a self-determined life in their private lives, the work sphere and the society at large’’ (Koitla, 2015). The five strategic goals have been established as follows (The Estonian Lifelong Learning Strategy 2020):

1. Change in the approach to learning
2. Competent and motivated teachers and school leadership
3. Alignment of lifelong learning opportunities with the labour market’s needs
4. A focus on digital skills in lifelong learning
5. Equal opportunities and increased participation in lifelong learning

The strategy mentioned above can be tested on the education system of the Republic of Azerbaijan since Estonia can be taken as a success story in this sphere.

In the draft of Estonian Education Strategy 2014–2020 (EestiKoostookogu) five challenges of Estonian Education were detected. One of the significant challenges for education seems to be improving the position and image of teachers since interest in the teaching profession is very low and many graduates of teacher education programs do not tend to continue as teachers and choose other professions instead (EestiKoostookogu). A similar study should be conducted in Azerbaijan, to identify the satisfaction level with the teaching profession. This also could be a significant barrier to the way of digitalization of the education system.
As for the Estonian case, the Estonian Education Strategy 2014-2020 provides some measures on how to solve the issue, such as motivating professional development by increasing salaries and separating them from the class load; giving an opportunity to take a half-year off from teaching with salary retaining for self-education and fulfillment.

This is also a possible measure for Azerbaijan. By doing this young generation would be motivated for a teaching position and as a result, the ICT integration into education

will be implemented quicker and way more efficiently due to the fact that young people are more interested in technology and new digital devices.

Nowadays, during the COVID-19 crisis when most of the countries around the world temporarily closed schools and universities according to UNESCO, many developed countries known for their e-solutions, especially Estonia, initiated support with the help of digital education tools. For instance, eKool[1] and Stuudium[2] are some of the tools providing school management options. They give a chance to create diaries, assign homework, share the documents, timetables, and so on. The current crisis has proved the importance of technology in school management and countries as Estonia are the best examples to follow in this sense.

4.2 Azerbaijan

ICT plays a leading role in diversifying the economy of Azerbaijan and reducing its reliance on hydrocarbons, one of the current goals of the Republic of Azerbaijan. The national development plan, Azerbaijan 2020, envisions creating a high-income economy by reaching a per capita income of $13,000 (Azerbaijan 2020: Look Into the Future - Concept of Development). However, Azerbaijan is at its initial stage of development of ICT use in education (Lifelong learning programme, 2013).

According to the national development plan, Azerbaijan 2020, ‘‘the computerization of the information system will always be in the center of attention as one of the main directions of establishing general education at a modern level’’ and by 2020 a virtual learning environment will be established for teachers and pupils, therefore increasing the use of electronic education technologies. The government will provide Open Education Resources free of charge, that will be integrated into the education process. As it is stated in the plan, the number of “electronic schools” will reach 1,000.

The institution responsible for ICT provision to schools is the Bureau on ICT for Education under the Ministry of Education (Yoon, 2019). This provision includes supplying schools with computers, developing e-textbooks (for instance a portal

[1] https://ekool.eu/index_et.html
[2] https://stuudium.com/

eBook[1], the analogue to e-Schoolbag in Estonia), internet access, and ICT trainings. As the report states, 85% of students and 75% of teachers have access to the internet, and those unconnected schools are in remote areas with bad internet access where mobile broadband technologies must be used.

After all schools across the country are equally equipped with the necessary technology for education, teachers should be provided with specific training on how to use ICT in the teaching process. Otherwise, there is a threat that teachers will use the technology integrated in the traditional teaching-learning process, which will not provide any benefits to both stakeholders, in our case they are teachers and students (Lifelong learning programme, 2013).

Moreover, it is worth mentioning that on April 2, 2020, a project called "Virtual School"[2] was established by the Ministry of Education and the "Microsoft" corporation in accordance with the national development plan, Azerbaijan 2020. The project was initiated at the right time, since considering the fact that all countries are facing problems due to COVID-19 pandemic, this kind of platform is currently a high demand than ever. Besides this, weekly classes are held on TV to provide distance learning to students. Now, when the "Virtual School" platform is ready for use, students will register in the portal, get assigned to a class of their age, and do homework assignments according to TV lessons. The portal has also a mobile application version. However, currently the portal "Virtual School" is not mandatory, and starting from April 18, 2020[3] teachers also have the option to register in the portal and enroll all the classes they usually teach.

[1] http://www.e-derslik.edu.az/
[2] https://edu.gov.az/az/page/9/18169
[3] https://edu.gov.az/az/page/9/18243

5 Results of the research

This chapter is aimed to present gathered data during interviews and survey distribution. It will allow finalizing the research by summarizing the findings and making a conclusion on the thesis topic. Later in the next chapter, a solution will be proposed based on these findings.

5.1 Interviews analysis

The primary aim for conducting interviews was to study in-depth how teachers see the education system in Azerbaijan in general, determine what is the overall digital literacy of teachers and what are the main barriers to implementing new technologies in education. Moreover, in connection with the current COVID-19 pandemic around the world, the topic of distance education has become more relevant and interviews helped to find out more detailed information on how Azerbaijan is tackling this issue.

During the interview analysis six themes were identified that are closely linked to research questions:

1. Teachers' Digital Literacy Level at Schools
2. Benefits of ICT in Education
3. Education before and during COVID-19
4. Digital Education Technologies/Solutions Applied
5. Stakeholders in Implementing Digital Education
6. Barriers to ICT Implementation in Education

Teachers' Digital Literacy Level at schools

Interviewees have demonstrated that they possess different digital literacy levels, however, both expressed interest in learning new things and constantly developing. Interviewee 2 admits that firstly the digital literacy level was below average and later

was improved time by time and meanwhile it is worth to emphasize the digital confidence of Interviewee 1 who states:

> *"I highly evaluate my work in the field of digital technologies, since I am a highly trained and educated specialist and the first e-lecturer in the field of ICT in Azerbaijan."*
>
> - *Matanat Akhadova*

Joining eTwinning in 2013 Interviewee 1 has participated in many professional development trainings and obtained certificates on different interactive methods of teaching such as flipped classroom approach. In the field of ICT, Interviewee 1 is one of the first five teachers who implemented e-classes and used an electronic board in Azerbaijan and, moreover, being an ambassador and a member of eTwinning, she provides various trainings to teachers from all the cities and regions of Azerbaijan. She believes it is very important to realize that everything depends on teaching purposes and the way students are communicated. Interviewee 1 claims that all teachers of their school are provided with trainings by her at least for 10-15 minutes in a presentation form to share new discovered beneficial things. For about 2-4 years a system of online homework submission for every class is introduced by Interviewee 1. Moreover, other teachers are also encouraged to practice this system during the classes. Obviously not all schools are well-equipped with digital devices and high-speed Internet, depending on the spot and conditions, however, there are at least classrooms for computer science which usually make utilization possible (Akhadova, 2020) (Anonymous, 2020). The fact that ICT started playing one of the most important roles in the life of our society influenced the below-average digital literacy level of teachers in a positive way (Anonymous, 2020). Both Interviewee 1 and 2 give credit to all educators trying to learn and implement new teaching methods with the help of technology.

Benefits of ICT in Education

Benefits of implementing new technologies into teaching and learning process such as time effectiveness (Akhadova, 2020), allowing to demonstrate the individual and creative approach, parents' participation and control opportunity (Anonymous, 2020), moreover, getting students interested, motivated and encouraged (Akhadova, 2020) (Anonymous, 2020) were revealed. It is worth noting that a lot of time can be saved

specifically due to online homework submission and students are able to work more on common mistakes discussing them during the class (Akhadova, 2020).

Education before and during COVID-19

Both Interviewees confirmed that COVID-19 had a huge impact on the education system in Azerbaijan (Akhadova, 2020) (Anonymous, 2020). The Interviewee 1 calls COVID-19 as a revolution in the Education System of Azerbaijan. It is worth to highlight how she claims that months and years were not spent to start this revolution. It all happened unexpectedly in a month. Some schools were well prepared in contrast to others. Schools, where the administration's main aim was to implement new technologies for studies, could easily switch to distant education and provide teachers with an instant class schedule for e-teaching during the pandemic. Moreover, the Ministry of Education launched a project of live and virtual classes on a TV channel both in Azerbaijani and Russian (Anonymous, 2020). Above all of this, it was stated that teachers who possessed low digital skills had no other choice than improve and implement them to meet the current demand (Akhadova, 2020) (Anonymous, 2020). Due to teachers' sceptic and pessimistic approach, it was hard to imagine that such changes will take place all of a sudden (Akhadova, 2020). However, overall parents' satisfaction is high, and the interviewees claim that teachers worthily find a way out of the situation that makes parents happy (Anonymous, 2020). Of course, there are difficulties, such as loss in connection, since currently the system is overloaded or low effectiveness of online classes for new topic mastering. However, Interviewee 2 believes that this depends on a student – if a student wants to learn, he or she will do so whatever the conditions are. It is obvious that today distant education has started prevailing in Azerbaijan and hopefully will be applied alongside in-school education hereafter (Akhadova, 2020).

Digital Education Technologies/Solutions Applied

Both Interviewees named several solutions applied at schools of Azerbaijan. For different reasons, some schools have all their classes well-equipped with computers, projectors, e-boards, and high-speed internet, while others have all these opportunities only in the primary school classrooms and Computer Science classrooms. In some cases, there is a netbook per two students to benefit from during the class (Akhadova,

2020). As the Interviewee 1 states, most of the schools in Azerbaijan have already started using e-journals, some of them have e-journals alongside the usual paper journal.

According to the information provided by Interviewees at the moment in connection with COVID-19 quarantine, teachers conduct online classes via Zoom or Skype. However, since April 2, 2020, the Ministry of Education in collaboration with Microsoft has launched a project called "Virtual School" with the aim to expand distant education opportunities. As the Interviewee 1 described, this will create a more systematic approach to e-learning via one joint platform.

Stakeholders in Implementing Digital Education

Both Interviewees have pointed out the Ministry of Education of Azerbaijan as the main stakeholder responsible for the implementation and development of the digital education system of Azerbaijan. Moreover, Interviewee 1 considers that the government should assign a specific institution to monitor all digitalization procedures and implementation of new technologies. Last but not least, it is very crucial that both school management and teachers realize that cooperation is a very significant component of this process (Akhadova, 2020). School management should be engaged in making its staff more professional in the field by providing conferences, courses, and motivating to participate and get certificates as well as equipping the workplace, while teachers should be interested in learning and actively participating.

Generally, both Interviewees believe that the implementation of new technologies in the education system and its development depends on the mutual effort of all engaged parties.

Barriers to ICT Implementation in Education

If analysing the data provided by both Interviewees, it is possible to notice that both of them pointed out the main current barrier for digitalization of the education system of Azerbaijan, which is wrong budget allocation. Interviewee 2 has highlighted not the less important fact that there are two types of schools in Azerbaijan, public and private and since the latter ones receive financial support from sponsors, they are much more developed in the sense of digital education and way better equipped (Anonymous, 2020). An inference is drawn at this point by a researcher that a government does not

allocate enough budget for equipping schools with all needed devices and tools. This is why we experience a huge gap between private and public schools in most cases. Much worse picture can be drawn for schools located in remote areas. They need a proper budget for at least provide safe conditions for students. Moreover, Interviewee 1 states that the current barriers are teachers' stereotypes, lack of motivation, and low salaries. How can teachers' motivation to implement new technologies and methods in the teaching-learning process be restored? One probable solution is introducing a new assessment method based on the digital literacy level of a teacher. If this assessment is applied and salaries are paid accordingly, then teachers having high digital literacy, possessing various certificates, and participating in different training and conferences will get a higher salary and this will become a great motivation for those who are not (Akhadova, 2020).

Interview analysis can be concluded by noting that based on two results it is hard to make any generalizations, however, two interviewees showed a positive attitude towards ICT implementation. Moreover, both of them realise that there are barriers that need to be overcome and they believe it requires actions of mutual efforts.

5.2 Surveys

As it was already mentioned, two surveys were conducted. The target group of the surveys was teachers and parents. This was done for analysing the current situation of the education system from two perspectives.

5.2.1 Survey results – teachers

Most responses were received from public schools (Figure 5).

As it can be seen from Figure 5, totally 115 respondents mentioned public school which makes 80,4% of all participants and 21 of all said they work at private schools which constitutes 14.7%. The rest 4.9% of respondents did not reply to this question.

Figure 5. Distribution of Teachers by School Type.

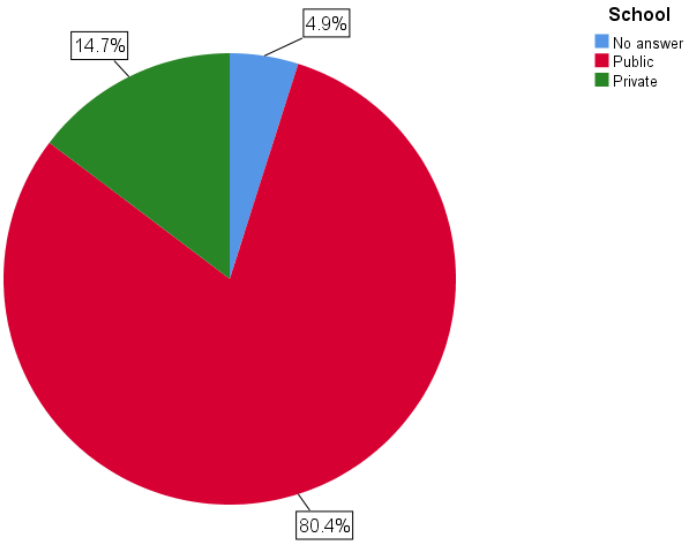
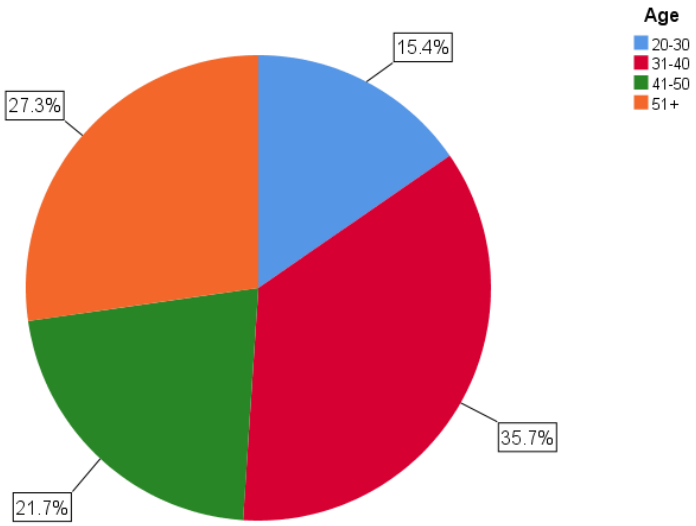


Figure 6. Distribution of Teachers by Age.



If to look into age data of respondents from Figure 6 it can be inferenced that the distribution of respondents by this category is smooth, though it is worth mentioning that 35.7% of responses came from participants in their 31-40 ages. Moreover, it is very surprising and promising that teachers from 51+ group were also very active and showed their interest in participating in the survey.

Table 1. Distribution of Teachers by Digital Literacy Level.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No answer	1	.7	.7	.7
	Basic	7	4.9	4.9	5.6
	Moderate	87	60.8	60.8	66.4
	High	40	28.0	28.0	94.4
	Expert	8	5.6	5.6	100.0
	Total	143	100.0	100.0	

The survey helped to identify the percentage of teachers for each group of digital literacy. As for digital literacy level teachers could choose basic, moderate, high, and expert for their knowledge in the field of technologies. According to Table 1, 60.8% (87 respondents) consider their digital literacy level as moderate and 28% (40 respondents) claim they possess a high level of digital literacy. Only 8 teachers, which constitute 5.6% of all participants, can declare themselves as experts in the digital field. Later in the paper when analysing responses received from parents', comparison between teachers' and parents' digital literacy will be made to get an overview of expectations and actuality.

Table 2. The Interrelation between the Teachers' Age and Their Digital Literacy Level.

		Digital Literacy Level of Teachers					
		No answer	Basic	Moderate	High	Expert	Total
Age	20-30	0	1	9	12	0	22
	31-40	0	3	33	13	2	51
	41-50	0	0	21	9	1	31
	51+	1	3	24	6	5	39
Total		1	7	87	40	8	143

When examining the relationship between Age and Digital Literacy Level (Table 2) it is possible to observe that unexpectedly 5 out of 39 (12.8%) respondents in the age group 51+ consider themselves as experts in the field of technology compared to only 2 (3.9%) of 51 respondents of 31-40 ages and 0 (0%) of 22 in 20-30 age range. However, for high digital literacy group results are different. 12 teachers (54.54%) out of 22 in 20-30 age range have identified their level of digital skills as high, while only 13 (25.5%) of 51 and 6 (15,38%) of 39 were from age range 20-30 and 51+ respectively.

Table 3. The Interrelation between the Digital Literacy Level and Frequency of Technology Use for Teaching Purposes.

		Frequency of Use					
		Once a month	Other (please specify)	Never	Once a week	Every day	Total
Digital Literacy Level	No answer	0	0	1	0	0	1
	Basic	3	1	1	0	2	7
	Moderate	7	11	1	19	49	87
	High	0	2	1	8	29	40
	Expert	1	0	0	3	4	8
Total		11	14	4	30	84	143

The purpose of investigating the frequency of technology use for teaching purposes was to detect how closely it correlates with the digital literacy level. Thus, the survey results have revealed an interrelation between these two variables. If someone is considered to be an expert in the digital field, then probably the technology usage by this person would be systematic. Therefore, the more experience teachers have, the more systematically they implement technological solutions for teaching purposes.

However, when analysing the data from Table 3, some gaps might be found. For instance, any researcher may question how a teacher being an expert in the digital field implements it for teaching purposes only once a week. 3 respondents out of 8, which constitutes 37.5% of those who have selected “expert” for “digital literacy level”, use digital/technological solutions for teaching purposes only once a week. Moreover, one of them implements these solutions even once a month. The researcher assumes that the reasons behind these results may be very different such as low teacher motivation, low salary, or poor school equipment.

For those with “moderate” and “high” digital literacy level, the results are more promising, since 49 of 87 (56.3%) and 29 of 40 (72.5%) respectively use technology for teaching purposes every day. Last but not least 2 teachers out of 7 with basic skills, which is 28.6%, confirmed that they use digital solutions in their classes every day, which demonstrates their eagerness to improve.

Moreover, some teachers when asked about the frequency of technology use for teaching purposes highlighted that there are no special opportunities to use any

technology since schools are not provided with the internet, poorly equipped and sometimes no computers at all are available for teachers.

Table 4. The Interrelation between School Type and Digital Literacy Level of Teachers.

		Digital Literacy Level					
		No answer	Basic	Moderate	High	Expert	Total
School	No answer	0	0	4	3	0	7
	Public	1	7	69	32	6	115
	Private	0	0	14	5	2	21
Total		1	7	87	40	8	143

It is worth highlighting that the digital literacy of public school and private school teachers strongly differ. None of 21 private school teachers participating in the survey has chosen “basic” for their digital literacy level. In addition, the percentage of teachers with “moderate” and “expert” levels in private schools prevails the percentage of teachers with the same levels in public schools: 66.7% for “moderate” and 9.5% for “expert” out of 21 while 60% for “moderate” and 5.2% for “expert” out of 115 working at public schools (Table 4). The reasons for these results can be either public school teachers are not motivated enough to implement technology and develop digital skills” or public schools do not provide a well-equipped workplace for teachers to develop and enhance teaching opportunities.

Table 5. Joint e-Platform Availability and Its Interrelation with School Type.

		Availability			
		No answer	Yes	No	Total
School	No answer	0	3	4	7
	Public	2	51	62	115
	Private	0	17	4	21
Total		2	71	70	143

To get a general overview of how schools are digitalized in Azerbaijan and how communication between all parties are organised, it is very important to identify the availability of joint e-platform at schools. From Table 5 it can be inferenced that 71 teachers (49.65%) claimed they have e-platform at school while 70 (48.95%) of all said they do not. Missing 1.4% is presented in the table as “no answer”. It is much more

important to identify how many teachers working in public schools approved e-platform availability, otherwise it is already mentioned that private schools are more developed in sense of technology.

According to the data in Table 5, 51 of 115 respondents from public and 17 of 21 from private schools confirmed the availability of joint e-platform which is 44.35% and 80.95% accordingly. This fact also proves that private schools are more well-equipped and offer better opportunities. Moreover, it demonstrates that either teachers from public schools are not aware of an existing platform or public schools are not supported in this kind of initiatives by the government.

However, as it may be inferenced from the table below (Table 6), respondents have shown a huge interest in using such a joint platform for easy and fast communication with parents.

Table 6. Joint e-platform Use Likelihood (Teachers' Perspective).

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No answer	4	2.8	2.8	2.8
	Already available	47	32.9	32.9	35.7
	Yes	83	58.0	58.0	93.7
	No	9	6.3	6.3	100.0
	Total	143	100.0	100.0	

Referring to Interviewee 1, it can be added that currently most of the public schools have implemented an electronic journal where grades for test assessments and attendance are logged and automatically sent to parents either in a message or email form, but the access right to the system itself is given only to school management and teachers (Akhadova, 2020). Basically, this journal is used instead of paper journals, however, it does not have any features like leaving feedback about a student or home task for the next class. Teachers make notes in their personal paper journals regarding students' achievements and share them with parents during meetings. Therefore, an inference can be made by the author that the current e-journal implemented in schools is not interactive and does not provide full two-end communication. Moreover, there is also a contradiction between answers of Interviewee and some parents mentioning that the platform is not free and costs about 5 AZN (approx. EUR 2.72) per a child a month and this is why not all parents can benefit from it.

Table 7. The Interrelation between Digital Literacy Level and Frequency of Attended Training.

		Training Frequency					
		No answer	Never	Every month	Once a year	Other (please specify)	Total
Digital Literacy Level	No answer	0	0	0	1	0	1
	Basic	0	2	0	2	3	7
	Moderate	1	8	9	40	29	87
	High	0	3	12	13	12	40
	Expert	0	1	2	4	1	8
Total		1	14	23	60	45	143

From Table 7, when comparing digital literacy level and frequency of participating in training, it becomes evident that it is quite enough if a teacher is provided with specific training for increasing digital skills at least once a year. 40 of 60 respondents who said they attend training once a year are from *moderate*, *high*, and *expert* digital literacy level groups. This constitutes 66.7%, 21.7% and 6.7% respectively. However, it can also be seen that those 14 respondents who never attend training also fall into the same *moderate*, *high*, and *expert* digital literacy level groups. It can be assumed that either they are not provided with training by schools or the Ministry and develop skills themselves, either they do not have any motivation to attend any training.

It is worth to mention that according to open questions there were answers from teachers saying that they attend training to improve their skills only when it is required, some of them cannot attend due to lack of time but try to improve themselves with the help of online courses and some of them said that no courses and training are available for teachers in other regions of Azerbaijan than Baku.

Table 8. Importance of Digitalization of the Education System in Azerbaijan.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No answer	1	.7	.7	.7
	Somewhat important	16	11.2	11.2	11.9
	Important	49	34.3	34.3	46.2
	Very important	74	51.7	51.7	97.9
	Not important	3	2.1	2.1	100.0
	Total	143	100.0	100.0	

The study also showed that according to the teachers' view the importance of the digitalization process of the Education System in Azerbaijan is very high (Table 8). 34.3% of respondents claim that it is important and 51.7% confirm that it is very important, which in total makes 86% of all survey participants. One of the aims of the survey was to find out who is the most responsible stakeholder for implementing new technologies in education. Respondents could choose several options in the question. The distribution of the answers is as follows:

Table 9. The Most Responsible Stakeholder in the Digitalization Process of the Education System in Azerbaijan.

		School Management	Teachers	The Ministry of Education
Importance of Digitalization of the Education System in Azerbaijan	No answer	0	1	0
	Somewhat important	2	0	14
	Important	14	7	33
	Very important	22	20	58
	Not important	1	0	2
Total		39	28	107

When analysing the total responses for each stakeholder in Table 9, the Ministry of Education was chosen by 107 respondents out of 143 which is 74.8% of all participants. However, this does not discharge teachers and school management from liability but reminds the Ministry of Education what a huge and supportive role it plays in the development process of the education system.

Moreover, according to other responses provided by teachers also consider parents as responsible stakeholders in the digitalization process. The availability of e-boards and computers for all students in the classroom as well as a higher salary for teachers implementing ICT for teaching purposes were also among the answers given by respondents.

Table 10. Educational Stage Priority for Digital Education Introduction.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Kindergarten	11	7.7	7.7	7.7
	Primary School	47	32.9	32.9	40.6
	Secondary School	73	51.0	51.0	91.6
	Higher Education	12	8.4	8.4	100
	Total	143	100.0	100.0	

As for the prior educational stage for the introduction of digital education, secondary school is leading with 51% of respondents followed by 32.9% for primary school (Table 10).

Table 11. Current Main Barrier to the Digital Education in Azerbaijan.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		3	2.1	2.1	2.1
	Other (please specify)	21	14.7	14.7	16.8
	School Management	6	4.2	4.2	21.0
	Lack of Teachers' Motivation	31	21.7	21.7	42.7
	Teachers' Low Skills	47	32.9	32.9	75.5
	The Ministry of Education	25	17.5	17.5	93.0
	Students' Low Skills	10	7.0	7.0	100.0
	Total	143	100.0	100.0	

It was also important for the author to identify the current main barrier to the introduction of digital education in Azerbaijan. The results show that teachers' low skills prevail with 32.9% of respondents, following by a lack of teachers' motivation with 21.7%. The third barrier with relatively fewer responses is the Ministry of Education (Table 11).

There are several respondents who claimed that lack of technology infrastructure, information, equipment, and specifically poor internet connection are also potential barriers to digital education in Azerbaijan nowadays. Teachers also believe that some irrelevant tasks such as preparing lesson plans in the written form need to be excluded so that they have more time and energy to apply modern technology in classes.

It is not relevant to make generalizations based on 143 respondents. Nevertheless, the analysis method revealed valuable results that can be used for future research. Mainly the current teachers' perception is justifying the interview results and giving hope for improvement possibilities.

5.2.2 Survey results - parents

After analysing the data from parents' survey statistics, it becomes evident that as in teachers' survey responses were mostly (86.9%) from public schools (Figure 7).

Figure 7. Distribution of Parents by School Type.

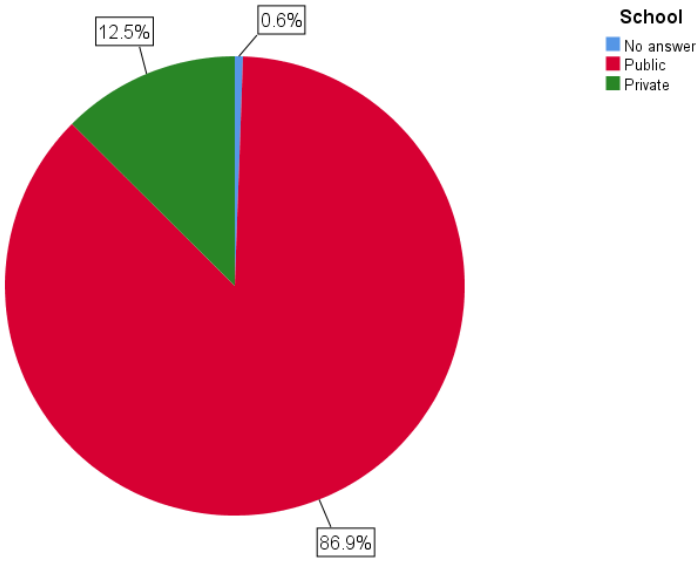


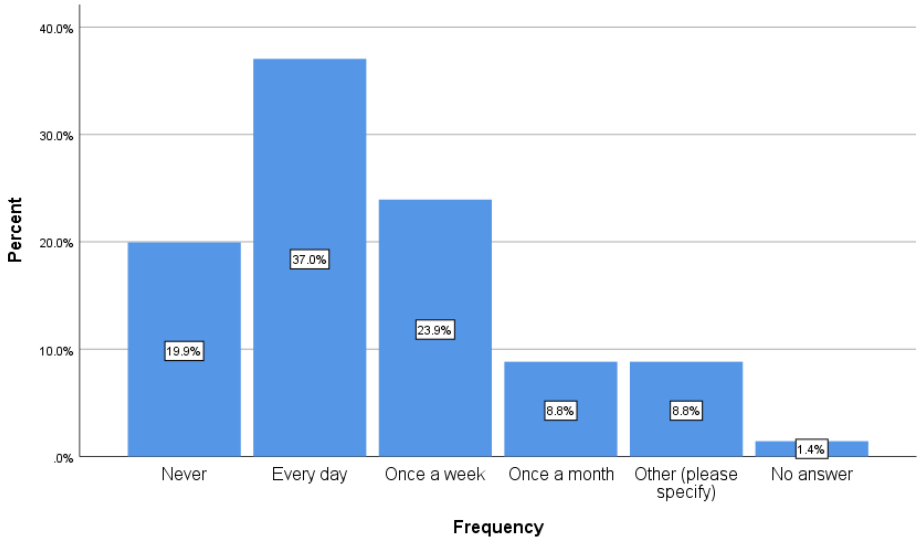
Table 12. The Interrelation between Digital Literacy of Parents and Teachers (Parents' Perspective).

		Digital Literacy Level of Teachers (Parents' Perspective)					
		No answer	Basic	Moderate	High	Expert	Total
Digital Literacy Level of Parents	No answer	3	0	0	0	0	3
	Basic	0	12	6	2	0	20
	Moderate	0	32	96	41	5	174
	High	1	17	69	46	4	137
	Expert	0	2	11	3	1	17
Total		4	63	182	92	10	351

The data from teachers' survey has already revealed that 60.8% of teachers who participated in the survey consider their digital literacy level as *moderate*, 28% as *high* and 5.6% confirm they are *experts* in this field. The survey conducted among parents helps to identify the correlation between digital literacy levels of both teachers and parents. It is very significant if the percentage of *moderate*, *high*, and *expert* digital literacy groups for teachers based on parents' perspective is close to the percentage of teachers claiming that they belong to these groups. The results are as follows: moderate 182 (51.9%), high 92 (26.2), and expert 10 (2.8%). It can also be seen from Table 12 in comparison with 4.9% of teachers who claimed they belong to a basic group of digital literacy level, 63 parents which makes 17.9% claimed that teachers at their children school possess basic knowledge in the digital field. This may be a result of teachers

extreme response bias to look more professional and experienced in the digital field. Moreover, it worth highlighting that totally 51 parents (80.9%) out of 63, who claimed that teachers' digital skills are basic, belong to moderate, high, and expert groups.

Figure 8. Frequency of Computer Use for Study Purposes.



According to the figure above, only 130 respondents (37%) out of 351 have confirmed that their children use the computer for study purposes every day (Figure 8).

For most of the questions, the author gave a chance to participants to give detailed answers and it is very important to mention that for the frequency of computer use question there were also answers other than given in Figure 8 such as *for presentations, once in two weeks, on weekends.*

Table 13. Distribution of Parents by Their Belief in Digital Solutions Benefits.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No answer	3	.9	.9	.9
	Yes	242	68.9	68.9	69.8
	Not sure	90	25.6	25.6	95.4
	No	16	4.6	4.6	100.0
	Total	351	100.0	100.0	

At the same time, 68.9% of respondents believe that digital solutions implemented in learning are beneficial for children (Table 13).

Table 14. Education in Azerbaijan during COVID-19 Pandemic.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No answer	3	.9	.9	.9
	Temporarily suspended	74	21.1	21.1	22
	Some teachers teach online	231	65.8	65.8	87.8
	Other (please specify)	43	12.3	12.3	100
	Total	351	100.0	100.0	

According to the data received from both Interviewees, the current situation with education across all the countries has been changed in connection with the COVID-19 pandemic. If to analyse the data in Table 14, it becomes obvious that 65.8% confirmed that only some teachers held online classes. Moreover, considering the fact that the responses were received starting from March till the 1st and 2nd of April and the project 'Virtual School' of the Ministry of Education and Microsoft was initiated only on the 2nd of April, it can be stated that not all teachers were ready for this change and not all the students were able to be educated at first.

Moreover, 43 parents chose "other" as for response and when analysing that data the researcher could encounter such answers as all classes are held online; classes are held on TV; online classes are held via Zoom but it is hard for children to understand the material; only homework is given and no online classes are held, and last but not least teachers are not prepared and trained for e-learning.

Besides, the author believes that the communication process is a very essential part of the education system. This can also be justified by previous studies (Kohpare et al., 2017) Therefore, the ways of controlling grades and homework were also studied, and the distribution of responses is as following:

Table 15. The Ways of Controlling Grades.

		N	Percent	Percent of Cases
Grade Control	SMS	13	2.6%	3.8%
	Diary	228	44.9%	65.9%
	Keep in touch personally with all teachers	137	27.0%	39.6%
	School open hours	74	14.6%	21.4%
	Student Information System	45	8.9%	13.0%
	Other	11	2.2%	3.2%
Total		508	100.0%	146.8%

The question for the received data in Table 15 was multiple choice, so the respondents could choose several possible answers. This is why the total number for all the responses differs from 351, however, the percentage is presented in relation to the actual number of participants. Thus, checking the grades from 'old-fashioned' *diary* way prevails other responses with 44.9% of parents, following by *keeping in touch personally with all teachers* with 27% and *school open hours* with 14.6% of respondents. Other responses included cases of using WhatsApp for controlling grades and communicating with teachers, while some parents also claimed that grades are not important since they are not fair sometimes.

Table 16. The Ways of Controlling Homework.

		N	Percent	Percent of Cases
HW Control	SMS	18	4.0%	5.2%
	Diary	210	46.9%	61.2%
	Keep in touch personally with all teachers	107	23.9%	31.2%
	School open hours	41	9.2%	12.0%
	Student Information System	31	6.9%	9.0%
	Other	41	9.2%	12.0%
Total		448	100.0%	130.6%

In contrast to controlling grades, according to Table 16, parents tend to check homework given by teachers from *diaries* (46.9%) and by *keeping in touch personally with all teachers* (23.9%). This question was also multiple-choice one and the total number differs from the actual number of participants. According to other responses, the WhatsApp parents' group seems to be a practical option for controlling homework as well.

Table 17. The Interrelation between School Type and Joint e-Platform Availability (Parents' Perspective).

		Joint e-Platform Availability				
		No answer	Yes	Not sure	No	Total
School	No answer	2	0	0	0	2
	Public	0	56	35	214	305
	Private	1	24	1	18	44
Total		3	80	36	232	351

It is noteworthy that only 80 parents (22.8%) of all respondents confirmed that there is a joint platform for controlling a child's attendance, grades, homework, and feedback from teachers (Table 17). Moreover, 56 of them were from public schools which is only 18.4% of 305 public school parents and 24 from private ones that constitute 54.55% of all respondents from private schools. If compare these results from Table 7, it is evident that the percentage of public schools' teachers confirming the joint e-platform availability was 44.34% and of private school teachers 80.95%. The author may assume that the reason behind this difference is either teachers' demand characteristics or no-response bias or parents' unawareness of the existing platform.

Table 18. The Interrelation between e-Platform Usefulness Belief and Usage Likelihood (Parents' Perspective).

		e-Platform Usefulness Belief				
		No answer	Not sure	Don't agree	Agree	Total
Usage Likelihood	No answer	5	2	0	1	8
	Already available	0	8	0	26	34
	Yes	0	43	10	197	250
	Not sure	0	5	2	11	18
	No	0	5	12	24	41
Total		5	63	24	259	351

The survey made it possible to define the correlation between usefulness and usage likelihood of the e-platform (Table 18). In accordance with responses, 259 (73.7%) of 351 parents believe that the e-platform would facilitate communication with teachers, and 197 (76.1%) of 259 would definitely use it.

Table 19. e-School Data Preferences.

Case Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
eSchool Data	339	96.6%	12	3.4%	351	100.0%

		Responses		
		N	Percent	Percent of Cases
e-School Data	attendance	161	20.4%	47.5%
	grades	205	25.9%	60.5%
	Teachers' feedback	262	33.2%	77.3%
	Timetable	134	17.0%	39.5%
	other	28	3.5%	8.3%
Total		790	100.0%	233.0%

It can be seen from the case summary of Table 19 that only 339 respondents answered the question about data preferences. Teachers' feedback and grades are the most preferable e-School data with 77.3% and 60.5% of 339 participants accordingly.

Moreover, based on answers, it can be inferenced that parents also would like to have information about given homework, syllabus for an academic year, some auxiliary links to additional information, feedback on individual approach and what should be prioritized as well as feedback on behaviour, communication and social adaptation of a child.

Table 20. The Interrelation between Cost of Joint e-Platform and Usage Likelihood.

		Cost of Joint e-Platform						
		No answer	Less than 1 AZN a month	1-3 AZN a month	3-5 AZN a month	The platform should be free of charge	Other (please specify)	Total
Usage Likelihood	No answer	0	2	0	2	4	0	8
	Already available	2	0	5	5	21	1	34
	Yes	2	12	29	34	164	9	250
	Not sure	0	2	0	0	16	0	18
	No	0	3	5	4	29	0	41
Total		4	19	39	45	234	10	351

Totally, 250 parents would definitely use the joint e-platform and 164 of them (65.6%) consider that this kind of platform should be free of charge (Table 20), meaning that the Ministry of Education should ensure that the needed budget is allocated for implementing such a platform.

Although there are 351 respondents for parents' survey, generalization is not relevant since not all regions were covered. Generally stating, 37% of parents confirmed their children use computers every day for doing homework when 19.9% and 23.9% mentioned that their children either never use computers or use them only once a week. The most significant result that needs to be considered by the government in the education digitalization process is that 232 of 351 parents confirmed that there is no e-platform available in schools, which constitutes 66.09% of all respondents. This percentage is a very significant variable to consider and decrease.

5.3 Conclusion of research results

The results of the research are based both on interviews and surveys. First of all, as for both surveys', the majority of responses were from public schools. This proportion is very relevant for the current paper, giving an opportunity to mostly cover public schools of the country. Most private schools in Azerbaijan are well equipped in terms of digital opportunities and this is due to financial support from sponsors and, moreover, such schools are not free of charge. This also leads to one of the conclusions that budget plays a huge role in implementing new technologies in the education system. The results

of interviews were analysed based on themes that were revealed: teachers' digital literacy level, benefits of implementing new technologies in the teaching and learning process, digital education technologies/solutions applied, stakeholders in implementing digital education as well as barriers. Overall, the digital literacy of teachers depends on different facts and may differ. Some teachers are very active and constantly develop, either themselves or by attending some training and courses since they are aware of how implementing new technologies solutions benefit the education process in various ways. These courses may be organised by schools, any specific organisation such as e-Twinning, or by the Ministry of Education. Teachers that are experts in this field tend to share their experience and knowledge with others, but this all, of course, depends on how motivated teachers are and how this motivation can be increased. The fact that teachers experience a lack of motivation reveals some barriers for instance low salaries due to budget allocation and, moreover, due to the same reason, poor ICT infrastructure at schools. In connection with the current COVID-19 pandemic, all educational institutions of the country have been temporarily closed and this situation had a huge impact on the education system of Azerbaijan. Interviewee 1 calls the current pandemic as a revolution since all teachers had to switch to online classes, either at their own will or not (Akhadova, 2020). Teachers with low digital skills had to learn how to use new platforms to educate students in such a difficult time. According to information received from interviewees, some schools have all classrooms provided with computers, projects, and Internet, some can offer only Computer Science classrooms that teachers can use by turns. Starting from April 2, 2020, the Ministry of Education launched a project "Virtual School" in collaboration with Microsoft. From now on all students across the country should have access to online classes provided by the Ministry. Before the project has been launched, depending on a teacher, motivation, and resources, classes were held via Zoom or Skype. Interviewees tend to believe that mainly the Ministry of Education is responsible for implementing new digital solutions in education, however, generally, all parties need to act jointly making mutual efforts. School management should be interested in having more professional staff and teachers demonstrate motivation to improve their digital skills.

The surveys helped identify different factors analysed in the current paper such as school type, teachers' age, frequency of attended training, the digital literacy level of teachers and parents, frequency of technology use by teachers and students, joint e-

platform availability and its usage likelihood both by teachers and parents, stakeholders responsible for digitalization process of education and educational stage priority for it as well as current barriers. Additionally, parents' survey included questions about their belief in the benefits of digital solutions and the current education situation in connection with COVID-19. Moreover, the survey has identified the ways parents tend to control the grades and homework of their children as well as their preferences for data availability in joint e-platform. In addition, parents' expectations regarding the joint e-platform price was an essential finding for the research. To get in-depth research for the received data, interrelations between different factors were made and analysed and as it was already mentioned in the chapter, the data was analysed both from teachers' and parents' perspectives.

To summarize the research results from surveys it is worth mentioning that only 40% of teachers fall into the high digital literacy level group (Table 1). The support from the government and the Ministry of Education is required in sense of providing schools with all necessary equipment and allocate the budget also for increasing salaries for motivating teachers and, thus, differentiating those who implement new technology solutions into practice from those who do not. 51.7% of teachers confirmed that the digitalization of education in Azerbaijan is very important (Table 8) and based on their opinion the introduction of digital education should be prioritized for secondary school (Table 10). On the contrary, the author believes that primary school should be considered in the first place. This idea is also reflected in 32.9% of teacher responses who chose the primary school as for educational stage priority for digital education introduction (Table 10). For achieving good results in education digitalization, barriers such as teachers' digital low skills and lack of motivation with 32.9% and 21.7% accordingly (Table 11) as well as lack of technology infrastructure, information, equipment, and good internet connection should be overcome.

The government, especially the Ministry of Education, should take serious measures in the field of education and start implementing new technologies in this sphere, since 242 out of 351 parents, which is 68.9%, believe that digital solutions implemented for teaching and learning purposes are of high importance for their children (Table 13). Participants of the parents' survey have explicitly showed their interest in joint e-platform. 250 (71.2%) of 351 respondents would definitely use it and 197 (78.8%) of them believe that it will facilitate the communication between them and teachers (Table

18). Last but not least, when implementing joint e-platform, the Ministry of Education should take parents' preferences regarding this into consideration, and especially the fact that 234 of 351 respondents confirmed they would like to have this platform free of charge (Table 20). Estonian e-solutions are a valuable example for the case of Azerbaijan. When implementing new e-services for the education system, the Ministry of Education of Azerbaijan should consider all high results that Estonia has achieved in the field such as good school management options, high students results, and last but not least digitally available data. Finally, the case study approach applied by the author proves that to achieve good results the government should set the priorities as Estonia since the Estonian government sees education as a lifestyle and acts accordingly (The Estonian Lifelong Learning Strategy 2020).

6 Recommendations

The following chapter provides answers to the research questions of the paper by recommending a possible solution of the digitalization of the education system of Azerbaijan. The recommendations are made based on the research results.

6.1 “My e-School” joint online platform

Research results revealed that one of the possible solutions to digitalize the education system is an online platform that could facilitate the communication process within schools, provide access to information, data availability, and constant e-learning possibility.

Therefore, a joint online platform “My e-School” is proposed for linking all schools together and accelerating the communication among school management, teachers, students, and parents. It is worth mentioning that in this phase no research was made about platform functionality and usefulness, and no results revealed that the platform should be one for all schools across the country. This is done only based on the author's subjective decision to get all school data in one unified platform and research on it can be considered for the future.

The platform would help eschew inefficient paper-based data exchange and storage. However, as it was mentioned previously, to balance between technology-based and paper-based communication, paper-based notes in diaries should also remain to ensure that teachers and parents, who do not feel comfortable with technology, can also be a part of school-home communication (Ramirez, 2001). This can be applied at the starting phase of the platform implementation and then gradually switch to a complete digitalization.

It is well-known that all schools in Azerbaijan hold parental meetings at least once a semester. However, that is not enough for proper communication with teachers and tracking your child’s success. Moreover, these kinds of meetings are usually held on

weekends depriving teachers of their leisure time so that all parents have an opportunity to attend. It is very significant to understand that in the days of modern technologies everything can be done online regarding time and location and it is possible to leave feedback about a student or share other school data in the digital form not only by inappropriate phone calls and constant WhatsApp messages. Thus, creating a joint online platform would make all necessary information available in digital form and ease all the processes at schools. Moreover, the platform will ensure that the "once-only" principle will be followed and no matter what school teachers or students will switch to, they will have all their data in digital format constantly being updated. It is worth mentioning that this can also be a good solution for transferring all students' data from school to university they are enrolled in the future by one click avoiding any kind of bureaucracy. Currently, there is no personal ID-based system like in Estonia which would allow such data export. At the same time, the platform should ensure the confidentiality of teachers and student personal information is applied.

The author offers a joint e-platform in the form of a two-sided synchronized school information system. The platform will namely provide the functionality of an e-register and e-diary. School management will have complete access to all data entries. Teachers, parents, and students will have personal profiles to have access to the system. In order to register in the platform, teachers and students will use the numbers of school e-IDs (Chapter 6.2), that author suggests the Ministry of Education to issue, and create passwords themselves.

Answering to the first research question, it can be stated that the provision of such a joint e-platform is one of the ways to improve the existing education system in the country.

The author suggests the Ministry of Education to initiate the project of platform design and implementation. The platform should be free of charge for everyone in all schools in Azerbaijan based on parents' views. The proposed platform offers 3 types of profiles: teachers, parents, students. Various options are available for each of these profiles, however, all entries are synchronized (Table 21, the illustrated version-see Appendix 4). Moreover, the author suggests integrating eBook portal (e-derslik.edu.az/) and Azerbaijan National Library website (anl.az/) with the proposed joint e-platform for more efficient functioning.

Table 21. Functionalities of My e-School Platform.

	Teachers	**Parents**	**Students**
Functionality in a form of	e-register	e-diary	e-diary
Progress identification	Teacher's development		Student's achievements
Notes	✓	✓	✓
Uploading a file	✓		✓
Searching option	✓	✓	✓
Work hours registration	✓		
Messages	✓	✓	✓
Notifications	✓	✓	✓
Calendar	✓	✓	✓
Documents	✓	✓	✓
e-Lessons	✓	✓	✓
My daily homework			✓
My daily results			✓
e-Book			✓
e-Library			✓

The following chapters 6.2 and 6.3 are not proposed by the author based on research results, but with the aim to maintain support for joint e-platform implementation.

6.2 School IDs for teachers and students

The author suggests issuing special e-ID cards to all teachers and students for identification and attendance control. These e-IDs would enable teachers and students to enter the school building and log in their attendance. Therefore, school management would easily track teachers' attendance and work hours, while teachers' workload will also decrease since they will not have to log in to students' attendance manually anymore.

Issuing of the cards is the responsibility of the Ministry of Education. Implementing the system of e-IDs will also help to ensure a secure environment for everyone at school.

Within such a system, visitors can enter the school building only with a Guest e-Card registered for a specific date with a visitor's national ID number.

6.3 One computer in each classroom

For a successful implementation of the proposed e-platform, all schools should make sure that each classroom is provided with a computer so teachers may have access when needed. The Ministry of Education should coordinate this provision from its side and the needed budget should be allocated.

6.4 Recommendations for introducing digital education to teachers and overcoming the current barriers

To answer the second research question about how to introduce e-Learning to teachers and overcome the current barriers to the digitalization of the education system of Azerbaijan, the author proposes to the Ministry of Education of Azerbaijan to:

1. review budget allocation for the education system and increase salaries to teachers based on their digital literacy level and implementation of ICT for teaching purposes. This solution will encourage all teachers to attend ICT training to improve digital skills and motivate them to use new technologies during lessons;

2. allocate needed budget for building technology infrastructure in all schools across the country. This includes equipping all schools with necessary technology such as computers, projectors, smartboards for each classroom as well as highspeed internet;

3. provide school management and teachers with ICT trainings and, if needed, assign training with ICT experts from abroad or invite them to Azerbaijan. The required expenses should be covered by the Ministry of Education;

4. allocate the required budget for "My e-School" platform design, implementation and constant maintaining;

5. construct ICT based curriculum so that teachers realize job relevance and usefulness of ICT in the teaching-learning process and start mandatory implement it at work.

Moreover, school management, in its turn, is also advised to stay updated regarding all possible ICT training, courses, and events provided by the Ministry of Education. As it was already mentioned, it is in school management interest to have its staff professional in the digital field since digital literacy plays a very significant role in successful ICT implementation in the education field. Therefore, school management should also require the necessary equipment for each classroom from the Ministry of Education to provide teachers with the best environment for teaching and professional development.

When such a digitalized education system is at the place, all stakeholders would be able to realize the actual advantages and results they get. Only by taking these steps, the government will be able to offer the best equal digital education to all across the country.

6.5 Limitations and recommendations for future research

However, due to the limited number of responses that were mainly received from Baku, the author could not make a generalization of the study results to other schools across the country and it is strongly recommended to conduct a similar study among teachers and parents living in other regions than capital, including remote districts. It would be very beneficial to conduct similar research sometime after the Covid-19 pandemic with the aim to find out if “revolution” has caused any changes in the digital literacy of teachers and their attitudes towards ICT use for teaching purposes. It is also significant to get students’ standpoint regarding overall satisfaction level with education and technology use for studying purposes. The comparison between schools in Baku and schools in other regions should be made in detail, barriers to equal education provision should be identified and a solution on how to overcome those barriers should be proposed. Moreover, the current level of education and potential of ICT implementation in education in other regions of Azerbaijan as well as remote districts should be identified. Finally, the author suggests to analyze the proposed joint e-platform, its user experience, and interface, since the prototype in this thesis is created subjectively without any deep research behind. It is also significant to find out whether the proposed

platform should be joint for all schools or different platforms can function and it is school management who decides which one to implement. A detailed analysis of the proposed joint e-platform is strongly recommended, since, currently, there is no similar platform available in the country to compare.

7 Summary

To make a conclusion to the current paper, it worth mentioning that education needs to be evolved to continue delivering on its mission (OECD, 2019). Only if education is constantly changing in a line with a changing world and its trends, it can prepare and develop individuals as professionals (OECD, 2019). The author has already stated earlier in the current paper that implementing new technologies in education gives a variety of new skills required by the modern labour market. This is why the research has shown that in order to form a child's identity, it is necessary to adapt the education system to emerging technology and, therefore, help to become an outstanding representative of the society.

Moreover, analysis of the interrelation between teachers' age and digital literacy level has revealed the fact that nowadays individuals of 50+ age group possess poor knowledge in the field of technology. This is not the only barrier to the digitalization process. Other barriers discovered in the current thesis are teachers' low motivation, lack of technology infrastructure, information, and equipment as well as a poor internet connection.

To overcome the barriers and offer the best environment for teaching and learning, governments should allocate the budget properly and invest in the education field. Considering that the technology emerges and there are many new tools available for the teaching-learning process as well as school-home communication, following old methods is not acceptable.

The methods chosen for data collection and research were appropriate and successful since it helped to define the current education level at schools and detect the barriers to the digitalization process at schools. The author was able to answer research questions and make recommendations based on the results of the study.

Overall, the research results showed that the current digital level of teachers is promising though there are not many experts in the field. Teachers are doing their best to meet modern parents' and students' needs. However, they lack motivation which can

be restored by increased salary based on teachers' digital literacy level. Parents are also awaiting some drastic changes to improve school-home communication.

Now it is the Ministry of Education who needs to take certain actions if it wants to give its people a bright future.

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Appendix 1 – List of interview questions

1. Please introduce yourself.
2. How would you describe your digital skills and how often do you use new technologies for teaching purposes?
3. How would you describe the digital skills of teachers around you in general?
4. How often do your students have homework that needs to be done on a computer and what is the purpose of such homework?
5. How would you describe education in Azerbaijan before COVID-19 and after? What changed and how prepared were teachers for this challenge?
6. How far the education system of Azerbaijan is digitalized? What should be improved?
7. In your opinion who is responsible for implementing new technologies and methods in education and what is the biggest current barrier for it?

Appendix 2 – List of questions in the survey for teachers

1. Please indicate the school you are working in (optional question-anonymous)

2. School:
    - Public
    - Private

3. Please indicate your age
    - 20-30
    - 31-40
    - 41-50
    - 51+

4. How would you describe the level of your digital literacy?
    - Basic
    - Moderate
    - High
    - Expert

5. How often do you use digital/technical solutions for teaching purposes?
    - Never
    - Every day
    - Once a week
    - Once a month
    - Other (please specify)

6. What technologies/solutions of digital education have you used? Please, indicate the exact purpose, respectively.

7. Is there any joint (all in one) electronic platform at your school where you can track the attendance, put grades, homework and leave feedback about students so that you easily communicate with parents?
    - Yes
    - No

8. If not, would you use such kind of platform?
    - Yes
    - Not
    - Already available

9. How often do you attend training courses to increase your digital literacy?
    - Never
    - Every month
    - Once a year
    - Other (please specify)

10. In your opinion, to what extent the introduction and development of digital education in Azerbaijan is important?
    - Very important
    - Important
    - Somewhat important
    - Not important

11. In your opinion, who is responsible for implementing new technology in education?
    - Teachers
    - School management
    - The Ministry of Education
    - Other (please specify)

12. In your opinion, what educational stage should be considered as a priority for the introduction of digital education?
    - Kindergarten
    - Primary School
    - Secondary School
    - Higher Education

13. In your opinion, what is the main barrier to the introduction of digital education in Azerbaijan?
    - Students Low Skills
    - Teachers Low Skills
    - Lack of Teachers Motivation
    - School management
    - The Ministry of Education
    - Other (please specify)

Appendix 3 – List of questions in the survey for parents

1. Your child goes to
   - Public school
   - Private school

2. Please indicate your child's studying grade
   - 1-4
   - 5-9
   - 10-11

3. How would you describe the level of your digital literacy?
   - Basic
   - Moderate
   - High
   - Expert

4. How often does your child have homework that needs to be done on computer?
   - Never
   - Every day
   - Once a week
   - Once a month
   - Other (please specify)

5. What is the purpose of these kinds of homework?

6. Are digital solutions/methods implemented in the education system beneficial for you child?
   - Yes
   - No
   - Not sure

7. How would you describe the level of teachers' digital literacy of the school your child studying at?
   - Basic
   - Moderate
   - High
   - Expert

8. Education during COVID-19 pandemic:
    - Temporarily suspended
    - Some teachers teach online
    - Other (please specify)

9. How do you control your child's grades?
    - Get SMS notification
    - Check the diary
    - Keep in touch personally with teachers
    - School open hours
    - Student Information System
    - Other (please specify)

10. How do you control what homework your child has for the next class?
    - Get SMS notification
    - Check the diary
    - Keep in touch personally with teachers
    - School open hours
    - Student Information System
    - Other (please specify)

11. Is there any specific electronic platform at your school where you can control your child's attendance, grades, homework, and feedback from teachers?
    - Yes
    - Not sure
    - No

12. If not, how likely would you like to use a specific platform to control your child's attendance, grades, homework, and feedback from teachers?
    - Yes
    - No
    - Not sure
    - Already available

13. What kind of school data about your child should be in the joint electronic platform?
    - Attendance
    - Grades
    - Teacher's Feedback
    - Timetable
    - Other (please specify)

14. I think that a mobile application will facilitate the flow of information between me and my child's professors.

- Agree
- Disagree
- Not sure

15. How much per month would you be willing to pay for such a platform per a child?
    - Less than 1 AZN a month
    - 1-3 AZN a month
    - 3-5 AZN a month
    - The platform should be free of charge
    - Other (please specify)

Appendix 4 – My e-School Prototype

Welcome page

WELCOME
to

My e-School

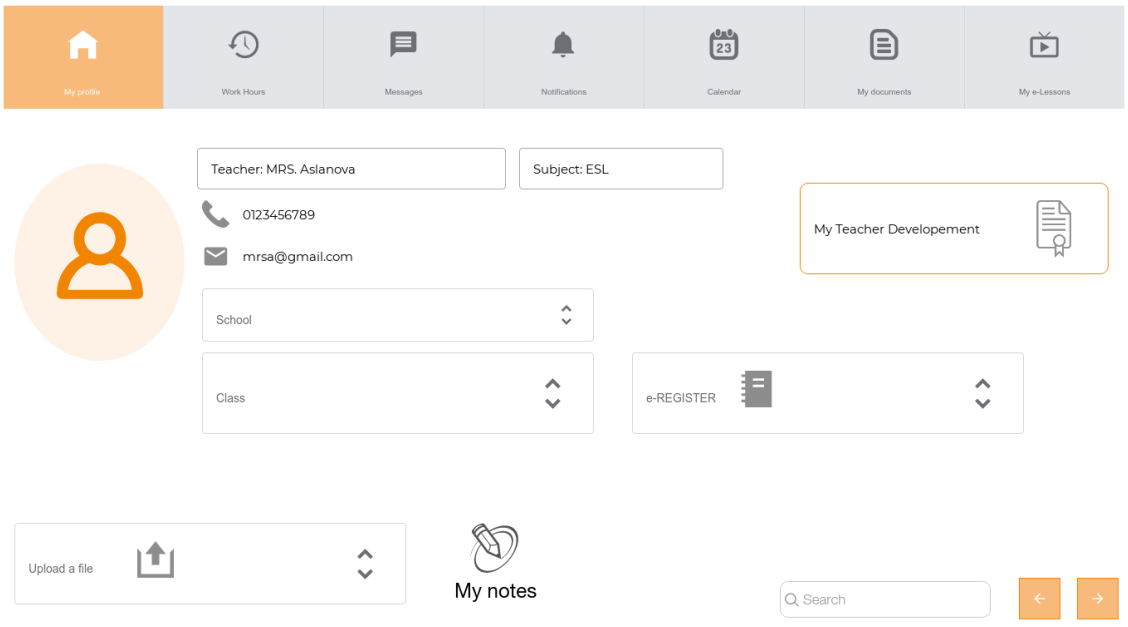
To enter your profile, click on one of bellow buttons and login as:

Teachers

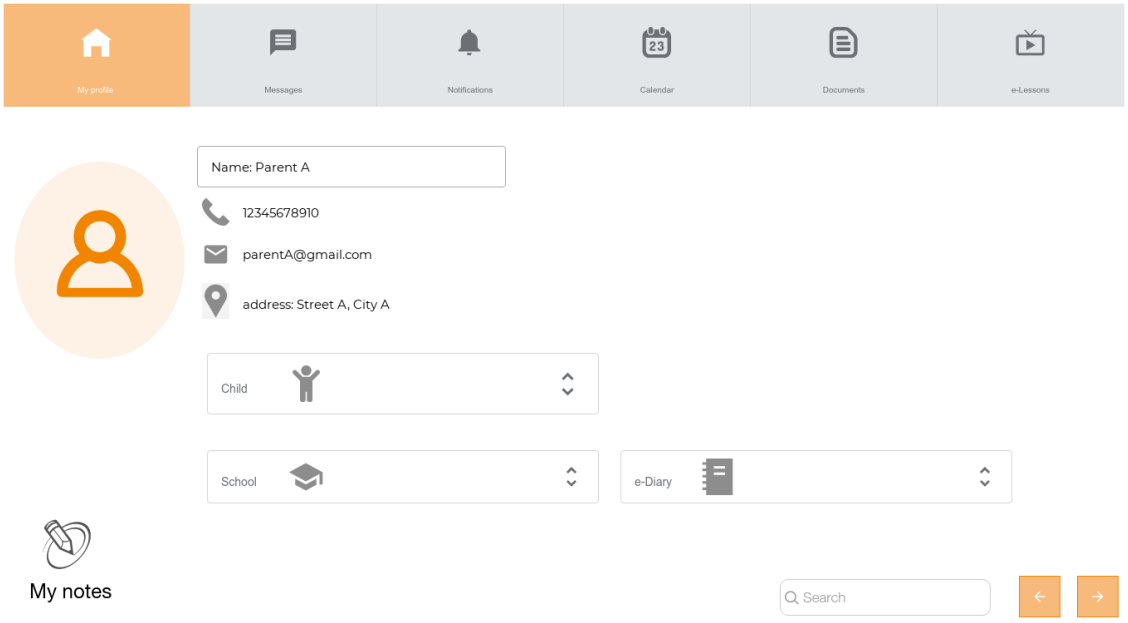
Parents

Students

Teachers' Profile



Parents’ Profile



Students' Profile