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**ANALYZING THE EDUCATIONAL SYSTEM
IN MOLDOVA AND DEVELOPING AN E-
SCHOOL MOBILE APPLICATION
PROTOTYPE**

Master's thesis

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**MOLDAVIA HARIDUSSÜSTEEMI
ANALÜÜS JA E-KOOLI MOBIILSE
PROTOTÜÜBI ARENDAMINE**

Magistritöö

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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

The present study reviews the current educational system In Moldova and proposes a Mobile E-School app in order to facilitate the information flow in schools. In particular, the researcher examines the current situation in the Moldovan schools, determines the existing deficiencies, and proposes a solution which can improve the learning experience for scholars and their parents. The methodology of this study was chosen on the basis of Lewin's Change Theory. According to the theory, in order for any change to happen, people need to 1) understand the need for it, 2) accept the new way of doing things and commit to making it prosperous, and 3) maintain/improve the change. For an accurate review of the need for change, a survey was designed to assess the parents' perceptions about the quality of studies and technology in their schools. A total of 68 parents of scholars from three different schools in Moldova participated in the survey. The results of the Non-parametric Spearmen correlations showed that there is a strong negative correlation between the perceptions about the current educational model (CEM) and the perceptions about the digital educational model (DEM). It demonstrates that the lower have parents rated the current educational system in Moldova, the higher was their interest in the development of the future mobile application. The obtained results have been considered when developing the mobile E-School application prototype. The Mobile E-School application is designed to increase the amount of information and its accessibility and will facilitate the communication flow between the scholars, teachers and their parents.

Keywords: Education, technology, E-School, mobile application

This thesis is written in English and is 58 pages long, including 8 chapters, 9 figures, and 7 tables.

Annotatsioon

MOLDAVIA HARIDUSSÜSTEEMI ANALÜÜS JA E-KOOLI MOBIILSE PROTOTÜÜBI ARENDAMINE

Antud töö uurib Moldaavia haridussüsteemi ja pakub välja mobiilse e-kooli rakenduse informatsiooni vahendamiseks koolides. Töös analüüsitakse Moldaavia koolide situatsiooni, tuuakse välja esinevad puudused ja pakutakse välja lahendus, mis parandaks õpilaste ja nende vanemate õpikogemusi.

Käesoleva uuringu aluseks on valitud Lewin-i Muudtuste Teooria. Selle teooria kohaselt tuleb selleks, et mingi muudatus tegelikult saaks läbi viidud, peavad inimesed 1) aru saama muudatuse vajadusest, 2) valmis olema asjade uut moodi tegemiseks ja 3) haldam aktiivselt muudatuse läbiviimist.

Muudatuse vajaduse kindlaks tegemiseks viidi läbi vanemate hulgas küsitlus õpingute ja tehnoloogia kvaliteedi kohta nende koolides. Uuringus osales kokku 68 vanemat kolmest erinevast koolist. Mitteparameetrilise Spearsmani korrelatsioonide tulemused näitasid, et praeguse haridusmudeli (CEM) arusaamade ja digitaalse hariduse mudeli (DEM) arusaamade vahel on tugev negatiivne seos. See näitab, et mida madalamalt vanemad hindasid Moldaavia praegust haridussüsteemi, seda kõrgem oli nende huvi tulevase mobiilirakenduse arendamisele. Mobiilse E-kooli rakenduste prototüübi väljatöötamisel on arvestatud saadud tulemusi. Mobiilne E-kooli rakendus on mõeldud teabe hulga ja selle ligipääsetavuse suurendamiseks ning hõlbustab teadlaste, õpetajate ja nende vanemate vahelist suhtlust.

Märksõnad: haridus, tehnoloogia, e-kool, mobiilirakendus

Käesolev väitekiri on inglise keeles ja 58 leheküljel, sealhulgas 8 peatükki, 9 joonist ja 7 tabelit.

List of Abbreviations and terms

| | |
|------|---|
| APP | <i>A computer program that is designed for a particular purpose</i> |
| CEM | <i>Current Educational Model</i> |
| DEM | <i>Digital Education Model</i> |
| IBM | <i>International Business Machines Corporation</i> |
| OECD | <i>Organisation for Economic Co-operation and Development</i> |
| SPSS | <i>Statistical Package for the Social Sciences</i> |
| UNDP | <i>United Nations Development Programme</i> |
| WTO | <i>World Trade Organization</i> |

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“There’s a way to do it better... find it!” (Thomas Edison)

1 Introduction

Education is the driving force of all the processes in our society (Power, 2014). The school years are crucial for the development of each person’s individuality, personality, and intellectual abilities (Woessmann, 2016). Moreover, the quality of education affects the success of nations on a global scale. A strong educational system can develop highly skilled professionals who accomplish achievements that penetrate the entire society and its mentality (Barber & Mourshed, 2009). As a consequence, people become happier citizens in a society that experiences growth in the economic, technological, and scientific areas (Retallick, 2005; Entwisle, 1995; Kisumo, Osman & Ongeti, 2013). For these reasons, every single country has to prioritize the reforms and investments in the educational sphere, starting from the deepest issues. Looking at the country’s current educational system, experts can predict the growth of progress in the near future. For achieving success in education, people need to develop, implement and use the new technologies (Botha, 2010).

Technology is a vital part of every high developed country. It invades every aspect of people’s day to day life. One of the most powerful aspects that technology has offered to the whole society is the access to data. Digital data that can be easily accessed from every part of the world (Mehdipour & Zerehkafi, 2013; Krumsvik, 2012; Bertheussen, 2014).

Nowadays, in Moldova, there is no school data available in the digital form. Information is saved and shared with the help of the old-fashioned and inefficient paper-based system. Therefore, the idea of developing and implementing a mobile E-School application arisen. Developing a mobile E-School application is a quite simple objective, but in case it is done appropriately, it will bring a totally new level of knowledge and evolution (Kohpare, Raut, Ashtankar, Awachat, & Shambharkar, 2017; Tosheva, Stojkovikj, Stojanova, Zlatanovska, & Martinovski Bande, 2017).

1.1 Problem Statement

The current educational system in Moldova has become inadequate in meeting the needs of today's children. The digital era has arrived and people use technologies and innovations in most aspects of their lives and embrace all the benefits of the progress. Thus, the old system where everything is paper-based is an inefficient way to save and share important data. Moldovan school system is changing very slowly or is not changing at all. It is inadmissible in today's smart society, in which failure to progress means stagnation.

One major reason why the educational sector is suffering, likewise many other sectors in Moldova, is due corruption. Corruption, like an infectious disease, has spread from the governmental layers to the entire society, affecting the youngsters in major ways. In the year of 2017, according to the corruption perceptions index, Moldova obtained 31 points, on a scale from 0 to 100, where 0 is highly corrupt and 100 is very clean. It has placed Moldova on the 122nd place among 180 countries. This situation is only getting worse, for example in 2012, according to the same index Moldova had 36 points (Transparency International, 2017).

Due to the corruption, almost everything can be bought, including grades, merits, diplomas, or any other achievements in school. For example, based on personal experience, it often happens that children who have shown low attendance and low performance throughout a school year, suddenly appear to have inflated extraordinary grades by the end of the year. In addition, students often buy their school and university diplomas. This is one of the reasons why nowadays' diplomas have lost their value in the eyes of both local employers and foreign universities and organizations (Stimpovschii, 2016). As a consequence, Moldovan youth has extreme difficulties in being accepted at foreign universities and institutions across Europe or USA. They must prove their knowledge by passing several extra exams and tests, which would not be otherwise required for children coming from other countries (Fatkin & Titov, 2017).

Another example of corruption is the illegal taxes that parents pay in schools. Parents are forced to pay different inexistent taxes in order to ensure a higher quality of school experience for their children. They bribe school authorities and teachers in order to make sure that their children are treated well. For example, if a child experiences difficulties in

several subjects and is falling below the rest of the class, the bribe ensures that the teacher will pay more attention and will help the child. Focusing on struggling children should be a regular part of any teacher's job, except Moldovan teachers, who get miserable pay for their job and have 30 children to teach in each class. The bribe comes in several forms, such as paying for new school equipment, for the school repair, or even for teachers' laptops, and is often imposed by school authorities (Prime, 2017).

In the devastating school situation described above, it is difficult to blame the teachers. Teachers, like doctors and many other public workers, receive miserable wages that hardly allow them to make a living. In 2017, after an 11,3 % salary raise, the teachers with higher education had a salary of about 162 euros per month (1920 euros per year) (Guțu, 2017). It is problematic to hire professionals who will work for such money and will care enough to prepare strong scholars for the future life. The results of this situation are wistful and have a strongly negative effect on the educational level in general.

Teachers lose their motivation to teach, while students lose their motivation to learn. In a society where one's classmates put little effort and get positive results at school, it is understandable that one has little motivation to obtain honest accomplishments through hard work at school. Scholars' lack of motivation to learn is also partly related to the fact that they often do not live with their parents. According to a recent study of the migrant situation, more than 100.000 children in Moldova have either one or both parents working abroad (Jurnal de Chisinau, 2018). They see their parents once in few years, and the rest of time they are living with relatives or random people. Parents intend to offer a better quality of life to their children, by supporting their material needs. Their absence, however, has a negative effect on children psychological, emotional, and educational development. Parents are missing out their children's activities and school achievements. Children become irresponsible and have problems with discipline (Jurnal de Chisinau, 2018).

Children's low motivation to study has become a serious problem in Moldova. At the Moldovan baccalaureate exams from 2013, more than 28 thousands students participated, out of which 42% failed the exams (Ministerul Educației al Republicii Moldova, 2013). Such a striking result happened for the first time in the history of Moldova. It can be explained by the fact that, for the first time Ministry of Education has installed video cameras in every school where the baccalaureate exam was held. Moreover, in all

institutions where the Bacalaureate was held, there were assistants with metal detectors checking each child at the entrance. All children's mobile phones and other items of interest that could help the children cheat at the exam were confiscated by the assistants. Thus, it was almost impossible for the students to cheat or gain the correct answers in any other illegitimate way. This situation, in turn, opened a new business possibility for the teachers who develop the Bacalaureate exams. Now, bacalaureate exam is sold online on different social media giants, where for a specific pay, children have access to the exam ahead of time (Realitatea, 2017).

The bacalaureate incident has opened people's eyes to an emerging deficiency in the educational system that has been neglected for years. Children in Moldova do not benefit from a strong and efficient educational system and they are not helped by the government in a hasty manner. For example, children must learn from school materials that are of very low quality. Until the 1991 year, as Moldova was part of the Soviet Union, Russia decided that all children in Moldova had to learn by the Russian books. They simply translated their Russian books in the Romanian language. After the declaration of independence, the policies had radically changed, and the World Bank offered Moldova financial support, in order to elaborate new study materials similar to Romania's school books. It took Moldova about ten years to finally write and print new materials, when the political situation changed again, as Communists came to power. During their governance, from 2001 to 2009, Communists decided against the Romanian-type of books and installed the old Russian-type books back in the educational system. Nowadays, as the pro-European parties hold the power, they strive to change the education system towards a more European one. In conclusion, instead of improving the educational system from its roots and offering children a variety of high-quality tools and materials to learn from, the government uses inhumane and degrading measures such as confiscating children's phones during exams. In a constant economic and political instability, corruption, and injustice, it is comprehensible that children have lost interest and trust in their schools.

All of those endless problems must be stopped until it is not too late. If the school system radically changes and becomes transparent, efficient and trustworthy, the Moldovan children will be able to enjoy quality education and understand its value. This will open many doors and possibilities for the youth to grow and evolve, either at home or abroad.

1.2 The motivation for the research and research goals

The motivation for this research is to give the possibility to scholars and their parents to experience the advantage of new technologies in education. Firstly, the goal is to make information accessible to all parties in school –parents, children, and teachers. They all need to have easy access to the basic data, such as attendances, classes, upcoming events, exams, grading, and others. Thus, the main goal of this project is to give access to digital school information, for scholars, their parents, and teachers by means of a Mobile app. Next, another goal is to update the current futile situation and to introduce the children to the new and exciting world of technology in school. Children in Moldova deserve to experience the learning practices the same way as children in the majority of schools in the highly developed countries. This way, they will become more excited about their day to day school routine and, in case of traveling, they will be more comfortable to study abroad. The third goal is to facilitate learning for children who suffer from various disabilities or other health-related issues that often impede them to attend classes like other children. The app will facilitate all the information flow and will give them more possibilities for learning, such as, for instance, studying from home. Lastly, the goal is to install some transparency in the Moldovan educational system – information such as payments, attendances, grades, and so on will be more accessible and more difficult to fabricate than the way it is currently done in a paper-based system. An Indian professor of Educational Technology Sugata Mitra stated in one of his works that *“There will always be areas in the world where, for whatever reason, good schools and good teachers will not exist”* (Mitra, 2009). The researcher’s overall hope and the objective is to help Moldova avoid this destiny.

1.3 Research objective

In order to achieve the goals listed above, several objectives are followed. The first objective is to analyze the education system in Moldova and to identify its main deficiencies. The second objective is to identify parents’ perceptions about the current educational model, as well as their perceptions about a future digital education model by means of a survey. Thirdly, after combining the findings from the first two stages, the objective is to develop a simple and useful E-School mobile application prototype.

1.4 Research questions

In order to determine parents' perceptions of the current educational system in the Republic of Moldova and their perceptions about a future digital educational model, a survey was created to identify the following information:

How satisfied are people in Moldova with the current educational system?

This question will help the researcher understand if there is a need for changing the existing situation or not.

How satisfied are parents in Moldova with the current possibilities to access child's school data?

This question is one of the most significant for the research because there are few possibilities of information sharing in Moldovan schools. One way in which parents and teachers communicate is by the child's agenda, a paper notebook where parents verify the grades, attendance, and messages from teachers. The second one is the parents' meetings which are usually held once a semester. It means that by default, parents have limited information about their children.

Who will benefit from an E-School mobile application?

With this question, the intention is to define who will benefit from using a mobile E-School application. *Will it benefit parents who live abroad from the children? Will it help the disabled children? Will scholars benefit from it?*

What benefits an E-School mobile application will bring to the future educational system?

With this question, the intention is to understand what issues will be solved by introducing an E-School app and how it should be designed in order to become an ultimate tool for scholars, parents, and teachers in the near future.

1.5 Proposed solution

A mobile E-School application can manage to improve the school experience, by facilitating the communication flow between the children, parents, and teachers. First of all, there has to be an online system where all the study results are stored. This is crucial

for an accurate and fair assessment of students' work in school and eliminates the possibility to fabricate the information as it is done in a paper system. Moreover, due to migration problems described previously, parents often lack knowledge and access to information regarding what is happening to their children in school. So, a mobile E-School application with instant updates on attendance, grades, and events, will offer parents more opportunities to support their children proactively. The basic information that will be accessible in a digital form, will allow parents to know their children better, to offer timely support in difficult times and to celebrate success together. Furthermore, teachers need to be able to contact the parents in a timely manner, not once a semester at the final meeting with parents, but with every single important event arising in school. These and many other issues related to the lack of quick access to information can be solved with the proposed efficient mobile E-School application.

The app aims to be designed in a way to ensure mutual trust and care. It is designed for the children's sake and by no means does it aim to intrude on their privacy (Kirkman, 2014). The app is not a spying instrument, rather, it is to be treated as a means of quick information updates for all.

A simple information accessibility tool seems to be the basic part of any institution -there is nothing revolutionary in it per se. However, in a system that lacks this basic information accessibility and open communication, many other functional levels suffer stagnation. This paper proposes a mobile E-School app prototype, in order to tackle the fundamental shortcomings in today's education. Later, as this fundamental issue is fixed, there will be a place for changes in education on larger scales. Today, information technology has penetrated every aspect of human life and it is unreasonable to deprive children of the countless benefits of the digital society.

2 Literature review

The African-American minister and human rights activist Malcolm X once said: *“Education is the passport to the future, for tomorrow belongs to those who prepare for it today”* (X, 1964). Education is a driving force, so important, that even from the early age, children start preparing for the school years. A study has shown that children who attend preschool, feel much more comfortable at school, and have a higher chance to graduate from high school (Entwisle, 1995). This illustrates that the educational system has to be well-developed from the very first years of life. Providing powerful education that offers the necessary knowledge and skills to the children, is a fundamental step in developing a bright future, mainly for the individuals as well as for the country as a whole (Woessmann, 2016). For example, with the help of the Organization for Economic Cooperation and Development’s (OECD) involvement, Mexican children have shown a 33 score-point increase in the mathematics performance in the years from 2003 to 2009. This has been the largest absolute increase in the mathematics field up-to-day in Mexico (OECD, 2013). Also, the country has shown the largest decrease of low performers in level two of mathematics within the same period. Such results are possible due to an efficient effort in changing the educational system. Another success example is Ireland. On the worldwide education index, where “1” yields the highest score, Ireland goes from 0.533 points in the 1980’s to 0.887 points in the 2013 year. It shows that they have developed from a middle educational level to being among the top seven leaders in education worldwide (United Nations Development Programme, 2015). This outstanding outcome is explained by the fact that they see education as a central plank in their economic, social and cultural development, and invest much time, money and efforts into this field. Moreover, they support education by promoting science and technology in it (Department of education and skills, 2004).

A weak educational system, vice versa, impedes the development of a smart-nation and creates situations in which the incoming issues are heavier than the possibility to solve them (Barnaba, 2015). For example, because of the problems like outdated curricula, lack of professional teachers, corruption, low budgetary allocation, a biased system of

examination, lack of uniformity and some other factors, the future generation of children from Pakistan will continue having a low level of quality life. Issues like weak economy and problems in social, moral and political life still remain unsolved today (Ahmad, Rehman, Ali, Khan & Khan, 2014).

In order to achieve the most efficient results in the educational system, all the parties – scholars, parents, and teachers have to cooperate (Retallick, 2005; Killion, 2015). Teachers have to be active participants in the decision-making processes and strategies in schools (Kisumo, Osman & Ongeti, 2013; Wynn, 2010; Erişti, Kurt, & Dindar, 2012). Also, the heads of the school must be open to changes and innovations, and, more importantly, they must be open towards teachers' opinions and proposals. Mostly, it is crucial that parents and children are the drivers of the educational process – by offering feedback and proposing changes (Ceka & Murati, 2016; Menheere & Hooge, 2010; Graham-Clay, 2005). While investing the human capital in education is important, infusing technology in education might become a priority in today's fast-evolving digital society (Tiitola-Meskanen, 2014). New technologies are helping education to evolve (Di Paola, Pedone, & Pizzurro, 2013). They can make the system more efficient, transparent, fun, and easily accessible. Main benefits of the technology in education imply access, novel teaching and learning experience, value for money, accountability, reliability, entertainment, and many others (Saba, 2009).

One of the first countries which realized the absolute power of technologies in education was Singapore. Starting from the 1980s, Singapore began changing its educational system. They realized that in order to become world leaders they had to invest in the technology and in their future specialist who would be able to handle and create technology (Boon & Gopinathan, 2006). For example, they have implemented online annotation tools to analyze the visual texts in classrooms. The tools helped children analyze and make logical connections between visual aids and texts. Children's ideas and views about the class material became visible in real time for their classmates. In such way, they started to gain a mutual understanding of the topics and to develop communication and thinking skills (Yang, 2016). Nowadays, Singapore is one of the world's leaders in the educational system.

Another example of how technology is used in the education system is by improving scholars' achievement on exams and tests. For example, in 2002, a school from Oklahoma

used a Cognitive Tutor computer-based curriculum and found that scholars who learned to use that new technology, outscored scholars who used a traditional curriculum (Morgan & Ritter, 2002).

Technology also improves the quality of students' work. The Harvest Park Middle school discovered that pupils who use the computer when studying, have a better quality of work, greater volume, and higher motivation and engagement levels (Gulek & Demirtas, 2005).

An additional benefit of using new technologies in education is the possibility of individualized learning for the students with special needs. A study showed that children with dyslexia achieve better results while they use computer-based read-aloud support. Especially, they gain a considerable increase in the tests which are longer than 100 words. The explanation is that dyslectic children simply are terrified of massive texts and try to skip them, but if they have the chance to use read-aloud support and listen to the questions, then they are better able to concentrate and give the correct responses (Dolan, Hall, Banerjee, Chun & Strangman, 2005). Overall, technology offers a wide range of possibilities for individualized learning for children with special needs, because technology can be built and adapted for any needs (Adebisi, Liman & Longpoe, 2015).

Another benefit of using technology in schools is the acquisition of knowledge and skills that are applicable to other areas of life that use technology. Most of the workplaces today already require specialists who are familiar with new technologies and possess the necessary background for that. If scholars start using new technologies in schools, they will be prepared theoretically and practically for the future job market (Saba, 2009). Students from the study "Freedom to learn" believed that technology in education "*made it easier to do school work, made them more interested in learning, and would help them get better jobs in the future*" (Lowther, Strahl, Inan & Bates, 2007, p. 2, para. 3).

Nowadays, there is a large variety of mobile applications designed to help and motivate children in learning complex materials. They have a positive impact in raising motivation, attention, and interest for education in the scholars who use them (Scholz, 2016). Numerous mobile applications were developed to help children in learning mathematics and many of them had a positive result (Saba, 2009; Drigas & Pappas, 2015). For example, an Israeli school performed an experiment in learning math in an authentic mobile environment. Thirty-two scholars from the 8th grade used to learn math while

they had outdoor activities. The results showed that those scholars had more of independent and collaborative thinking in different life situations and the math learning process, in general, was faster and easier (Baya'a & Daher, 2009).

It is necessary to update the educational system by bringing new technologies in it, but unfortunately, people are often resistant to change. By default, change in any type of institution involves much resistance from people, as they try to remain within their comfort zone. Education, however, has always been one of the fields that embraced change the slowest as it strived to maintain its status quo (Tiitola-Meskanen, 2014). This happens because people still preserve the sentimental notion of schooling –the one-size-fits-it-all model, where children “*learn the same things at the same time in the same way from the same person in the same place for many hours every day*” (Tiitola-Meskanen, 2014, p. 297, para. 2). Unfortunately, the old type of schooling has become inadequate in meeting today's children's needs.

Today, reevaluating and experimenting with tools, forms, and techniques of learning, is essential within the irreversible technological progress. For example, at the time when China was preparing to enter into the World Trade Organization, it experienced a huge deficiency of English-speaking specialists. The Chinese old system of English learning, which was grammar-centered was not efficient and required urgent replacement. A team of experts developed new curricula and syllabi, which focused on developing practical skills, such as listening and speaking. Undoubtedly, reading and writing were also an important factor, but they were shifted to the second place. First of all, teachers had to change their teaching methods. They were introduced to the new teaching method called “The Lexical Approach”, which was proposed by the Michael Lewis in 1993. The idea of that method was that “Lexis is the basis of the language” and the best way to learn is to communicate (Shen, 2008). The change process was challenging itself, but there were some more impediments related to the learning environment and lack of appropriate tools. Schools had to buy tapes, various audio and visual aids and electronic equipment in order to fit the new model of teaching. After all, three years were needed to implement the new system and to gain visible results. Children's results advanced significantly in comparison to the results of children whose schools have not yet implemented the new system. The results of English language knowledge and skills testing were 72% versus 60% (Shen, 2008). The example above demonstrates that change is complicated, it takes lots of resources, such as time, money, and efforts, but it is an inevitable process nowadays

digital world. Change happens sooner or later but the timing is crucial, as to avoid stagnation and to yield stable results, change has to happen at its optimal time (Northwestern University Information Technology, 2011).

3 Methodology

The methodology of this study was chosen on the basis of Lewin's Change Theory. This theory has three main stages: unfreeze, change and refreeze. It means that change can happen only if the problem is firstly unfrozen. In this step, the deficiencies of the current model have to be revealed and perceived by the users of the model. The next step is to design a new strategy and to demonstrate how and why it is a better one. The final step is to freeze the new model. That step is needed because maintaining the change is one of the most difficult objectives, as people tend to return to the well-known models (Kritsonis, 2005). Figure 1 below demonstrates Lewin's Change Theory adapted to the specific educational change proposed in this paper.

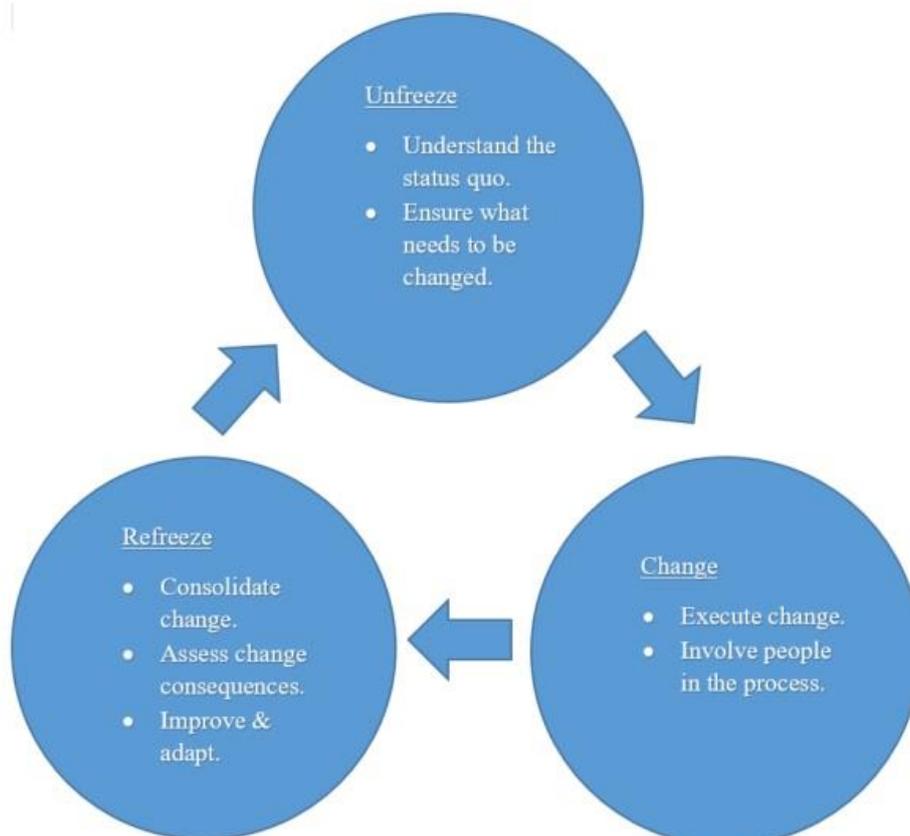


Figure 1. Lewin's Change Model: Practical Steps for a Digital School Change

The Lewin's Change Model was adapted for the purpose of the current research. According to this Model, the first steps to any change require understanding the status quo and acknowledging the need for change. For this purpose, a quantitative analysis based on surveys was used. For this analysis, the researcher distributed an online survey to a sample of parents whose children were school-aged. The survey was asking about the quality of studies and technology in their schools. The quantitative analysis of the results is used as a basis for building the service that is needed and useful for today's educational system.

The second step according to the theory is to elaborate a new solution that will improve the current situation. For this purpose, the researcher has designed a mobile E-School application prototype, which will expand the possibilities to access and use the school information. Scholars will be able to see their grades, attendance, homework and other relevant information on their smartphones. Parents will have fast access to their children's school information which will allow them to support scholars in their school years. Teachers will be able to talk with parents via the mobile application, in case of any problem that occurs at school. In that way, all the three parties will experience their own benefits from the change process.

The final third step that is described in the Lewin's theory of change, is to implement and to maintain the new technology in education. For this goal, people who are in charge of the changing process have to demonstrate all the advantages and to show all the benefits of the new system. That is done because people resist changes and if they have a chance to go back in the environment that is more familiar, they are tempted to do so. The Refreezing step in this particular case is impossible to fulfill without the government's support and the ministry of education's involvement. They have to show their interest in such a project and give the feasibility to implement this idea into life for the best interest of the citizens.

3.1 Data collection

The sample was composed of 68 parents whose children studied at one of the following public schools: Liceul Teoretic "Mircea Eliade", Liceul "Mihail Kogălniceanu" and Liceul Teoretic "Ion Creangă". Out of them, 47 were women (69.1%) and 21 were men

(30.9%). In the sample, 33.8% of the participants were under 30 years old, 32.4% were between 30 and 40 years old, 26.5% were between 40-50 years old, and 7.4% were over 50 years old. Moreover, 33.8% of the participants' children were studying at elementary school, 32.4% were studying at middle school, and 33.8% were studying in high school. Further, 76.5% of participants indicated that they had one school-age child in their family, 17.6% indicated two school-age children in the family, and 5.9% indicated three school-age children in their family. There were no respondents with more than 3 school-aged children. Out of them, 39.7% were from Liceul Teoretic "Ion Creangă", 38.2% of scholars were from Liceul Teoretic "Mircea Eliade", and 22.1% were from Liceul "Mihail Kogălniceanu".

The questionnaire was distributed electronically through the online survey software SurveyMonkey. Data were collected during the period from February 2018 to April 2018. Respondents were encouraged by their school professors to participate in the survey. The researcher contacted the three school principals in the month of January, asking permission to conduct the study and requesting help in the distribution of the survey link to professors, and ultimately, to parents. During meetings with parents, professors asked the interested parents who spoke English to leave their email addresses for further contact. The lists of emails were further emailed to the researcher, who contacted the parents. Next, all the participants received an e-mail from the researcher, informing them that participation was voluntary and guaranteeing the anonymity and confidentiality of the data, which was used exclusively for scientific purposes. The message also contained a link redirecting users to the designed web-link where they could fill out the relevant form and submit their answers. Out of 122 interested participants who gave their email addresses for a future contact, 68 parents completed the survey, which made it a response rate of 55.7%.

3.2 Measurement

The "Mobile E-School App Survey" was created by the researcher of this study. The survey included a total of 12 items in the English language, six of which asked the participant's perception about the current educational model (CEM) in Moldova, and other 6 items asked about perceptions about the digital educational model (DEM) for the future educational system in Moldova. Sample items are: "I am satisfied with the current

possibilities to access my child's school information" (CEM), "I would like to have the possibility to pay my child's school expenses through a mobile application" (DEM) and "I think that a mobile application will facilitate the information flow between me and my child's professors" (DEM) (see Appendix 1). The time required to complete the questionnaire was approximately 7 minutes, taking into consideration the language factor. The first subscale that assessed the perceptions regarding current educational model (CEM) showed high levels of internal reliability of .941. The internal reliability for the second subscale that assessed perceptions about a digital educational model was .909.

3.3 Hypotheses

Hypothesis 1: People are generally dissatisfied with the current educational model.

Hypothesis 2: People believe an E-School Mobile app will benefit the current educational system.

Hypothesis 3: There is a strong negative correlation between the current educational model and the digital educational model. In other words, the less people are satisfied with the current educational model, the more positive they will be about implementing an E-School Mobile app.

4 Analysis & Results

4.1 Analysis

The IBM SPSS 23 statistical analysis software was used to analyze the data. A test of reliability was performed in order to ensure that the created survey's subscales had internal reliability and assessed what they were supposed to assess. Descriptive statistics with frequency histograms were performed in order to have a clear understanding of the data's tendencies (H1 and H2). A test of normality was performed in order to assess whether the data were normally distributed. Next, a factor analysis was run to identify the scale's factorability. A Spearman's correlation was conducted to examine if there was a relationship between the two constructs: current education and future application (H3). Additional correlations including demographic items were assessed.

4.2 Results

Reliability. Cronbach's alphas (α) were determined to measure the internal consistency for the subscales used in the study. The Current Educational Model (CEM) subscale yielded $\alpha=0.941$. The Digital Education Model (DEM) yielded $\alpha=0.909$.

Factor Analysis. The factorability of the 12 Mobile E-School App Survey items was examined. Several well-recognized criteria for the factorability were used. Firstly, it was observed that 6 out of 12 items: 1, 2,5,7,9, and 10 correlate at least at .5 level with one another, suggesting reasonable factorability. Meantime, items 3, 4, 6,8,11, and 12 correlate with each other at least .3 level. The fact that the current scale measures 2 factors is also apparent in the scatterplot which clearly shows two distinct factors above the eigenvalue of 1 (see Appendix 2). Secondly, the Kaiser-Meyer-Olkin measure of sampling adequacy was .88, above the commonly recommended value of .6, and Bartlett's test of sphericity was significant ($\chi^2(66) = 1094.13, p < .01$) (see Appendix 2). Finally, the analysis showed a total variance explained of 83.7 %. Given these overall indicators, factor analysis was deemed to be suitable for all 12 items.

Normality. Shapiro – Wilk test for normality was performed on CEM and DEM instruments. The results for all the instruments yielded significant results ($p < .001$), meaning that the data were not normally distributed. The skewness of CEM = 2.457 and kurtosis = 5.128. The skewness and kurtosis of DEM were the following: -2.129 and 3.572 respectively. The CEM subscale was positively skewed, while the DEM was negatively skewed scales were negatively (see Appendix 3).

The fact that the data was not normally distributed led to the decision to use non-parametric tests.

Descriptive Statistics. Participants’ perceptions of the current educational model and the benefits of the digital educational model can be easily assessed from the descriptive data in Table 1. The frequency distribution of participants’ responses to survey questions can be examined in Table 2 and Table 3 below.

Table 1. *Descriptive Statistics.*

| Descriptive Statistics | | | | | | |
|-------------------------------|-------------------------|-------------------------|--------|--------|------------------|--|
| | CurrenEduModel (CEM) | FutureEduModel (DEM) | Gender | Age | EducationalLevel | |
| N Valid | 68 | 68 | 68 | 68 | 68 | |
| Missing | 0 | 0 | 0 | 0 | 0 | |
| Mean | 1.6495 | 4.3725 | 1.6912 | 2.0735 | 2.0000 | |
| Median | 1.3333 | 4.6667 | 2.0000 | 2.0000 | 2.0000 | |
| Skewness | 2.457 | -2.129 | -.846 | .386 | .000 | |
| Std. Error of Skewness | .291 | .291 | .291 | .291 | .291 | |
| Kurtosis | 5.128 | 3.572 | -1.323 | -.893 | -1.546 | |
| Std. Error of Kurtosis | .574 | .574 | .574 | .574 | .574 | |

Table 1 shows that, on a scale from 1 to 5, participants rated their satisfaction with the current education model on the lower end ($M=1.64$). Meanwhile, participants rated their desire for an E-School Mobile App on the higher end ($M=4.37$).

Table 2. *The frequency distribution of participants' perceptions of the current educational Model.*

| | | Current Education | | | |
|--------------|----------------------------------|--------------------------|--------------|------------------|-----------------------|
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | strongly disagree | 3 | 4.4 | 4.4 | 4.4 |
| | 1.17 | 7 | 10.3 | 10.3 | 14.7 |
| | 1.33 | 33 | 48.5 | 48.5 | 63.2 |
| | 1.50 | 8 | 11.8 | 11.8 | 75.0 |
| | 1.67 | 7 | 10.3 | 10.3 | 85.3 |
| | 1.83 | 2 | 2.9 | 2.9 | 88.2 |
| | partly agree, partly disagree | 1 | 1.5 | 1.5 | 89.7 |
| | 3.17 | 1 | 1.5 | 1.5 | 91.2 |
| | 3.50 | 1 | 1.5 | 1.5 | 92.6 |
| | 3.67 | 3 | 4.4 | 4.4 | 97.1 |
| | 4.50 | 2 | 2.9 | 2.9 | 100.0 |
| Total | | 68 | 100.0 | 100.0 | |

Table 2 shows that 60 participants out of 68, which makes it a total of 85,3 % responded on the lower end to the items about the adequacy and information availability in the current education system, staying within “strongly disagree” and “somewhat disagree”. Eight participants, the remaining 14,7 % rated their satisfaction with the current education model and data availability 3 out of 5 or higher.

Table 3. *The frequency distribution of participants' perceptions of the digital educational Model.*

| | | Digital Education | | Valid | Cumulative |
|----------------|-------------------------------|--------------------------|---------|---------|------------|
| | | Frequency | Percent | Percent | Percent |
| Valid | somewhat agree | 1 | 1.5 | 1.5 | 1.5 |
| | 2.33 | 1 | 1.5 | 1.5 | 2.9 |
| | 2.50 | 2 | 2.9 | 2.9 | 5.9 |
| | 2.83 | 3 | 4.4 | 4.4 | 10.3 |
| | partly agree, partly disagree | 1 | 1.5 | 1.5 | 11.8 |
| | 3.67 | 1 | 1.5 | 1.5 | 13.2 |
| | 4.17 | 2 | 2.9 | 2.9 | 16.2 |
| | 4.33 | 9 | 13.2 | 13.2 | 29.4 |
| | 4.50 | 6 | 8.8 | 8.8 | 38.2 |
| | 4.67 | 32 | 47.1 | 47.1 | 85.3 |
| 4.83 | 5 | 7.4 | 7.4 | 92.6 | |
| strongly agree | | 5 | 7.4 | 7.4 | 100.0 |
| Total | | 68 | 100.0 | 100.0 | |

According to Table 3, seven respondents out of 68, which makes it a total of 10,3 % responded on the lower end to the items about the need for implementing the App for the future educational system, staying within “strongly disagree” and “somewhat disagree”. Sixty-one participants, a total of 89,7% rated their agreement with the need for the E-School app in the future education model 3 out of 5 or higher. Based on the descriptive data represented below, Hypothesis 1: People are generally dissatisfied with the current educational model and Hypothesis 2: People believe an E-School Mobile app will benefit the current educational system are supported.

Spearman Correlation. To test the third hypothesis – that there is a strong negative correlation between the current educational model and the digital educational model – the non- parametric Spearman's correlation was calculated. The analysis showed that there was a strong negative correlation between CEM and DEM, $r_s = .927$, $p < .001$, (see Table 4). The hypothesis was supported.

Table 4. *Correlations between Current Educational Model and Digital Education Model.*

| | | Current EduModel | Digital EduModel |
|----------------|-------------------------|---------------------|---------------------|
| Spearman's rho | CurrentEduModel | | |
| | Correlation Coefficient | 1.000 | .927** |
| | Sig. (2-tailed) | . | .000 |
| | N | 68 | 68 |
| | DigitalEduModel | | |
| | Correlation Coefficient | .927** | 1.000 |
| | Sig. (2-tailed) | .000 | . |
| | N | 68 | 68 |

** . Correlation is significant at the 0.01 level (2-tailed).

4.3 Bonus Questions

The designed survey had one bonus question. It asked parents what school-related information they perceive as the most necessary to know about their child (see Appendix 4). Parents could choose from the following options –Grades, time-table, events, e-materials, attendance, teacher’s feedback and another option, with a text box where they could to write their own alternative response. From all the respondents, 75 % selected the grade option, followed by the attendance on the second place with 27, 94 %, and thirdly, with 1, 47 % parents selected the teacher’s feedback option. These results show that information on grades and attendance present the most interest for parents. Teacher’s feedback is also necessary, while the rest of data like the timetable, events, and e-materials apparently is not in high demand. This may be explained by the fact that parents are not yet used to have access to such kind of information and have difficulties visualizing it in a digital form.

5 Solution

A Mobile E-School application will increase the amount of information and its accessibility and will facilitate the communication flow between the scholars, teachers and their parents. We developed a mobile application in which all the necessary school information is displayed. This mobile application gives access to the needed information, in a very clear, intuitive and comprehensive way. E-School mobile application is mainly designed for scholars and their parents, of course, it will be also an effective tool for teachers who will be able to conduct the educational process as it has to be. They will be able to check the attendance list, input the grades, home assignments, additional reading lists, feedback and comments, and many others in a timely and convenient manner. From the first screen of the application, the user can select one of three possible languages. These languages are Romanian, English, and Russian. By default, the main shown language is Romanian. Next, the user can choose one of three possible types of account. The first type of account is “Student”. The second type is “Parent”. The third type is “Teacher” (see Figure 2). After selecting one of these accounts, the user will log into the mobile application.



Figure 2. The homepage of application.

5.1 Student account

For the log into the “Student” account, the user will have to input school email address and the password which was created on the first usage of the app. If the scholar is using this app for the first time, he/she will have to sign up. For that, the user will input four parameters: First name, Last name, School, and Password. To finalize the Sign Up process, the user will press the “Register” button.

After a sign in or sign up the process, the scholar will see the main screen of an application with nine subcategories (see Figure 3):



Figure 3. Student's main page

5.1.1 Grades

In this subcategory, the scholars have the possibility to check the current general average for all the classes and to see all their grades for any lessons or exams on any given date. In this subcategory, the scholars initially see the full list of courses they are enrolled in. After selecting the course of interest, the app will redirect to a table with dates and grades received up to that point in the semester.

5.1.2 Time-table

In this subcategory, the scholars see the following information for any of the five school-days: time, lesson (e.g. math) and room number. Initially, the scholar sees five boxes: Monday, Tuesday, Wednesday, Thursday, and Friday. By clicking on any day of the week, the app redirects to a timetable that shows the classes on that day, the time of each class and the room number where each class is held.

5.1.3 Homework

In this subcategory, the scholars see their homework for the next class, the exact time of the next class and also the room where the class will take place. Firstly, on the screen appear all the courses that the scholar has in the semester. By clicking on the course, the scholars can see their homework assignment for the next class, as well as the room number and the time of that class.

5.1.4 Attendance

In this subcategory, the scholars see a calendar, where the absences are represented by either a green or a yellow square. If the scholars click on the square, they can see if the absence was motivated by the parent or not. The green square means that the absence was approved by the parent and red one means that the absence has not yet been approved by the parent. Students can use the arrows in the upper left and right corners to see the absences for the other months (see Figure 4).



Figure 4. Attendance calendar

5.1.5 Events

In this subcategory, the scholars see the information about the upcoming school events. These can be special courses, focus groups, reading classes, and many others. Scholars see the concrete date and the name of the upcoming event in a chronological order.

5.1.6 Materials

In this subcategory, the scholars see the needed e-books/journals/PDFs/presentations/documents and other types of digital files that help them in the learning process. These files are categorized for each course separately. Initially, the list of courses appears on the screen, and by choosing any course, for example, History, the scholars see a list of materials uploaded by the teacher of that course.

5.1.7 Settings

In this subcategory, the scholars can change some parameters like the password, the language of the application, notifications status, text size, text font.

5.1.8 Message

In this subcategory, the scholars can see the incoming messages from the teachers. Also, the scholars are able to reply to the message. These messages can be either feedback, notifications of updates, and are stored in two different categories: new messages and old messages.

5.1.9 My Profile

In this subcategory, the scholars see the information that is displayed for the teachers. This includes information like Name, Surname, Country, City, Address, School, Age, and Class.

All the nine types of data described above will make the learning process simpler and much more interesting for the children. They will have more time and strengths to devote to learning rather than wasting it on searching for the basic information.

5.2 Parent account

For the “Parent” account, the users have to input their email address and password. In case of sign up, the users have to complete a two-step registration process. The first step is to input the name, surname, e-mail, ID, and password. Next step will require the parent to insert the bank card details. This step will allow mobile payments for the children’s school expenses. There will be no more hidden payments -all the payments will be saved in the app. After completing the two-step registration, “Parent” users are able to see the Daily Overview of their child. The daily overview displays the grades, attendance, and messages from the teacher (if there is any) for that specific day (see Figure 5). Next, the parent can see the full situation of their child, by clicking on the “More Information” button.

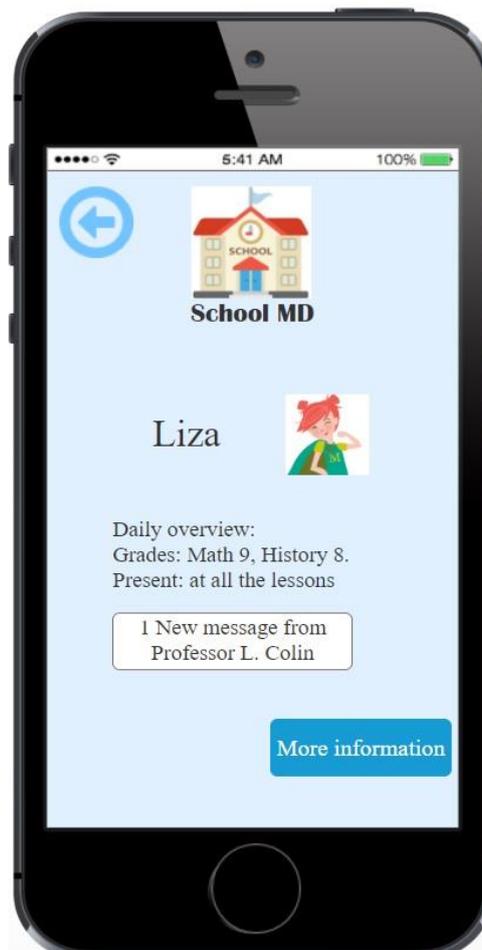


Figure 5. Daily overview for parents

On this screen, the “Parent” users see almost the same information as the student (Grades, Time-table, Homework, Attendance, Events, and Materials), but there are two more types of data that is displayed only for the “Parent” user. These subcategories are Messages from Teachers and Payments. Note, there are small changes in the Attendance subcategory. The parent user is able to add a reason for the child’s absences. If there is no reason or the parents does not know why their child missed a class, the absences in the calendar will remain red. In case the reason is added, the absence will automatically change its colour to green.

5.2.1 Messages from Teachers

In this subcategory, the parent users can receive and reply to messages from the teachers. The messages are aligned chronologically and are stored in two different categories: new messages and old messages.

5.2.2 Payments

In this subcategory, parent users are able to pay different school expenses. The paid expenses are displayed in green colour (see Figure 6). Also, the main payment details, such as payment status, the total amount in Moldovan currency (Lei), and the date of the transaction is available on the screen. The pending transactions are displayed in red colour.



Figure 6. Mobile payments

Notifications. If the parent users have not logged in the app during the entire day, in the evening the parent users receive a short notification message: “Click here for your child’s day overview” that redirects the parent users to the daily overview which appears normally right after the login.

5.3 Teacher account

For the teacher account, the users input their school email and password. In case the users are new, they need to sign up for the application. For this, the users input their first name, last name, school, school email address, and password. Next, the users press the “Register” button and enter into the Teacher account. On the main teacher screen, the users see all the classes that they teach (10B, 9A, etc.), a settings button, and “my profile”

information. After selecting a specific class, the teachers see six subcategories: Attendance & Grades, Homework, Materials, Events, Timetable, and Messages.

5.3.1 Attendance & Grades

In this subcategory, the teachers select from the table the needed scholar and can input the information about attendance and grade.

5.3.2 Homework

In this subcategory, the teachers have a standard form which contains the next date of the lesson and the text-box where the homework should be specified.

5.3.3 Materials

In this subcategory, the teachers upload needed digital files to the application. These files automatically appear in the materials section in the student and parent account. These materials are aimed to help students to prepare for the next lesson.

5.3.4 Events

In this subcategory, information is the same as for the students and parents, except there is a possibility to add new events to the main list.

5.3.5 Timetable

In this subcategory, the teachers verify their timetable. The displayed information is day, class and room of the lesson.

5.3.6 Messages

This subcategory, one of the most important for the teachers, offers the possibility to write messages to students and their parents.

The proposed mobile application is continuously developing and improving, thus, new features will be created and implemented.

5.4 Needed resources and Implementation process

The educational system of Moldova can begin its journey to development today. The major players in this process are the ministry of education and the government. They need to understand the purpose of introducing the app in schools and to define if they are ready to support this change as it requires a decent amount of resources.

First of all, the government has to supply all the schools with the needed equipment. For example, all the teachers must be furnished with a smartphone, as the proposed prototype has to be programmed for the Android and iOS platforms. This prototype is fully working, with all the connections done, so it only has to be duplicated for the main mobile platforms.

Second, the government has to support all the costs of the app design and implementation. Access to the mobile application has to be free of charge in all schools in Moldova. Initially, the schools must gain access to the app and in time, additional features will be implemented gradually. The app features should be equal across all schools. Every school that is connected to this mobile application, requires few preceding actions.

Lastly, the ministry must be capable of storing all the digital data on their servers. In such way, all the schools, regardless of their geolocation, offer the same quality of education for its scholars. Such an approach will allow improving not only elite private schools but the whole educational field on the country level. Additionally, the transparency issue can be diminished, as all the school information is stored securely in the digital space and cannot be easily manufactured.

5.5 Prototype development

The mobile application prototype was fully designed by the researcher. It was made with the help of Axure RP 8 software (see Appendix 5). It contains over 150 pages and hundreds of connections.

6 Discussion

The current paper demonstrates how a strong educational system supports a country's evolution and, to the contrary, weak education stagnates a country's development. The paper describes the benefits of new technologies, especially the assets of technology in the educational field. Specifically, the work discusses the impact of mobile applications on the children achievements and on the school advance in general.

The current paper reviewed extensively the current situation in the Moldovan educational system. The existing issues and obstacles were identified, demonstrated and argued. The aim of the paper was to identify what are the major issues in the Moldovan educational system and to determine how they can be solved. For that, Lewin's theory of change and a small survey were used.

Lewin's theory of change shows that change happens in a three-step process. The first step is to unfreeze the current situation and to identify the issues that can be solved in the change process. In the case of education, it means that from the beginning the issues have to be identified and a future solution must be proposed. The second step is to change the existing situation with a new and efficient one. In this step, the researcher designed a mobile E-School application prototype that can solve the majority of the identified issues. The third step is to freeze this new technology by learning and helping the involved parties to use and enjoy the benefits of easy data access. For the last step, there is a need for support from the government's and the schools' side to make this change possible.

On the practical side, the survey proved that there is a need for a change in the Moldovan educational system and that parents are waiting for a mobile application which will make their life easier. This survey pulled out a crucial correlation, which showed that parents who rate the current educational situation with the lowest rates have the highest interest in the development of the future mobile application. The survey showed that most parents, 85,3%, are dissatisfied with the current availability of information in schools and 89,7% of parents believe the Mobile E-School app will benefit them and their children.

Besides, there have been found some curious additional correlations. First of all, the results showed that older parents (age 50 and older) are not as interested in the

development of the mobile application as the younger ones (ages 20- 50). It can be explained by the fact that the older parents have older children who are close to graduating and they are not so interested in the educational system at this point. For them, school years of their children are almost over and the benefits of an E-School mobile application are minimal.

On the other hand, young parents, whose children study in the elementary school, want the new mobile application and believe that it can facilitate their lives for many years to come. Also, youngsters adore new technology and feel comfortable with it, and they understand its full range of benefits.

Another interesting finding is that older parents (50 years old and older) rate the current situation in the education a little higher than the young parents. It can be explained in few ways. First, as supported by research, people are nostalgic about the old ways one-size-fits-it-all methods of education (Tiitola-Meskanen, 2014). The old-fashioned system is comfortable and familiar, in contrast to the complex and technological new one. A second explanation is that older people are more dependent on the current political situation, as they have fewer options to move abroad or make radical life changes. Thus, they might not feel comfortable to express dissatisfaction or disagreements with the status quo. Young parents are not so attached to the country as older parents, contrariwise they tend to change the habitat in order to ensure a better life for their children. That is why they express their views with no fear. Additionally, young parents have a more accurate overview of the current situation. They are used to reading and verifying information from different sources, as they have been affected by the technological development from the recent past.

The paper proposed that people are generally dissatisfied with the current educational model (H1) and that people believe an E-School Mobile app will benefit the current educational system (H2). More importantly, the researcher proposed that the lower is parents' satisfaction with the current educational model, the more positive they will be about implementing an E-School Mobile app (H3). In the process of analyzing the results of the survey, all three hypothesis has been supported.

As research has demonstrated, technology is a vital factor in education. It is an undeniable part of any highly developed school system. That is why, the researcher developed a mobile E-School application prototype, where most aspects can significantly improve the

current educational system. This mobile application has the possibility to give the necessary amount of information for three types of users. The first type of user is the student. This user can see nine categories of information. These categories are – grades, timetable, homework, attendance, events, materials, settings, messages and own profile. The second type of user is the parent. This user can see on the main screen the daily overview of his/her child. On the next screen, the parent users can see almost the same categories as the student users, and additionally, they see the payment and teachers messages category. One more option is that the parent users can add a reason for missing in attendance calendar of his/her child. The third type of user is the teacher. This type of user has the possibility to add and edit information in the listed above categories of information. For example, a teacher user can add and edit children's grades, can write the homework for the next lesson, and can upload different e-materials that will be useful for scholars. Also, the teacher will have the possibility to send quick messages to parents. All of these elements will make the learning process easier for all three parties.

7 Limitations and suggestions for future work

When interpreting the results of the study, it is necessary to address a number of limitations. First of all, the sample size is modest –it consists of only 68 participants. A larger sample size could give a different and more precise overview. Second of all is that participants (parents) were from three different schools. A larger number of schools could offer a more generalizable overview. And the third limitation is that the study was conducted in an online platform, which does not offer possibilities for clarifying parents' inquiries related to the survey items.

There can be multiple suggestions for future work as technology is constantly evolving. This mobile application will continuously get new updates with new features. Soon, there will be a possibility to view all the lessons in video or in the audio format, depending on the content. This feature will help scholars who are ill or are unable to come to school due to any other reasons to learn the needed materials from any place in the world.

Also in future updates, there will appear a star-rating for the scholars, this feature will add a play and competition feeling especially for the smaller children. A star will be added to children's profile for some help in school. For example, a star will appear if the child helped to scan an old chemistry book and now it is available in digital form for the rest of the school. That interaction will make children more interested in the app. Also, it will offer some benefits to the school.

One more feature will include the possibility for the children to fully personalize their app, for example, by changing the background screen, changing colours, and many others. Children like to express their unique personalities, and it will be great if they have this option in the app.

Another idea for the future work is to add some games for the memory or development of logic, depending on the age of the child. Games like Sudoku and puzzles have proved to develop children's abilities, such as problem-solving, memory development, abstract thinking and others (Myers, 2011). These and many other games can be implemented in the future application.

8 Conclusion

Education is one of the main pillars of tomorrow's smart society. Countries have to invest in schools because this is the only way to raise specialists who know how to handle new technologies and are able to keep up with new technology. Moldova has paused its improvements in educational system and continues to regulate schools like in the Soviet Union times. This approach does not allow the country to develop properly. One of the most influential and appropriate decisions that can bring positive outcomes is to invest in technologies and to use them in the educational system.

Nowadays, with all the new technologies and innovations that have been designed to facilitate and support children's school years, it is inefficient and simply unacceptable to learn with the old-fashioned methods. In addition, access to the school information has to be fast, easy and clear, and for that aim, the digital data is needed. Scholars, their parents, and teachers will benefit from the use of new technologies in schools. Different studies demonstrate that the use of technology in education is the right direction for future welfare, both for the individuals and for the countries where they live.

The points described above reveal the reason why this study has been originated –out of the concern for own's country's development. The results that were obtained from this research, were used to develop a useful and powerful tool which can bring new possibilities for children, parents, and teachers from Moldova. This tool, which is a mobile E-School application, gives them access to the needed information in a digital form.

Overall, the research showed that people are not satisfied with the current educational system and that they desire a change to happen. Based on the people's needs and wishes, the mobile E-School application prototype was designed. Now it is the governance turn to make decisions which will prompt the long-awaited changing process.

References

- Adebisi, R.O., Liman, N.A., & Longpoe, P.K. (2015). Using Assistive Technology in Teaching Children with Learning Disabilities in the 21st Century. *Journal of Education and Practice* 6(24), p. 14-20.
- Ahmad, I., Rehman, K., Ali, A., Khan, I., & Khan, F.A. (2014). Critical Analysis of the Problems of Education in Pakistan: Possible Solutions. *International Journal of Evaluation and Research in Education* 3(2), p. 79-84.
- Barber, M., & Mourshed, M. (2009). Shaping the Future: How Good Education Systems Can Become Great in the Decade Ahead. *Report on the International Education Roundtable*, p. 7-27.
- Barnaba, B.J.E. (2015). A Scholar of the Practice in International Development Management, Governance and Social Policy. *Examining the Contemporary Status of an Education System: The Case of the Republic of South Sudan*, p. 1-10.
- Baya'a, N., & Daher, W. (2009). Students' Perceptions of Mathematics Learning Using Mobile Phones. *IMCL International Conference on Mobile and Computer aided Learning*, p. 79-87.
- Bertheussen, B. A. (2014). Digital School Examinations: An Educational Note of an Innovative Practice. *International Business Research* 7(6), p. 129-139. doi: 10.5539/ibr.v7n6p129
- Boon, G.C., & Gopinathan, S. (2006). The Development of Education in Singapore since 1965. *Asia Education Study Tour for African Policy Makers*, p. 1-59.
- Botha, R.J.N. (2010). School effectiveness: Conceptualising divergent assessment approaches. *South African Journal of Education* 30(1), p. 605-620.
- Ceka, A., & Murati, R. (2016). The Role of Parents in the Education of Children. *Journal of Education and Practice* 7(5), p. 61-64.

- Department of education and skills, (2004). A Brief Description of the Irish Education System. Retrieved from <https://www.education.ie/en/Publications/Education-Reports/>
- Di Paola, F., Pedone, P., & Pizzurro, M. R. (2013). Digital and Interactive Learning and Teaching Methods in Descriptive Geometry. *Procedia - Social and Behavioral Sciences* 106, p. 873-885. doi: 10.1016/j.sbspro.2013.12.100
- Dolan, R. P., Hall, T. E., Banerjee, M., Chun, E., & Strangman, N. (2005). Applying principles of universal design to test delivery: The effect of computer-based read-aloud on test performance of high school students with learning disabilities. *Journal of Technology, Learning, and Assessment*, 3(7), p. 5-32.
- Drigas, A.S., & Pappas, M.A. (2015). A Review of Mobile Learning Applications for Mathematics. *International Journal of Interactive Mobile Technologies* 9(3), p. 18-23. DOI: 10.3991/ijim.v9i3.4420
- Entwisle, D.R. (1995). The Role of Schools in Sustaining Early Childhood Program Benefits. *The Future of Children Long-term outcomes of early childhood programs* 5(3), p. 133-144.
- Erişti, S. D., Kurt, A. A., & Dindar, M. (2012). Teachers' Views about Effective Use of Technology in Classrooms. *Turkish Online Journal of Qualitative Inquiry*, 3(2), p. 30-41.
- Fatkin, Y., & Titov, V. (2017). Pentru a majora salariile, Ministerul Educației va închide mai multe școli. *Sputnik*. Retrieved from <https://sputnik.md/moldova/20170112/10744612/salarii-majorare-sindicate-cristina-boaghi.html>
- Graham-Clay, S. (2005). Communicating with Parents: Strategies for Teachers. *School Community Journal*, 16(1), p. 117-129.
- Gulek, J. C. & Demirtas, H. (2005). Learning with technology: The impact of laptop use on student achievement. *Journal of Technology, Learning, and Assessment*, 3(2), p. 5-38.
- Gutu, L. (2017). Profesorii din Moldova au cel mai mic salariu în comparație cu colegii lor din UE. De 37 de ori mai mic decât în Luxemburg. *Diez*. Retrieved from <http://diez.md/2017/10/16/infografic-profesorii-din-moldova-au-cel-mai-mic-salariu-comparatie-cu-colegii-lor-din-ue-de-37-de-ori-mai-mic-decat-luxembrug/>

- Jurnal de Chisinau, (2018). Peste 100 de mii de copii au unul sau ambii părinți plecați la muncă peste hotare. Retrieved from <http://www.jc.md/parintii-pleaca-in-grija-cui-raman-copiii/>
- Killion, J. (2015). High-quality collaboration benefits teachers and students. *Journal of Staff Development*, 36(5), p. 62-64.
- Kirkman, J. (2014). Building a culture of trust: Trust in the use of educational technology. *Australian Educational Computing* 29(1), p. 1-11.
- Kisumo, C. C., Osman, A., & Ongeti, K. (2013). School Culture: Implications to School Improvement and Performance in National Examinations in Kenya. *Journal of Emerging Trends in Educational Research and Policy Studies* 4(1), p. 94-99.
- Kohpare, U., Raut, S., Ashtankar, K., Awachat, A., & Shambharkar, S. (2017). E - School Android Application. *International Journal for Innovative Research in Science & Technology*, 3(10), p. 26-29.
- Kritsonis, A. (2005). Comparison of Change Theories. *International journal of management, business, and administration* 8 (1), p. 1-7.
- Krumsvik, R. (2012). The Digital School and teacher education in Norway. *Jahrbuch Medienpädagogik* 9, p. 455-480. doi.org/10.1007/978-3-531-94219-3_20
- Lowther, D.L., Strahl, J.D., Inan, F.A., Bates, J. (2007). Freedom to Learn Program, Michigan 2005-2006 Evaluation Report Prepared for the Freedom to Learn and the One-to-One Institute. *Center for Research in Educational Policy*, p. 1-69.
- Mehdipour, Y., & Zerehkafi, H. (2013). Mobile Learning for Education: Benefits and Challenges. *International Journal of Computational Engineering Research* 3(6), p. 93-101.
- Menheere, A., & Hooge, E. H. (2010). Parental involvement in children's education: A review study about the effect of parental involvement on children's school education with a focus on the position of illiterate parents. *Journal of the European Teacher Education Network JETEN*, 6, p. 144-157.
- Ministerul Educației al Republicii Moldova, (2013). Examene și Evaluări Naționale. Retrieved from <http://aee.edu.md/content/comunicat-de-pres%C4%83>
- Mitra, S., (2009). "Can Technology Plug the Educational Divide?" *ScienceDaily*. Retrieved from <https://www.sciencedaily.com/releases/2009/03/090303102731.htm>

- Morgan, P., & Ritter, S. (2002). An experimental study of the effects of Cognitive Tutor® Algebra 1 on student knowledge and attitude. *Carnegie Learning, Inc*, p. 3-18.
- Myers, P. (2011). Why Puzzles Are Good for Your Child's Development. Child development institute. Retrieved from <https://childdevelopmentinfo.com/child-activities/why-puzzles-are-good-for-your-childs-development/#.Wu9usYiFM2w>
- Northwestern University Information Technology, (2011). Change Management Process. *Northwestern University Information Technology* 2(7), p. 3-24.
- Organisation for Economic Co-operation and Development, (2013). EDUCATION POLICY OUTLOOK MEXICO. Retrieved from <http://www.oecd.org/education/policyoutlook.htm>
- Power, C. (2014). Education development: importance, challenges and solutions. *The student economic review* 28(1), p. 149-157.
- Prime, (2017). Taxe ilegale în școli. ONG-urile vorbesc despre corupția din Educație. Retrieved from https://prime.md/ro/taxe-ilegale-in-scoli-ong-urile-vorbesc-despre-coruptia-din-educatie_60404.html
- Realitatea, (2017). Testele la BAC, de vânzare, pe rețelele de socializare! Cât costă itemii de la examenul la limba străină pe Odnoklassniki. Retrieved from <http://www.realitatea.md/testele-la-bac--de-vanzare--pe-retelele-de-socializare--cat-costa-itemii-de-la-examenul-la-limba-straina-pe-odnoklassniki--foto-59014.html>
- Retallick, J. (2005). Managing school success: A case study from Pakistan. *Leading & Managing*, 11(1), p. 32-42.
- Saba, A. (2009). Benefits of Technology Integration in Education. *EdTech* 501, p. 1-11.
- Scholz, C. L. (2016). A Study of the Application of a Bring Your Own Device Strategy in an Elementary School. *Walden Dissertations and Doctoral Studies*, p. 1-261.
- Shen, S. (2008). The Effect of Changes and Innovation on Educational Improvement. *International Education Studies* 1(3), p. 73-77.
- Stimpovschii, D. (2016). Educația din Republica Moldova este pe brânci. Elevii nu pot citi, diplomele se cumpără, iar profesorii sunt corupți. Retrieved from <http://moldnova.eu/ro/educatia-din-republica-moldova-este-pe-branci-elevii-nu-pot-citi-diplomele-se-cumpara-iar-profesorii-sunt-corupti-3442.html/>

- Tiitola-Meskanen, T. (2014). A Mobile School in the Digital Era: Learning Environment Ecosystem Strategies for Challenging Locations and Extreme Poverty Contexts. *Proceedings of the Annual Architectural Research Symposium in Finland*, p. 292-304.
- Tosheva, S., Stojkovikj, N., Stojanova, A., Zlatanovska, B., & Martinovski Bande, C. (2017). Implementation of Adaptive "E-School" System. *TEM Journal*. 6(2), p 349-357. doi:10.18421/TEM62-21
- Transparency International, (2017). CORRUPTION PERCEPTIONS INDEX 2017. Retrieved from https://www.transparency.org/news/feature/corruption_perceptions_index_2017#table
- United Nations Development Programme, (2015). QUALITY EDUCATION. Retrieved from <http://hdr.undp.org/en/content/education-index>
- Woessmann, L. (2016). The Importance of School Systems: Evidence from International Differences in Student Achievement. *Journal of Economic Perspectives*, 30(3), p. 3-32.
- Wynn, J. L. (2010). A study of selected teachers' perceptions of grade retention in a Florida school district. *Graduate Theses and Dissertations*, p. 1-226.
- X, M. (1964). Founding Rally of the Organization of Afro-American Unity. Retrieved from <http://www.blackpast.org/1964-malcolm-x-s-speech-founding-rally-organization-afro-american-unity>

Appendix 1 – Survey.

Please, check to what extent you are agreeing with the following sentences.

1. Strongly disagree
2. Somewhat disagree
3. Partly agree, partly disagree
4. Somewhat agree
5. Strongly agree

| | 1 | 2 | 3 | 4 | 5 |
|--|---|---|---|---|---|
| 1. I am satisfied with the educational system in Moldova. | | | | | |
| 2. I am satisfied with the current possibilities of accessing my child's school information. | | | | | |
| 3. I would like to have access to my child's school information in digital form. | | | | | |
| 4. I am willing to pay a certain fee to have access to all my child's necessary school information in a mobile form. | | | | | |
| 5. I am satisfied with the current possibilities of paying my child's school expenses. | | | | | |
| 6. I would like to have the opportunity to pay my child's school expenses through a mobile application. | | | | | |
| 7. I am satisfied with the amount of communication I currently have with my child's professors. | | | | | |
| 8. I think that a mobile application will facilitate the flow of information between me and my child's professors. | | | | | |
| 9. I am well informed about my child's attendance at school. | | | | | |
| 10. I am well informed about my child's success at school. | | | | | |
| 11. I would like to receive a daily overview of my child's success at school. | | | | | |
| 12. I think that the mobile application will improve the experience of school years for me and my child. | | | | | |

Appendix 2 – Factorability of the Mobile E-School App Survey.

Table 5. *Correlations among Survey items that load on Factor 1 (CEM).*

| Correlation Matrix | | | | | | |
|--------------------|-------|-------|-------|-------|-------|--------|
| | Item1 | Item2 | Item5 | Item7 | Item9 | Item10 |
| Item1 | 1.000 | .633 | .653 | .583 | .459 | .870 |
| Item2 | .633 | 1.000 | .934 | .887 | .794 | .673 |
| Item5 | .653 | .934 | 1.000 | .871 | .820 | .686 |
| Item7 | .583 | .887 | .871 | 1.000 | .798 | .659 |
| Item9 | .459 | .794 | .820 | .798 | 1.000 | .554 |
| Item10 | .870 | .673 | .686 | .659 | .554 | 1.000 |

Table 6. *Correlations among Survey items that load on Factor 2 (DEM).*

| Correlation Matrix | | | | | | |
|--------------------|-------|-------|-------|-------|--------|--------|
| | Item3 | Item4 | Item6 | Item8 | Item11 | Item12 |
| Item3 | 1.000 | .588 | .859 | .900 | .785 | .385 |
| Item4 | .588 | 1.000 | .567 | .533 | .599 | .697 |
| Item6 | .859 | .567 | 1.000 | .790 | .692 | .452 |
| Item8 | .900 | .533 | .790 | 1.000 | .746 | .449 |
| Item11 | .785 | .599 | .692 | .746 | 1.000 | .418 |
| Item12 | .385 | .697 | .452 | .449 | .418 | 1.000 |

Table 7. *KMO Measure and Bartlett's Test of Sphericity, indicating that the data is suitable for factor analysis.*

| KMO and Bartlett's Test | |
|--|--------------------|
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. | .882 |
| Bartlett's Test of Sphericity | Approx. Chi-Square |
| | 1094.127 |
| | df |
| | 66 |
| | Sig. |
| | .000 |

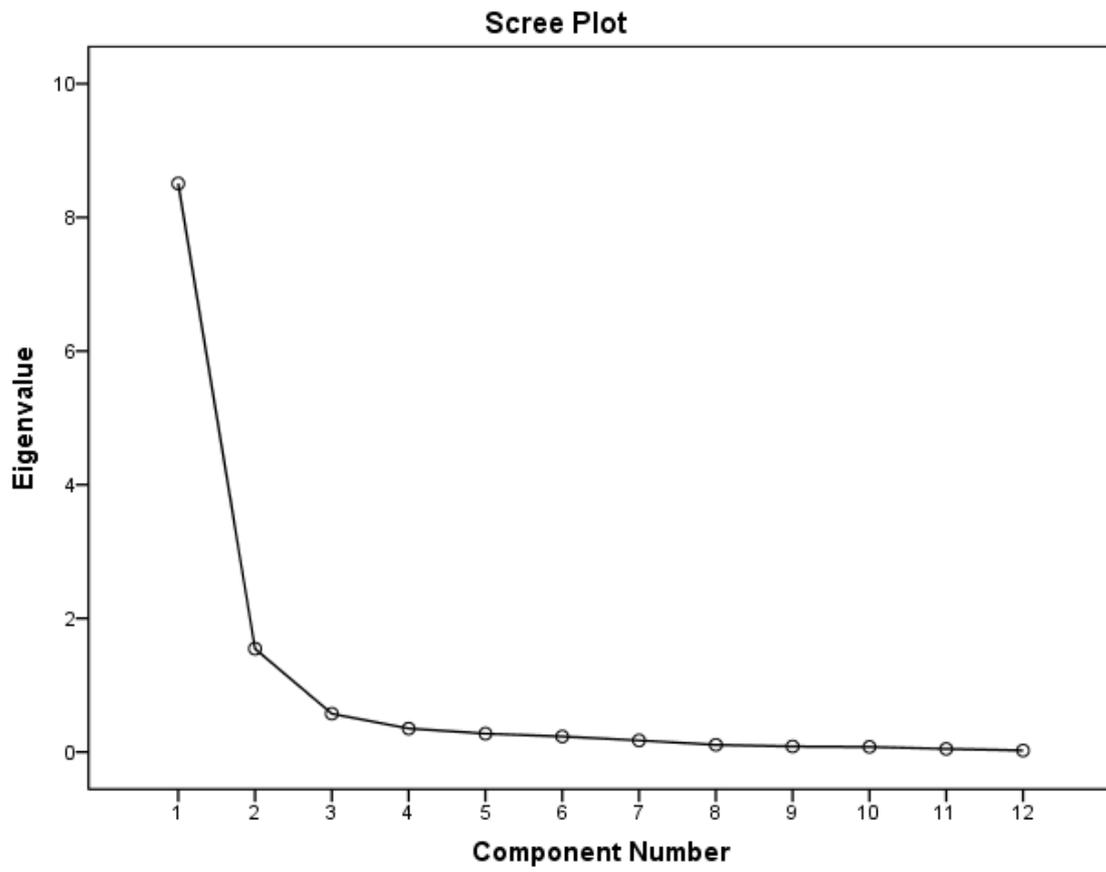


Figure 7. Scree Plot showing two emerging factors in the Mobile E-School App Survey.

Appendix 3 – Histograms of the distribution of scores for all scales, showing positive and negative skewness.

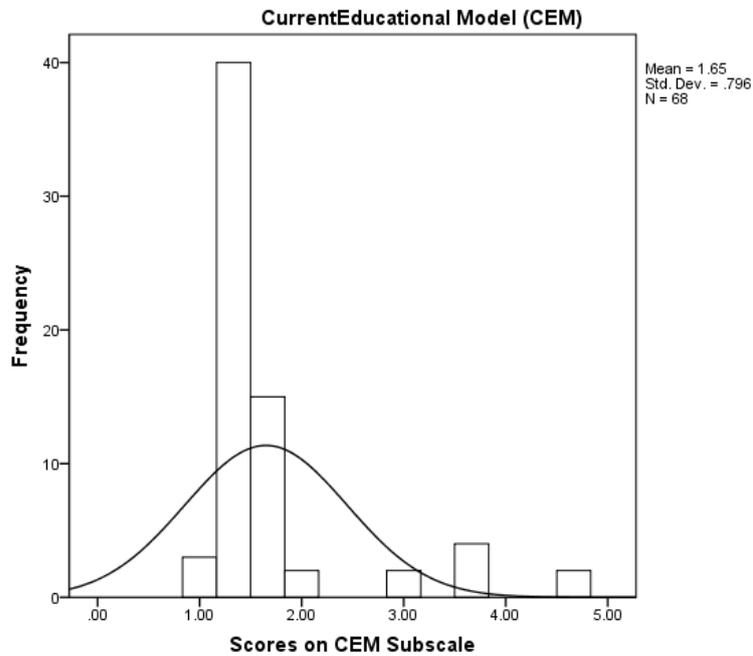


Figure 8. Histogram of the distribution of CEM scores, showing positive skewness.

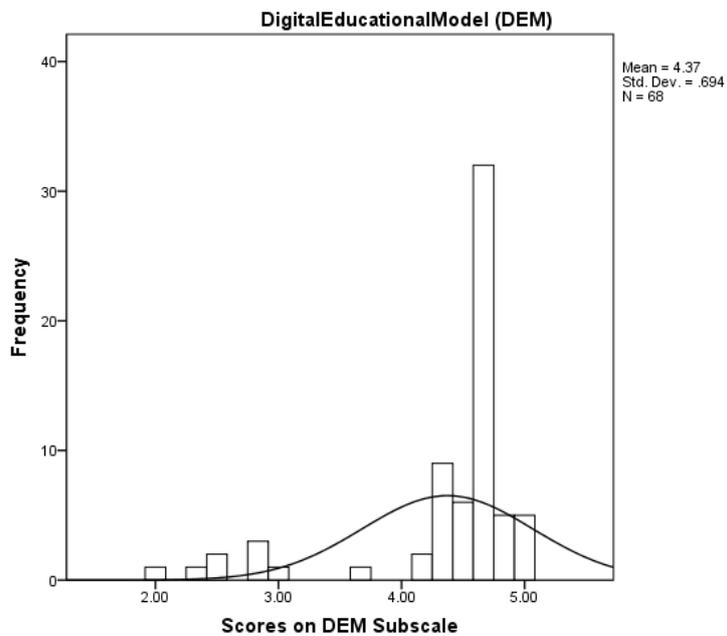
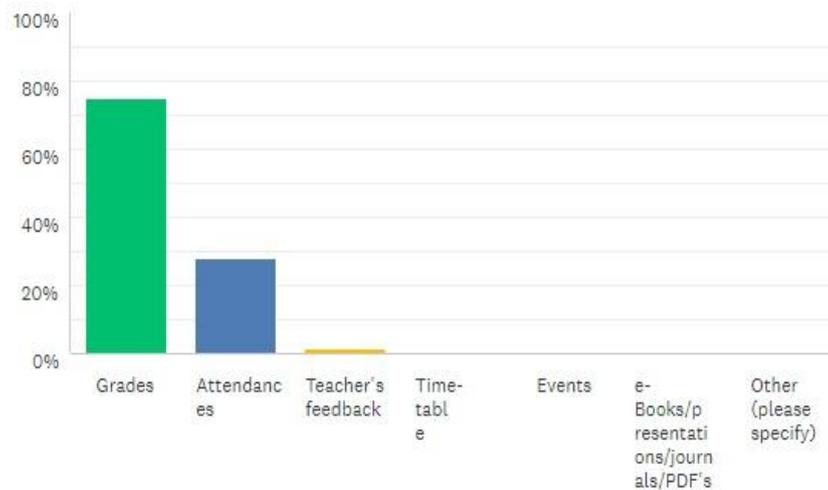


Figure 9. Histogram of the distribution of DEM scores, showing negative skewness.

Appendix 4 – Bonus question.

2. Bonus question: What kind of school data about your child is among the most necessary for you?

Answered: 68 Skipped: 0



Appendix 5 – Prototyping.

