

The Impact of Technology on Education in Iraqi Kurdistan Region, Sulaimani Province Schools

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Abstract— Educational technology is a fast-growing and increasingly developed subject in education during the past 50 years. The focus of the development of its theories and research is oriented into the methods and effectiveness of its implementation. Education is something that was once not available in certain parts of the world. Understanding the ways, technology has helped with education and the actual impact made will help you to see how vital technology has become effective in the education world. This paper uses a mixed method to collect and analyze data from 30 teachers and 30 students from 30 schools in Sulaimani Province gauging the impact of technology on teaching and learning in their schools. It asks whether technology has any impact on the teaching and learning process and also asks to what extent teachers and students use technological means for teaching and learning. As a result of the interview which has been conducted by the researcher with both students and teachers, there is clear and compelling evidence to state that technology has a tremendous impact positively in both learning and teaching processes. Interestingly, as concluded in this research, students more use technological means for education purposes than teachers.

Index Terms—Educational technology, Implementation, Iraqi Kurdistan, Schools, Use of technology.

I. INTRODUCTION

The 21st century has seen a huge development in education technologies at various levels. At an early stage, media technology has been brought into education sector as an important player in all fields of education until today. Afterward, the development of networking and computing technology has immensely affected not only the education *per se* but also in one's daily life as well. In 1997, the idea of distance education learning has resulted in developing electronic platforms from blackboard to whiteboard then to smartboard which has been extensively utilized in web instruction and administration in elementary and middle/high schools, as well as in the colleges and universities (Ronghua and Stanley 2014, pp. 161-172).

Throughout the past decade, researchers have shown some evidence that technology improves literacy, impacts language acquisition, supplies greater access to information, keep up learning, encourages student, and improves their self-esteem. In addition, it has been affirmed by researchers that technology provides richer opportunities for students to build or update their personal knowledge (Susan and Robert, 2014). According to research, technological impacts might have advantages and disadvantages at the same time but one simple fact is that those impacts are inevitable in the current era due to a widespread of technological means around the globe and its influence on human daily life. Almost every subject from pre-school to college can utilize technology as a tool for direction, development, and/or their functions. Moreover, those who lack the skills to teach or implement the resources are left out (Salem Press, 2011).

A. The Research Questions

This research tries to answer the following questions:

1. Does technology have impact on learning and teaching?
2. To what extent teachers and students use technology in teaching and learning processes?

II. THEORETICAL BACKGROUND

Practically, educators worldwide have attempted to use technology to improve the delivery of instructions. At an early age, the focus was on the delivery of directing instructions such as radio, recorded lesson on audiotape, and television, particularly in low-income countries. After the invention of internet and the World Wide Web, the vision and focus of education technology have shifted to expand communication and increase access to resources. Therefore, recent technologies represent a significant change in the teacher's role in the instructional process. Whereas earlier technologies provided teachers primarily with a tool for continuing to teach in the manner, they were already teaching (though presumably more efficiently), technologies such as e-mail and the internet tend to push teachers toward fundamentally different ways of teaching. Depending on how they are used, these techniques shift more responsibility to the students to seek out information and interact with people in other locations. For the most part, they tend to encourage more student-centered learning. This, in turn, is putting pressure on teachers to modify their approach to classroom

teaching. In the following, the researcher aims to describe various educational tools used in the education sector such as online classroom, tablets, projector, smartboard, and the internet (Mohammed, 2017).

A. Online Classrooms

This is one of the first things that many think of when it comes to technology and education. There are many ways indicate that this has been implemented in all levels of school. There are classes that children can take online, whereas they are still in school to earn extra credit. There are even online schools that children can do from home as well. According to Sophia (2015) the impact for this technological advancement is on more than just a grade school level though. Today, just about any college class that a person could want to take can be done online. Many people earn a degree online today, “in fact, in 2011, University of Phoenix gave out 6000 online degrees. This is monumental when you compare it to other schools. For instance, Arizona State University, which is known for having a high number of students only gave out 2075 degrees that year, all of which were from on campus education” (Mohammed, 2017).

Pritler (15-33) has summarized online resources used within education system primarily in seven ways:

1. The most common use is in direct instruction. Lessons developed in one location can be broadcast through radio or television or made available through e-mail or the World Wide Web for the use by students (individually or in groups) in other locations. Excellent teaching can be made widely available, this is especially important in countries, in which large segments of the teaching force are under-qualified for the grades, they are expected to teach. Well-designed instruction in the form of lessons delivered by radio, television, or online may be able to offset weak teacher preparation.
2. Similarly, teachers can use online searches to find and access resource materials that are used in the teachers' own lesson preparation. For example, teachers might locate maps and fact sheets about countries being studied in social studies class.
3. A variation on this approach is that teachers can use the web to access curriculum and instructional guides for their own use. For example, teachers may access instructions on how to lead a class in the dissection of a frog in biology.
4. Students can use the web to find and retrieve information; they can use in their own class research projects. In some schools, allowing students to use school computers for independent study are used as a way to motivate and reward good students. However, this approach tends to be limited to classrooms that have sufficient technology to allow students to use the equipment for independent study.
5. Some teachers use web-based chat rooms and online communications technology to connect two or more classrooms in different parts of the world. Students at different locations can ask and answer questions from those at the other locations.
6. Teachers can have their lessons broadcast to multiple classrooms simultaneously. This has already widely used

in higher education as a means of offering courses in low enrolment subject areas. In secondary education, this allows students in remote locations to have direct interaction with teachers at a central location.

7. Finally, technology-based instruction is used in many countries as a means of delivering in-service teacher education. Teachers need not leave their teaching posts to participate in professional development activities. A common element across all these innovations is that, to effectively use such technologies, teachers sometimes have to learn new knowledge and skills, spend more time in lesson preparation, and engage in different types of conversation with students.

One consequence is that teachers sometimes resist – not because the educational benefits of these new technologies are not clear, but they lack sufficient incentives to undertake the increased workload since they do not understand what is expected of them, or they do not know how to cope with new demands imposed by the technology.

B. Tablets

Muhtadi has stated that tablets can offer a substantial improvement in learning. His justification is based on a survey of 150 teachers during the 2012–2013 school year stated that 87% of them felt that the tablets made a significant improvement to the learning environment. Furthermore, using certain educational apps can hugely enhance education and learning for pre-schoolers and kindergartners apps such as ABCs, sight words, SAT Math, and addition facts which are designed to work with the student in the classroom as well as at home. Schools that involve in this program will enroll kids with the program and send the registration information to the parents with the instructions for locating and downloading the apps. Students then will get access for questions that are matching their level and will assist them to improve their skills. Those apps also show the progress of the student. In the developed countries, tablets have revolutionized the classroom experience in many ways such as providing the ability to be in a classroom through webcam, watch lectures when they are sick, and giving capabilities to chat with classmates. Simultaneously, tablets designed with Wi-Fi technology will push students to be proactive and look for answers they need on the search engines like Google (Mohammed, 2017).

C. Liquid Crystal Display (LCD) Projector/Overhead Projector

The projector is still in use in some classrooms. It is a small machine designed to project an image onto a small screen or whiteboard. If you have a screen, which can be placed above the whiteboard and pulled down accordingly, it will stop the glare. The materials we normally use with it are pens, which can either be permanent or cleanable. In addition to these, there are transparencies (OHT), which you can write or draw on, and a special type of transparency which a text or image can be photocopied onto. The major advantage of using this tool over the chalkboard is when a teacher can communicate, she/he delivers better due to a direct

eye contact all the time with their students without turning around. As a result, maintaining this eye contact has a very essential role in both facilitative and expository teaching. Furthermore, using projector for teacher's means that they have more time to prepare a prior material, make notes, draw tables, and diagrams (Natasha, 2016).

D. Interactive Whiteboard (Smartboard)

A smartboard is an interactive electronic whiteboard that gives educators an additional presentation device for the classroom. A smartboard can interface with a computer, displaying images through a digital projector, and its users can control the software from either the computer or the board, where they can manipulate images or texts. Students or audience members can participate by adding their annotations or pointing out materials using a pen or highlighter. Teachers can teach visually to the class while teaching a certain topic. It is important because people learn in different ways and learning a lesson in numerous ways can help to give a deeper understanding that will stay with the student. Using these boards make the learning experience more comprehensive for the students. Teachers are able to use different resources on their computers while teaching something that was unheard of before. Even if this is just something as simple as watching videos on a topic or being able to see pictures related to the topic, it can make a significant impact on the way students understand the lesson they are being shown. It has even been shown to be very helpful for children with special needs. Drawing on whiteboard will give a lot of context to the lesson and make the subject rather exciting for students (Mohammed, 2017).

E. Practical Gaming and the Impact on Education

For many video games and virtual reality bring up an image of relaxation and time for fun. The truth of the matter though is that they also have their place in the classroom. They are important for those who are going into digital and video game programming. However, the reach of this technology reaches even further. There are virtual reality games out there that can help people learn technical skills. One of the biggest examples of this is with virtual gaming for surgical students. By being able to practice the surgery in virtual environment, they are able to get the experience they need for operating on a live human being (Gee, 2005, pp. 25-32).

F. Challenges of using Cutting-edge Technologies in Education

According to Rob (2016, p. 16), online instruction is widely used in higher education worldwide, though less so at the primary and secondary levels. One reason is the scale of demand at the lower levels. Many governments view the cost of providing computers to individual schools as unaffordable. The initial equipment and the necessary teacher training are expensive, in addition to this equipment upkeep, repair, replacement and software costs involve a substantial recurrent expenditure. Limitations of infrastructure and

finances effectively bar some countries from participating in this electronic revolution. In other countries, education sector and government leaders have legitimate concerns about the cost, the efficacy, and the feasibility of using communication technologies in their education systems (Howard, *et al.*, 2007). More specifically, developing countries face four main problems:

1. Access is expensive. Whereas the cost of the internet access is low by world standards, it still represents a high (often prohibitively so) cost for many developing countries. Making the internet connections available at the school or school cluster level will be a central problem for many countries in educational planning over the next decade. Moreover, hidden costs are substantial, internet use shifts a significant cost from the information provider to the information recipient. It is the recipient who usually pays for the telephone line, paper, printer cartridges, software upgrades, and equipment repair. Moreover, meaningful use of the internet in the instructional process will require new curriculum and new training for teachers (Penni, 2000. pp. 25-27).
2. Ensuring equity of access is difficult. If access to electronic communication was limited to schools serving the rich and influential, the social and economic disparities among those who could obtain quality education would widen. Such differences can erode the social fabric of a country and lead to serious social and educational rifts. Ensuring that the benefits of easy access to world information and to electronic instruction are widely available to students of all social and economic backgrounds will be a challenge for educational planners in the next decade (Penni, 2000. pp. 25-27).
3. Retraining teachers to use the new technology are complicated and costly. Even if they had access to the internet, most teachers in the developing world lack the technical skills, the content background, and the language capacity to effectively utilize the World Wide Web including in the classroom instruction. Most web-based resource material is in an international language, with the preponderance in English. Notwithstanding language skills, teachers often lack the pedagogical skills to know how to most effectively use this powerful information tool in their classroom. At times, the use of the internet may conflict with the prevalent instructional strategy of the teacher (Penni, 2000. pp. 25-27).
4. Inappropriate content poses a problem. Some countries resist introducing widespread internet access of a fear that it will have a negative impact on the local culture or be used in ways that undermine the national authority. A central concern is children access to pornography. Some governments are also concerned about political and social content. They observe that people from some industrialized countries place content on the internet that may convey unacceptable ideological positions (Penni, 2000. pp. 25-27).

G. Previous Studies

There have been some studies tackling the impact of technology on education, Raja and Nagaubramani (2018) focused on technology's positive and negative impact in general,

stating that technology revolutionized the field of education and they also focused on advantages and disadvantages of technology on education. Kaushik and Dutta (2016) looked into information technology (IT) and its big impact on all areas of education, especially highlighting on the importance of IT in education sector, the impact of IT on classroom teaching, and the advantages and disadvantages of IT. Swapnil *et al.* (2015) highlighted the effect of technology on children education by focusing on children exposure to digital devices and networked communication. In their study, they focused on the current status of K-12 and the challenges in changing K-12 to adopt technology, they concluded that technology optimizes learning for a given student while reducing complete dependency on teachers to manually monitor and apply digital means for K-12. SIU (2002) reviewed the background and development of technology education in Hong Kong by tracing the changes of technology in education since the 1930s and introducing the most recent education policy "education reform." However, this paper gauged the use of currently available technological means around the globe in 30 different schools in Iraqi Kurdistan region, Sulaimani Province to know whether Iraqi Kurdistan schools in Sulaimani Province exploited these means in the learning and teaching process.

III. RESEARCH DESIGN FOR THIS STUDY

This part deals with the mechanism of data collection which uses one of the tools to collect data. This tool is an interview for the sample populations, the researcher has chosen 30 different schools from 30 different areas in Sulaimani Province and interviewing 30 teachers and students following.

A. Research Methods

Given the nature and focus of this investigation and research questions, a mixed-method comparative design of both quantitative and qualitative research was conducted to more fully understand how technology is used in basic school classrooms. Data were generated from interviews with individual teachers and students. Triangulation of data (individual interviews) provided consistent evidence and increased the validity of the findings.

B. Setting

In this paper, Sulaimani city has been chosen to conduct the research question interview for about 30 schools. According to the Sulaimani Statistics, National Office in 2010, the city has around 1680 primary schools from level (1–6) with a total student population of 270,000.

The city was chosen for this study for the following reasons: (a) Some schools have already equipped several technology classrooms, (b) the school was closed and well located for the researcher, and (c) the school management, students, and teachers were open to take part in the research.

C. Participants

This multisite investigated the impact of technology in 30 basic schools in the city. School names and participant

names are protected and recorded for validity of this research. These schools are both urban and suburban basic schools with similar demographics. The criterion for selection is not based on size of school, ethnicity of school, free and reduced lunch statistics, and rate of attendance. Schools were randomly chosen not based on the level of technology access.

D. Qualitative Research

Connie (2005, p. 52) has described qualitative data analysis as "working with data, organizing them, breaking them into manageable units, synthesizing them, searching for patterns, discovering what is important and what is to be learned, and deciding what you will tell others." Qualitative data analysis made up of individual and focus group interviews. With the interviewees' consent, all interviews were tape recorded and transcribed to ensure that all the data available for analysis.

E. Quantitative Research

The core area of this research is to follow the qualitative method to assess the impact of technology on education and learning in general. However, it is also important to gather statistical data in several schools in different areas of the city. The main hypothesis of whether teachers and students equally use technological means in the teaching and learning processes on the sample population is as follows:

- a. Teachers participated are teaching in the grade level (1–6) in all 30 basic schools
- b. Students at grade level (1–6) in 30 basic schools.

Instrumentation

A consent letter has been designed and verified from the college of basic education/Sulaimani University. Then, the researcher has decided to approach 30 random schools in the city after the administration's approval from each school. The research interview questions were constructed for the participants to obtain the feedback and answer the research questions needed. The researcher has reassured the participants that their answers will remain confidential and would only be used for this study.

Data collection

Through this multisite interview question, participants were asked nine questions to 30 teachers and seven questions to 30 students. After getting participants' approval, the voice conversations have been recorded solely for the purpose of this study. Participants selected based randomly to facilitate this study. The main points of emphasis are to cover at the beginning of each interview, which were designed to provide a consistent foundation for the researcher. Each interviewee was provided with the list of questions as in the appendix. This in-depth, semi-structured individual interview of both teachers and students used to determine the perceptions of the participants involved in the data collection so as to see what kind of impact there is on the education process in the schools of Sulaimani province. The interview questions were translated into Kurdish to probe for deeper meaning and clarification of the interviewee's experience. Interviews were conducted during the day over a period of several weeks.

Data analysis

Through the quantitative method, data from the interview questions can be analyzed using descriptive statistics through a statistical package. However, due to a small size of the demographic population and inadequate data, we did achieve any desired result from research perspective and also our main focus is more related to the quality rather than quantity. The researcher has conducted all interviews in person and the interview data were recorded, translated into English from Kurdish, and analyzed to identify patterns, themes, threads, and topics of beliefs, values, and practices. The qualitative methods can be used to better understand any phenomenon about which little is yet known and it provides a deeper comprehension of a social or human problem as well as building a complex picture with words that provide rich detail and insights into participant's experiences (Connie, 2005). Data have been organized into discrete concepts then into categories and linking them to broad themes to justify for patterns.

Interview data

In this interview, the researcher has targeted 30 students and 30 teachers in 30 different schools. In each school, the researcher chose a teacher and a student randomly.

IV. RESULTS AND DISCUSSION

After data collection, the researcher has analyzed the data which is representative since 30 teachers and students have been chosen in 30 different areas in Sulaimani Province. In this line, Nation (2005) states that 30 respondents of a sample population give a representative sample that can be generalized since it is reliable and valid for similar situations. The qualitative analysis is used to analyze the collected data.

A. Teacher's Edition

Based on the collected data from the interview with teachers, it appears that the small number of teachers has used technology for education purposes in a classroom. However, the majority of teachers believe that technology has an important role in the learning process. A fair number of teachers are using compact disc (CD) and digital versatile disc (DVD) players as the main technological mean in schools. The vast majority of teachers have raised

a similar concern about how the power cut problem and the recent financial crisis in Kurdistan Region has dramatically become a burden to adopt technological means in schools for learning purposes. The minority of teachers was aware of the recent technological advancement in education sector, and indeed, they were not familiar with using new technology. Paradoxically, the students on other side seemed to use the technological means more than that of teachers. Strangely, almost all the teachers suggested that technology has a negative impact on health without providing any valid evidence or research. There are several findings with respect to the questions which have been used in interviewing teachers which can be outlined as follows:

1. Which of the technological means are beneficial for teaching and learning purposes? Why?

The following technological means have been mentioned the most by teachers. However, due to the limited abilities of teaching staffs within the Ministry of Education, teachers are not able to use newer technologies and they stick to traditional technology devices such as CD and DVD players.

As seen in Chart 1 and Table I:

- Over 38% of the teachers have used CD/DVD player
- Approximately 2% of teachers have utilized LCD projector for learning purposes
- 4% of the respondent used tablets in education
- Interestingly, using computers in education comes at the third frequency by 21%
- Internet is the second most technological means used by teachers which represents 25% of the sampled data
- Less than 15% of teachers have used smartphones for education purposes.

TABLE I
TECHNOLOGICAL MEANS USED BY TEACHERS IN PERCENTAGES

Technological means used by teachers	Frequency	Percentage
Television	0	0
Liquid crystal display projector	1	2
Tablets	2	4
Smartphones	6	11
Computers	11	21
Internet	13	25
Compact disc and digital versatile disc player	20	38
Total	53	100

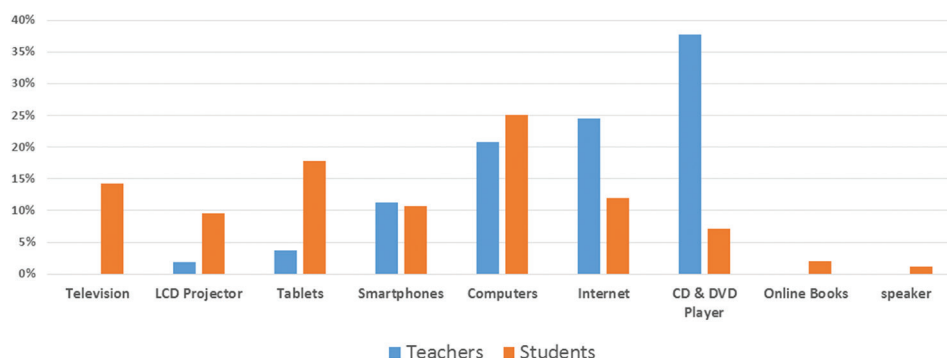


Chart 1. The comparison of technological use by teachers and students.

2. How have you enhanced students' learning capacity through the use of technology?
Different teachers have different approach in terms of enhancing learning. Moreover, most teachers agreed that due to time restriction in classroom, they could not focus on using technology to enhance learning.
3. How do you deal with the time consumption in terms of the use of social networking sites for teaching and learning purposes?
Nearly, all of the respondents mentioned that they have not involved in using social networking sites for teaching and learning purposes.
4. How many of you encourage setting up a social networking group for learning or educational purposes?
Few teachers have got involved in setting up a social networking group for educational purposes.
5. What techniques and technologies have you employed to improve communication?
A limited amount of teachers has used YouTube, Google, and apps on smartphone, whereas the large volume of teachers was only using CD and DVD player to improve communication.
6. What were some of the technological challenges for education?
The vast majority of teachers listed three major challenges for education which are an electricity problem in the Kurdistan region, the current financial crisis, and the carelessness from the Ministry of Education to improve the overall education system in Kurdistan.
7. Do you believe that the use of technology positively or negatively influences student's learning?
Almost all teachers agreed that technology has both positive and negative impacts
8. Are adequate technological resources available in education?
Nearly, all the participants confirmed that there are not adequate technological resources available in education and they hold the Ministry of Education into account for not providing enough resources
9. What is your philosophy on using and encouraging students to use technology for learning?
As the large number of teachers is not familiar with new technologies compared with students, therefore they have not given much information about technologies to students. In contrast, a small amount of teachers was initiative by advising students on how to use new technologies or providing them with additional information on that ground.

B. Student's Edition

Despite the technological advancements in many areas of life, the officials in the education sector, teachers, and educators use less technological means for learning purposes than the students, that is, the students use more technological means than teachers. Amazingly, most students have used several technological means both inside and outside the classroom for learning and entertainment, whereas their teachers are still not exposed with some technological means. Another finding was related to the fact that the majority of students use technology about an average of

1–2 h/day; almost all the students suggest to provide further technological means in the classroom. Table II and Chart 2 summarizes further findings from the result of the interview questions conducted with students:

1. Which of the following technologies have you used inside or outside the classroom in learning?
Unlike teachers, the students appear to be more exposed to the recent technologies as several students have listed the following technologies which they aware of.
 - Nearly, majority of respondent which represents about 25% and 18% of students have used computers and tablets consecutively for education purposes as seen in chart 1
 - Surprisingly, unlike teachers, students have used CD/DVD player at the lowest rate of 7% for learning purposes.
2. How often do you use technology at home?
More than half of students use technology for about 1–2 h/day.
3. Do you support using technology in classrooms? If yes, why? If no, why?
Most of participants mentioned that they support using newer technologies in class as it enhances their learning.
4. Do you consult the internet or dictionary for finding out word meanings? How?
Load of students has cited that they have used dictionary to find the meaning of words either on Google or using dictionary apps on smartphones or tablets.
5. Can you tell us the three most promising technologies on the horizon for today's educational environment?

TABLE II
TECHNOLOGICAL MEANS USED BY STUDENTS IN PERCENTAGES

Technological means used by students	Frequency	Percentage
Computers	21	25
Tablets	15	18
Television	12	14
Internet	10	12
Smartphones	9	11
Liquid crystal display projector	8	10
Compact disc and digital versatile disc player	6	7
Online book	2	2
Speaker	1	1
Total	84	100

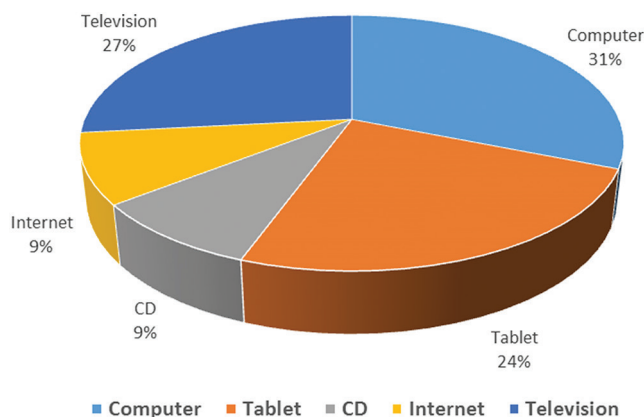


Chart 2. The most promising technologies stated by students.

As per the below pie chart, over 50% of students have agreed that computers and tablets were the most promising technologies consecutively. Astonishingly, television still appears to be quite promising technologies for today's educational environment.

6. How do you enhance technological use for learning?
Hardly any students use technology for learning outside classroom, it seems to be rather entertainment tool for them. Some uses YouTube to watch videos and few use dictionaries for learning new languages.
7. How many social networking groups have you engaged with for learning purposes?
About 10% of students have engaged with social networking groups for learning purposes.

V. CONCLUSIONS

In the light of the results and discussions of this study, the following points have been concluded:

1. It appears that the technological impact on education is inevitable in modern times, and it may bring forth both positive and negative effects on education
2. There is clear and compelling evidence to state that technology has a tremendous impact positively on learning and teaching in Sulaimani Province schools
3. Interestingly as concluded in this research, students use more technological means for education purposes than teachers as shown in the findings
4. Another finding was related to the fact that the majority of students use technology about an average of 1–2 h/day and almost all of them agree to provide further technological means in the classroom for learning purposes
5. Almost all the teachers suggested that technology has a negative impact on health without providing any valid evidence or research
6. It has also been found that the government is indifferent to facilitate technological means in the education sector
7. The teacher's roles in using technological means are very weak and can be seen in the teaching process.

VI. RECOMMENDATIONS

As a result of this research and based on the gathered data from the interview questions, it is essential for the Ministry of Education in the Kurdistan region to have a long-term strategic plan to equip schools with new technological tools for the purpose of education and introduce an internal guideline of standard operating procedures for the reliability of various materials. It is vital to educate students and their families with the use of technology outside the classroom. This paper also strongly recommends to train teachers about the recent technological advancement in education sector to improve and deliver the best learning methods which might

have a favorable effect on student's achievement and a successful future.

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APPENDIX

Teachers interview questions

1. Which of the technological means are beneficial for teaching and learning purposes? Why?
2. How have you enhanced students' learning capacity through the use of technology?
3. How do you deal with the time consumption in terms of the use of social networking sites for teaching and learning purposes?
4. How many of you encourage setting up a social networking group for learning or educational purposes?
5. What techniques and technologies have you employed to improve communication?
6. What were some of the technological challenges for education?
7. Do you believe that the use of technology positively or negatively influences student's learning?
8. Are adequate technological resources available in education?
9. What is your philosophy on using and encouraging students to use technology for learning?

Students interview questions

1. Which of the following technologies have you used inside or outside the classroom in learning?
2. How often do you use technology at home?
3. Do you support using technology in classrooms? If yes, why? If no, why?
4. Do you consult the internet or dictionary for finding out word meanings? How?
5. Can you tell us the three most promising technologies on the horizon for today's educational environment?
6. How do you enhance technological use for learning?
7. How many social networking groups have you engaged with for learning purposes?.