

التعلم الإلكتروني وتكنولوجيا المعلومات والاتصالات في التعليم في المدارس الفلسطينية:

الطريق نحو مهارات القرن الواحد والعشرين

E-Learning and ICT in Education at Palestinian Schools:

The Path Towards 21st Century Skills*

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Abstract

This paper seeks to evaluate e-learning and ICT in the primary and secondary education in Palestine in light of the School-Led Initiatives (SLIs) on e-learning curriculum. It focuses on the e-learning project implemented at schools during 2012-2015, which was funded by the Belgian Technical Cooperation (BTC). We measured the most significant changes at the Palestinian Ministry of Education and among other project's stakeholders (e.g. schools' principals, teachers, students and their families). Moreover, we explored the impact of SLIs on the teaching and learning processes, using focus groups for data collection among the stakeholders. They were asked about the new teaching practices and the use of 21st century tools to develop the learning skills, such as problem solving and teamwork to lead others towards success. In addition, we inquired about the method of ICT employment in their initiatives as an essential tool for life skills.

Results showed that there was a transformation in the teachers' and students' behaviors; as active learning strategies made teaching more effective and enjoyable. Moreover, underachieving and shy students participated in the learning activities. On the other hand, teachers pointed out that they still need more practice on the 21st century skills, and that the educational policies should encourage implementation of these skills at the national level, reform curriculum, as well as provide motivation, support and training for teachers. However, there were serious obstacles related to school infrastructure, curriculum density, school culture and ICT skills. For change, all stakeholders should be involved in the efforts to promote 21st century skills and redesign the curriculum, taking into account knowledge, learning methods and assessment.

Keywords- ICT in Education, E-Learning, 21st Century Skills (21CS), Education System, School, Initiative, Most Significant Change (MSC), Story Collection, Thematic Coding, Teaching, Teachers, Students, Behavior, Community, Obstacles.

ملخص:

تهدف هذه الورقة الى تقييم التعليم الالكتروني وتكنولوجيا المعلومات والاتصالات في التعليم الابتدائي والثانوي في فلسطين في ضوء المبادرات التي تنتهجها المدارس في مناهج التعليم الالكتروني. يركز البحث على مشروع التعليم الإلكتروني الذي تم تنفيذه في المدارس خلال 2012-2015، الممول من التعاون التقني البلجيكي (BTC). وعليه، قمنا بقياس أهم التغييرات في وزارة التعليم الفلسطينية وبين أصحاب المصلحة الآخرين في

المشروع (مثل مديري المدارس والمدرسين والطلاب وأسرهم). تم سؤالهم عن الممارسات التعليمية الجديدة واستخدام أدوات القرن الحادي والعشرين لتطوير مهارات التعلم كحل المشكلات والعمل الجماعي لقيادة الآخرين نحو النجاح. بالإضافة إلى ذلك، استفسرنا عن آلية توظيف تكنولوجيا المعلومات والاتصالات في مبادراتهم كأداة أساسية للمهارات الحياتية.

أظهرت النتائج تحولاً في سلوكيات المعلمين والطلاب وان استراتيجيات التعلم النشط جعلت التعليم أكثر فعالية ومرتعة. علاوة على ذلك، شارك الطلاب الخجولين وضعفاء الإنجاز الأكاديمي في نشاطات التعلم. أشار المعلمون إلى أنهم ما زالوا بحاجة إلى مزيد من التدريب على مهارات القرن الحادي والعشرين، وأن السياسات التعليمية يجب أن تشجع على تنفيذ وتعميم هذه المهارات على المستوى الوطني والعمل على اصلاح المناهج التعليمية وتوفير التحفيز والدعم والتدريب للمعلمين. ومع ذلك، كانت هناك عقبات جدية تتعلق بالبنية التحتية للمدرسة وكثافة المناهج والثقافة المدرسية ومهارات تكنولوجيا المعلومات والاتصالات. لإحداث التغيير، ينبغي إشراك جميع أصحاب المصلحة في الجهود المبذولة لتعزيز مهارات القرن الحادي والعشرين وإعادة تصميم المناهج الدراسية، مع مراعاة المعرفة وطرق التعلم والتقييم.

الكلمات المفتاحية: تكنولوجيا المعلومات والاتصالات في التعليم، التعليم الإلكتروني، مهارات القرن الواحد والعشرين، النظام التعليمي، المدرسة، مبادرة.

1 Introduction

Palestine is located in the center of the Middle East and North Africa (MENA) region. Israelis occupied it in two phases in 1948 and 1967. It borders Jordan in the east, the Mediterranean and Egypt in the west, Lebanon and Syria in the north, and the red sea in the south. According to PCBS (2016), the Palestinian population around the world was estimated to be 12.4 million by the end of 2015, where 6.2 million live in historic Palestine with Islam being the main religion in the area. Statistical data and UNRWA records show that 5.59 million are registered as refugees. The size of occupied Palestine is approx. 27,000 km², but Israel utilizes 85% of that area. The Gross Domestic Product (GDP)'s worth in Palestine was 8.03 billion USD (Trading Economics, 2016).

The Palestinian Ministry of Education and Higher Education (MoEHE) implemented a project titled "E-learning Curriculum in Primary and Secondary Education", financed by Belgium in the period 2011-2013. It was based on School-Led Initiatives (SLIs) that employ ICT in education. After three years of implementation, the MoEHE assigned the Open University of Cyprus (OUC) and al-Quds Open University (QOU) to conduct an e-learning intervention action research, to provide upstream advice towards enhancing e-learning resources and practices for teachers, students and their families. The action research was a collaborative work between

OUC, QOU, the Project Management Team (PMT), the MoEHE staff and the schools. The PMT was composed of a national project coordinator, a school grant manager, an e-learning content manager, an ICT and multimedia assistant, an administrative and finance officer, and field coordinators.

In this research, the researcher presents the main results of the first work package of the action research project, which focused on the lessons learnt by teachers, students, parents, school principals, supervisors, heads of directorates, and the MoEHE leaders, since quality improvement of education and measuring its impact are long-term issues.

This paper consists of five sections. The first section introduces the Palestinian education system and the problem statement. The second section goes through the research's objectives and methodology. The third section concentrates on sampling and story collection procedure as well as thematic analysis. The fourth section provides results and discussion. Finally, conclusions are presented in the fifth section.

1.1 The Palestinian Education System

The Palestinian education system went through several difficulties and challenges during the Ottoman era, the British Mandate, the Israeli occupation between 1948 and 1967, and the Israeli occupation after 1967 until the establishment of the Palestinian Authority in 1993, as the educational system was placed under the Palestinian control. The Palestinian MoEHE restructured the educational system and developed the schools' infrastructure. This included developing the curriculum, building new schools and classrooms, improving technology infrastructure, employing teachers, and setting a new model for the General Secondary Examination (GSE). However, many challenges were encountered by the Palestinian educational system and schools, such as:

Instability due to the Israeli occupation and its arbitrary practices against schools.

- Lack of funding and expenditure on education.
- Weak relations between the schools and the society.
- Low participation of families in the educational process.
- The predominance of traditional teaching style.
- Lack of equipment and potentials.
- Students' numbers in one class and the two-shift system.
- Lack of entertainment programs.

The Palestinian educational system provides primary and secondary education at school-level. According to the statistics of the Palestinian MoEHE for 2014/2015, the total number of schools reached 2856, which translates to 75% in the West Bank and 25% in the Gaza Strip. Around 1,171,596 students were enrolled in these schools; a total of 58.44% in the West Bank and 41.56% in the Gaza Strip (50.4% females and 49.6% males). On the other hand, the total number of the teachers reached 65,175; with a total of 64.5% in the West Bank and 35.5% in the Gaza Strip (59.8% females and 40.2% males; MoEHE, 2018).

There are three types of schools according to MoEHE (2018):

- Public schools: These schools fall within the MoEHE responsibility. They represent 73.3% of the total schools, with 66% of the total number of students and 69.84% of the total number of teachers.
- Private schools: Owned by the private sector and supervised by the MoEHE. They represent 14.4% of the total number of schools, including 9.4% of the students and 13.07% of the teachers.
- UNRWA schools: The United Nations Relief and Works Agency for Palestine Refugees (UNRWA) administrates these schools, which represent 12.2% of the total number of schools, including 24.6% of the students and 17.09% of the teachers.

The Palestinian educational system includes two stages, pre-school education for children aged 4-5.5 years and general education, which is divided into two levels (MoEHE, 2018):

- A.** Basic education (compulsory), from the first grade to the tenth grade.
- B.** Secondary education for two years, which enables successful students to enroll in universities, community or university colleges. It is divided into two categories:
 - 1.** Academic secondary education, that concludes with the GSE (Tawjihi). Students in this stage choose either scientific or literary stream.
 - 2.** Vocational secondary education, that concludes with the vocational Tawjihi. Students choose from five streams; Industry, commercial, agricultural, nursing and hospitality.

The school year consists of two integrated semesters, and begins in September, lasting for nine months. All the Palestinian schools, except some private ones, use the curriculum developed by the Palestinian MoEHE. Regarding students' assessment, it is exam-based, where all students after the fourth

grade should pass four exams per subject each semester. Passing grade is 50%, and students should pass all the subjects to move to the next level. Four parties should certify school certificates and certificates of transfer: the student's school, the directorate of education, the MoEHE, and the Ministry of Foreign Affairs (MoEHE, 2018).

The Directorate of Education in each district has its own administrative staff and supervisors distributed on different specializations. One of their tasks is reporting to the MoEHE. The Directorate of Education in each district is responsible for the schools in that district. Each school has its own principal, vice-principal, secretary and teachers. Supervisors together with principals are responsible for teachers' training and annual performance evaluation. Students' families are in direct contact with schools to monitor their children attitude.

The turn towards ICT-based teaching and learning over the past 20 years is assumed to have revolutionized and revitalized the education sector tremendously (Uma Maheswari, 2012). It has been an innovative teaching tool for supporting pedagogy (Somekh et al, 2006). Moreover, ICT has increased students' motivation, responsibility and organization skills, leading to independent and active learning (Lewin et al, 2000; Perry, 2003). Palestine is one of the four Arab countries that have the largest number of trained teachers that use ICT in teaching (Abu Gazalah, 2013). ICT has led to changes on how we act and interact at work, education, civil life and home, directing us to a new set of skills called the 21st century skills (21CS; Allen, et al., 2012; Lee, 2013). ETS (2007) has defined the 21CS as the ability to collect, retrieve, organize, and manage information, as well as evaluate its quality, relevance, and usefulness, and generate accurate information using the existing resources.

1.2 Problem Statement

In 2009, the Palestinian MoEHE received fund from Belgium for the "E-learning Curriculum in Primary and Secondary Education" project (REoI, 2013). The MoEHE collaborated with the Belgian Technical Cooperation (BTC) in the project's implementation that started in 2010 for five years. The project targeted four subjects (Science, Math, English, and Arabic) from the fifth grade to the tenth grade. In order to ensure the implementation of the project's activities, up to five field-coordinators worked on the project on a regional scale. The PMT initiated and accompanied day-to-day activities in collaboration with the MoEHE, its directorates and schools.

The overall objective was "to raise competencies of individual learners to become active members of the knowledge society". Specifically, "to enhance

students' learning acquiring the 21CS by applying e-curricula modules and practices" (ToR, 2010). It aimed to train approx. 1000 teachers on e-learning. Teachers developed SLIs and implemented them in their schools for 3 years. They focused on innovative learning practices including learning objects, mobile learning and piloting new ICT tools and 21CS in the education system.

In order to test the assumption that by "introducing innovative learning practices, students will become more active participants in the education process," the BTC announced a call for proposal with a TOR in September 2013 for an action research on e-learning at the Palestinian schools (ToR, 2013). It selected our consortium to conduct this action research, which consists of experts from QOU and OUC. Therefore, in this research, we have tested the assumption above and tried to answer the question, "does a SLI alone without any external intervention lead to the required achievement?" We measured the extent to which SLIs have improved teaching practices, teaching methods and the educational environment. In addition, we investigated the different affected-dimensions, including the attitudes of the teachers and students, students' acquisition of the 21CS, and the obstacles which faced them during the initiative implementation.

2 Research Objectives and Methodology

2.1 Research Objectives

The main objective of this paper is to assess the above assumption by measuring the Most Significant Change (MSC) in the performance and behavior of teachers and students and in the enabling environment through a controlled sample group. Based on the TOR and the action research results, we focused on "understanding the contribution and describing challenges, opportunities and minimum requirements for successful scale up of innovative learning practices and introducing new ICT tools to achieve learner-centered education and students' acquiring of the 21CS."³ The importance of this research stems from the action research results which can be used as directives for similar future-projects by introducing policy papers for the MoEHE to consider when developing its strategic plan.

We have implemented the action research in four work packages (WPs): 1) Lessons learnt from the Pilots: Most Significant Change, 2) A one-semester e-learning action-research, 3) A one-semester m-learning action-research, and 4) Policy Advice-Participatory recommendation formulation. This paper covers WP1, in which we have applied the MSC method in order to obtain information on the reality and updates of the e-learning project and the lessons

learnt from SLIs.

2.2 Research Methodology

The Most Significant Change (MSC) is a participatory monitoring and evaluation technique, where project stakeholders are involved in deciding the sorts of changes. It is based on story-collection of significant change (SC) emanating from the field and systematic selection of the Most Significant (MS) stories by panels of designated stakeholders. Stories are collected orally or in non-formal written form called “original oral stories” (Davies & Dart, 2005). Stakeholders (e.g. teachers) comment on these stories by agreeing or disagreeing, etc. to identify the stories, which express a broader view. In this research, we applied a modified MSC to obtain information on the reality and updates of the e-learning project, as follows:

1. Host stories with their metadata in a repository (e.g. social networking), and allow comments to those stories.
2. Process the stories, i.e. allow adding comments, and show for each story of level N from which stories of level N-1 was selected or formed.
3. Answer queries based on the metadata.

They developed a repository module in the

Palestinian educational portal⁽¹⁾ and hosted the collected stories under the social networks menu. This allowed teachers/stakeholders to utilize ICT tools in the research, and integrate a critical reflection on the stories. The results of the MS stories were organized, analyzed, and visualized.

3 Sampling, Story Collection and Analysis

3.1 Sampling

Sampling was based on subsequent discussion with the PMT and the MoEHE staff. We distributed the winning SLIs, which were implemented throughout the project period, under four categories as shown in Table 1. Cat1 refers to individual initiatives (i.e. one school), Cat2 refers to multiple initiatives (i.e. collaboration of several schools), Cat3 refers to directorate-level initiatives (i.e. a MoEHE directorate), and Cat4 refers to m-learning initiatives (i.e. the use of tablets). According to the PMT data, the total number of participating schools was 353, and the total number of distinct initiatives was 283. In order to reflect the goal of the MSC, we selected a large representative sample, around 30% of the schools. We randomly selected and invited 110 schools for focus groups, using certain formulas⁽²⁾, as shown in Table 2.

Table 1
e-Learning initiatives and school statistics⁽³⁾

Category	1st year		2nd year		3rd year		Total No. of Schools	Total No. of Initiatives
	Schools	Initiatives	Schools	Initiatives	Schools	Initiatives		
Cat1	82	82	77	77	43	43	202	202
Cat2	9	3	5	2	57	18	71	23
Cat3	3	1	6	1	18	3	27	5
Cat4	-	-	-	-	53	53	53	53
Total	94	86	88	80	171	117	353	283

We conducted the focus groups in five branches of QOU in the West Bank (i.e. geographical distribution) in four days within the school period. Since field

researchers were not permitted to enter Jerusalem, we held the focus group of Jerusalem teachers in Ramallah.

(1) This portal has been developed in the e-learning project to host learning objects. See the link below: <http://www.elearn.edu.ps>

(2) For randomness, we used the formula $1+3n$ for Cat1 and Cat3, and the formula $1+4n$ for Cat2 and Cat4, where ($n=0,1,2,3,4,\dots$). For instance, schools/initiatives 1, 4, 7 ... etc. or 1, 5, 9 ...etc. of the original list respectively.

(3) Source: PMT, MoEHE

Table 2
School-selection criteria

Category	Schools		Initiatives		Randomness Formula
	Total	Selected	Total	Selected	
Cat1	202	67	202	67	1+3n
Cat2	71	20	23	6	1+4n
Cat3	27	12	5	2	1+3n
Cat4	53	11	53	11	1+4n
Total	353	110	283	75	

3.2 Story Collection

For validity purposes, we applied Future Café, usually offered in the form of a dialog-based workshop or focus group and based on people's natural desire to seek common ground and collaborative exploration. It creates an environment that fosters inspiring conversations in which people's opinions are heard, and different perspectives are allowed (NCDD, 2008). The regional distribution of participating schools that fairly reflects all categories of initiatives and school types validates the selection process. The total number of participants in the future café was 183; most of them were teachers with a small number of principals and field coordinators.

We carefully developed the focus groups to include five or six participants. They were moderated by one or two field researchers. For each group, we introduced the objectives and instructions of the MSC method. Moderators asked them 10 questions to compose the MS stories. They started with general questions to warm up the session, and ended with specific questions to compose stories, as follows:

- Among all changes, what do you think was the MSC? Please give a specific story that shows the change you are talking about.
- What do you think is needed to be done differently (by you/your colleagues/your school/ the Ministry) in order to achieve more significant changes?

- What challenges have you encountered and how have you overcome them (if you have)?

Moderators wrote down each story as narrated from the participant (i.e. level L0); they allowed each storyteller to use a story form to write down his/her story. Afterwards, they omitted invalid, weak or similar stories -usually collected from teachers sharing the same school or initiative. In the end, they submitted 153 original-stories (i.e. L1).

3.3 Qualitative and Thematic Data-Analysis

“There is no quick-fix technique in qualitative analysis, but there are probably as many different ways of analyzing qualitative data as there are researchers doing it” (Mays and Pope, 2006). However, there are some theoretical approaches to choose from (Lacey, 2007). The Grounded Theory approach is used when data analysis has a well-defined process that begins with basic description and moves from coding, conceptual ordering, to theorizing (Gerrish & Lacey, 2010; Patton, 2002; Morse, 2009). We have used this approach for analysis by organizing and reducing the stories into codes, then feeding these codes into descriptions, models or theories. Qualitative data-analysis started with familiarization, which means the analysis of all the stories to identify the common issues that recur, and the main themes that summarize the entire views, as follows:

- Applying a quick reading on 10 randomly selected stories, to take notes on the first impressions, then rereading them again word by word.
- Repeating the process on another 30 stories, to highlight key words and identify labels for codes. We applied each code later according to the standards to all stories, Fig.1.
- We provided codes for all of the stories (153), each one consists of five digits. The first digit represents the initial of the district (e.g. N for Nablus).

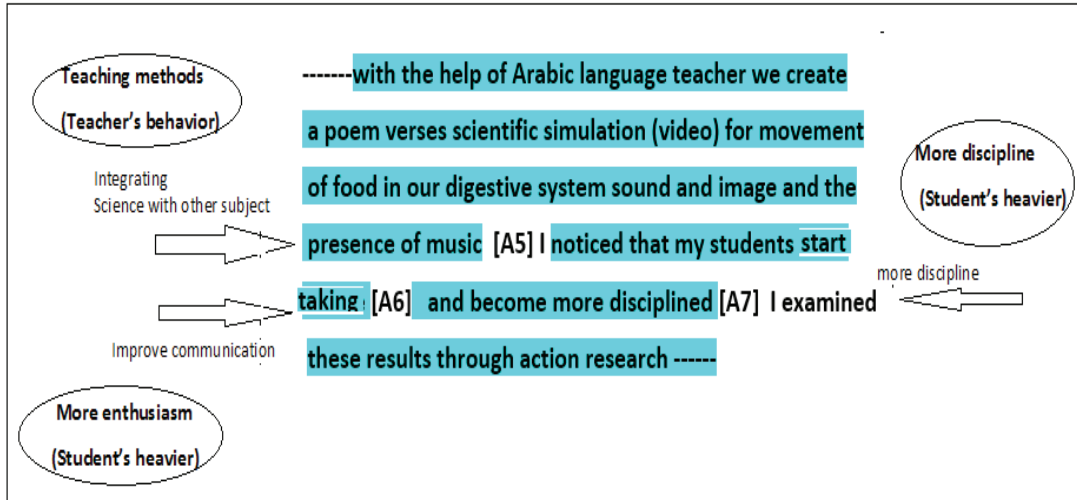


Figure 1: Transcript (Story) Coding

Afterwards, we employed open coding to explore and examine all data carefully. Open coding is “concerned with identifying, naming, categorizing and describing phenomena found in the text. Essentially, each line, sentence, or paragraph is read, searching for the answer to the repeated question (what is this about?)” (Lopes, 2012).

In order to code relevant words, phrases, sections that could describe activities, processes, or concepts, we used thematic coding, which involves “identifying passages of text or images that are linked by a common theme or idea allowing you to index the text into categories, and therefore establish a framework of thematic ideas about it” (Gibbs, 2007).

Example:

“-----of the most important phenomenon that was noticed and tested when using ICT, was the increased discipline in classroom ----“

The statement above indicates a change in students’ behavior, as they became more discipline. It is relevant, since the participant has explicitly stated that it was important. Moreover, participants have frequently repeated this statement in several stories.

Another example:

“----- students created a biology group on Facebook,--- they downloaded material from YouTube that explain concepts from their textbook -- used electronic games --- the students shared duties and responsibilities.-- My role (teacher) was a facilitator--”

The statement indicates that students have become part of the learning process. This is obvious and supported with a good evidence. It is also consistent with the student-centered learning theory that shifts the focus of instruction from teacher to the students (Jones, 2007). At this stage, we have created 27 codes, as shown in Fig.2. Fields represent codes, records represent stories, and x indicates a match.

S.Coded	E	I	H	I	J	K	L	M
	Time_preparation	Effort	Enthusiasm	Participation	Student	Change	centered teaching	teaching methods
H No1								x
N No31			x		x		x	
R No24							x	
J No19				x				
B No8		x		x		x	x	x

Figure 2: Part of coding method

In the last stage, we employed selective coding, to retrieve all codes and group them with the relevant phenomenon, idea, explanation or activity in one category. Accordingly, we have created the five major categories shown in Table 3:

1. Teachers' behavior: Behavior refers to the range of activities exhibited by humans, which is influenced by attitudes, values, ethics and profession (Gelisli, 2007; Carr-Back, 2009). Teacher's behavior is defined as «activities concerned with the direction of guidance of the learning of others» (Keeley, et al, 2006).
2. Students' behavior: Students' role is to assimilate the knowledge and skills as a contributing member of society. This would raise their thinking levels and direct their behavior to be self-motivated and self-aware of lifelong learning (OCCC, 2012).
3. Education towards the 21CS: A set of abilities, skills, knowledge and expertise that students must master to succeed in work and life. A blend of content knowledge, specific skills, expertise and literacies (Kereluik et al, 2013; KSRED, 2010).
4. Community: Relationship among the parties from schools and the local community (e.g. students and their parents, or teachers and students' families).
5. Obstacles: Refer to actions that interfere with or prevent action or progress. An obstacle could be physical or non-physical that stands in the way of literal or figurative progress⁽¹⁾.

Table 3:
Categories and their relevant codes

#	Category	Codes (Subcategories)
1	Teachers' Behavior	Decreased teaching effort
		Enthusiasm for teaching
		Collaboration with colleagues
		Social behavior
		Student-centered teaching
2	Students' Behavior	Change in teaching methods
		Thinking levels
		Achievement
		Participation
		Motivation
		Enjoy learning
		Discipline

#	Category	Codes (Subcategories)
3	Education Towards 21 st C Skills	Students as part of the teaching and learning process
		Collaborative learning
		Learning by research
		Active learning
		Brain storming
4	Community	Change in learning methods
		Involvement of students' parents
		Involvement of teachers' families
5	Obstacles	Dense school's curriculum
		Inappropriate or poor IT infrastructure (school/ home)
		Parents' approval of using ICT
		More difficult to monitor
		No enough time
		Lack of computer skills

3.4 Repository Implementation and Story Animation

In parallel with the implementation of the MCS methodology, we disseminated the Palestinian e-learning portal⁽¹⁾ among schools and teachers through adding a story-repository module to the portal. Under social networking menu, we have developed three interfaces:

- Story form: Used by the field researchers to submit their stories and metadata.
- Story view: Shows a list containing story titles, views, comments, edit/delete, like/dislike, etc.
- Story-query form: Provides a search engine based on story title, researcher's name, storyteller, date of entry: from-to, user name, collection place and date.

Figure 3 illustrates a sample interface, where field researchers have submitted 153 L1-stories. Afterwards, teachers, principals, and supervisors included in the SLIs were encouraged to read the stories, comment and/or agree/disagree. Unfortunately, the interaction has been noted to be very weak.

Alternatively, we have implemented another procedure as follows:

1. Each field coordinator nominated at least two stories from L1 that he/she believed to be the MS and had attractive titles. They have nominated around 45 L2-stories.
2. The 45 stories were distributed evenly on a three members representing the PMT, the MoEHE and QOU. Each member nominated five or six stories

(1) <http://dictionary.reference.com/browse/obstacle>

and exchanged them with the other two members. Then, the team unanimously chose 16 L3-stories (i.e. 10%).

3. Data analysts performed further analysis based

on the similarities among the L3 stories. They thoroughly read and sorted them out, according to the generated codes, into potential themes. After revision and refinement, we ended up with 10 MSC L4-stories.

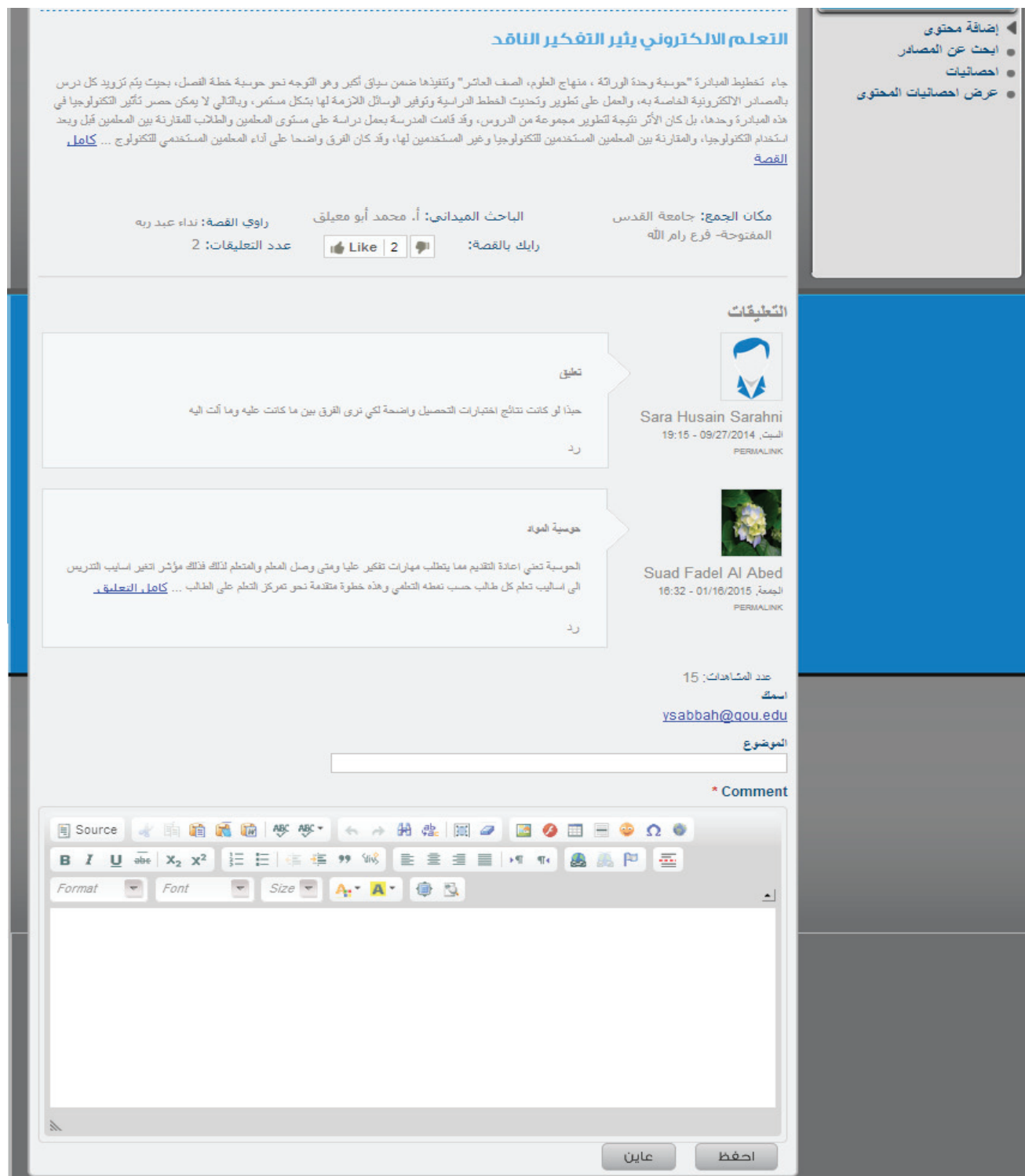


Figure 3: Story view

3.5 Validity and Reliability

In order to ensure the validity of the story collection, analysis and results, we have used a number of steps, as follows:

- A. Random selection. We have selected participants in the focus groups randomly.
- B. The sample. 92 schools (26% of the study population) to maintain a solid unbiased

representation.

- C. Use of controls throughout data collection. A clear coding system to organize relative data and to address each data element for each story and for the entire data set.
- D. Analysis process. Revision of 153 stories to find common themes and patterns.
- E. Verified individual response consistency. Confirmed appropriate responses and detected inadmissible responses.
- F. Accompanied notes and documentation about the stories.
- G. Dump the data. Categorized in tables, using consistent terminology.
- H. Checked data completeness. Availability of all stories and metadata.
- I. Double-checked coding. To ensure accurate coding.

Reliability refers to “The extent to which results are consistent over time and representation of the population is accurate, and if the results can be reproduced by a similar methodology” (Joppe, 2000). In order to achieve reliability, we have followed Hruschka’s (2004) method in three steps:

- A. Codebook creation: We generated an initial draft codebook and examined responses of 10 stories to propose a set of relevant themes. After discussion with the action research team, we agreed on a primary master list of codes.
- B. Codebook modification: Lead researchers reviewed and discussed the inter-coder reliability and concluded sufficient inter-coder agreement.
- C. Coding the entire stories and segmentation of text: We selected each story to capture a variation, segmented it into units of observations, and considered each code of a segment (e.g. a word or a sentence) as a measure. This has regulated interpretation without changing the content. We categorized and coded stories according to the draft codebook, and the team members reviewed and agreed upon the coding process.

4 Results and Discussion

The qualitative story-analysis and thematic coding resulted in significant changes in the five major categories. Table 4 and Fig. 4 summarize the number of excerpts found within the collected stories that show changes in each category. We examined each category in order to end up with the MSC and lessons learnt from each one of them.

Table 4:
Summary of Most Significant Changes (MSCs)

Theme/ Main Category	Teachers' Behavior	Students' Behavior	Education Towards 21 st C Skills	Community	Obstacle	Total
SUM	101	206	45	14	101	467
%	21.6	44.2	9.6	3.0	21.6	100

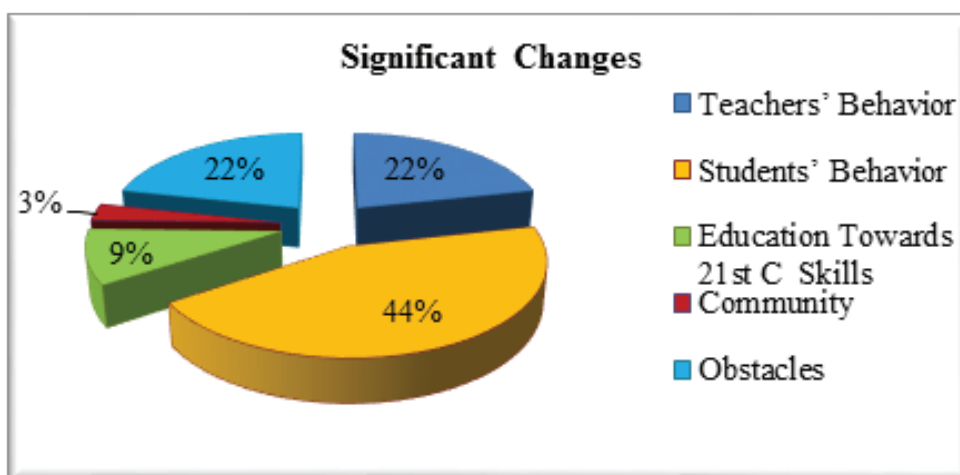


Figure 4
Significant changes

The major change occurred in the students' behavior (44%), which is logical, as they are ICT generation. Teachers' behavior came next at 22%, which is still acceptable as old teachers usually resist change. However, 9% of the excerpts shows the direction of education towards the 21CS. The reader should keep in mind that the story-collection occurred at the beginning of the action research, meaning teachers and students had not yet acquired these skills by that time, in other cases, had not yet been subjected to the concept. The least amount of change appeared in community at 3%. Finally, 22% show some kind of obstacles.

4.1 Teachers' Behavior

In general, research results have shown that teachers engaged students effectively in the learning process, offered them more opportunities to learn, and encouraged collaborative work. They used active, adaptable and ICT-based strategies that follow student-centered learning. Therefore, their classrooms became more active; they designed activities that allow

students to discover knowledge as active participants. They began to focus on students' needs, abilities and learning styles. Furthermore, teachers designed activities for collaborative and group learning, such as group projects, and internet-based small research, which enhanced the scope of students' learning, developed critical thinking, and strengthened the student-teacher and student-student relations.

Fig.5 summarizes the results of the teachers' behavior, where the largest portion (25.7%) has shown some kind of transformation in the teaching methods, from traditional to e-learning. 50% of teachers who reported these changes were from Hebron. In addition, 20.8% stated that they gave their students an important role as active participants. While 12.8% of teachers confirmed a reduced time spent in class preparation. In addition, 13.9% of teachers showed enthusiasm towards using ICT. A few participants (7%) stated that ICT reduced preparation efforts, since they reused the previous material. Finally, the MSC in teachers' behavior occurred in Nablus and Hebron.

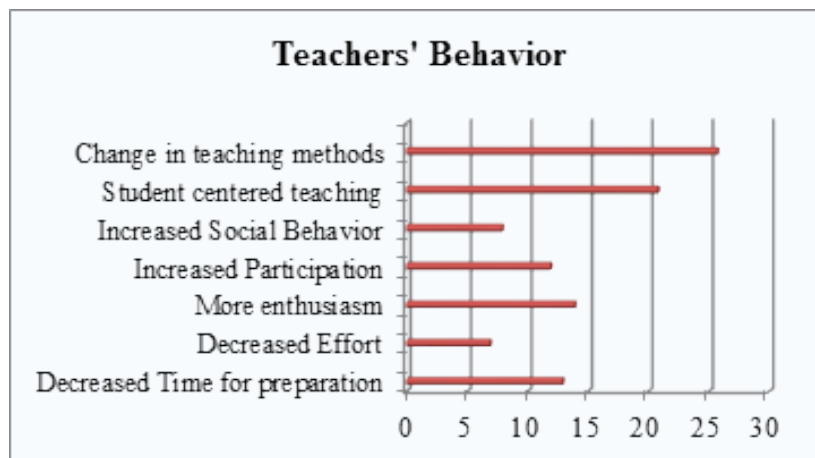


Figure 5

The percentage of change in teachers' behavior.

4.2 Students' Behavior

In general, students became more enthusiastic; they actively engaged in the learning objectives through group work using ICT, games, drama, social networks or other learning strategies. Active learning provided an enjoyable and entertaining atmosphere in the classroom; students themselves became more productive, creative, and cooperative. Shy students became more confident, and non-achievable students improved their achievement and participation. The results showed that many students did not have internet access at homes, which prevented them from getting the advantage of internet-based activities. Moreover,

many students did not have sufficient ICT skills and web security awareness.

The MSC appeared in students' behavior at 44% from their teachers' perspectives. Fig.6 summarizes the results, where the level of thinking increased in 34 excerpts supported with evidence. Students even developed analytical and critical thinking. Some of them showed deep understanding of the subjects, others showed some kind of reflection on complex concepts, and 25.7% began discussing topical issues after class using e-mail and Facebook. In addition, teachers recorded an increased student participation, motivation and well-being within a disciplined

atmosphere. Finally, our findings revealed that the insufficient change of teachers' behavior did not

prevent change in students' behavior, as 44% of the change was noted to be in the students' behavior.

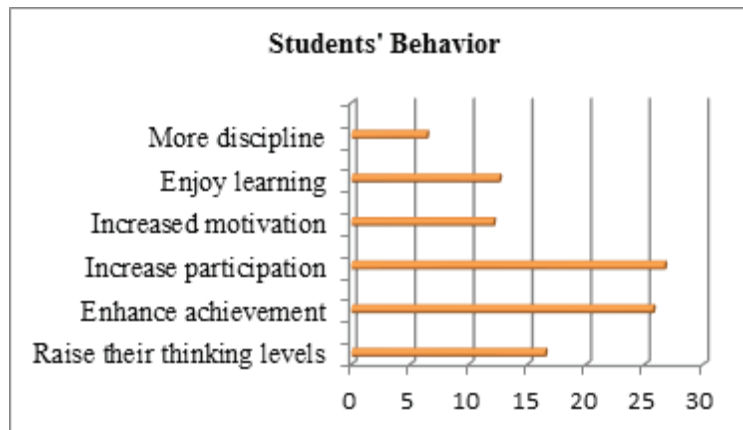


Figure 6

Change in students' behavior

Unsurprisingly, the more change in teachers' behavior the more change appeared in students' behavior, as shown in Fig. 7. This was clear in Nablus, where the MSC occurred in teachers' and students' behaviors were 33.6%, 28.3% respectively. Similarly in Hebron with 32.7%, 24.7% and to less extent in Jenin at 10.9%, 12.6%. This complies with the findings

of Keeley et al (2006) "ICT exhibited by teachers determines, largely, their behavior in the classroom and, ultimately, will influence students' behavior." This was not the case in Ramallah at 10%, 26.7%, where the least amount of change was found in the teachers' behavior and SC in students' behavior.

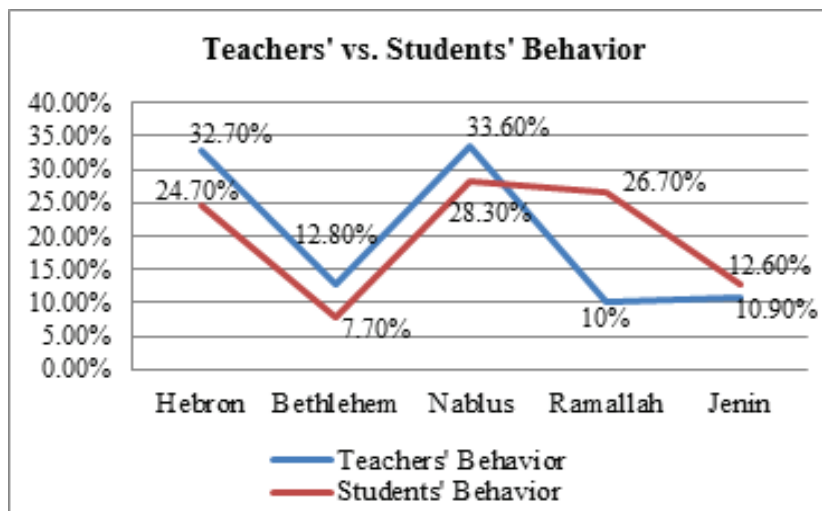


Figure 7

Change in teachers' behavior vs. students' behavior

The above discussion means that teachers' behavior unnecessarily affect students' behavior. There are still some debates in the literature regarding the impact of ICT in education. For instance, Al-Hawaj (2008) indicated that ICT had the potential to transform the nature of education. Mbah (2010) mentioned that ICT had a positive impact on the students' study habits, and Garrison and Kanuka (2004) comparative study showed that effective and efficient learning and success occurred in e-learning or blended learning

environment rather than in traditional one (Garrison, 2011). However, Leuven et al. (2004) stated that there is no evidence for a relationship between the increased use of ICT and students' performance.

4.3 Education towards the 21CS

The 21CS are a set of abilities that students need to develop in order to succeed in the information age. It describes the skills, knowledge and expertise

students must master to succeed in work and life. Furthermore, it is a blend of content knowledge, specific skills, expertise and literacies (KSRED, 2010; Greenhill, 2010). The stories have shown that some initiatives encouraged teachers to integrate the 21CS into their classes. Moreover, the role of the teachers changed dramatically, as they used different learning strategies and provided the students with opportunities to improve their learning skills. Some teachers used the available content to raise global awareness and civic literacy, which is essential for 21CS (NCREL & Metiri Group, 2003). Teachers acted as subject matter experts and facilitators. They employed active and flexible teaching strategies that promote 21CS, such as games, role-playing, drama, and group work. They deployed ICT when necessary in teaching to attract students and to facilitate the learning objectives, where students were able to think critically and creatively through problem-solving activities. Still, there was no clear vision and common understanding on 21CS. Moreover, some assessment tools should be developed to measure this change, based on certain MoEHE-level policy.

The necessity of ICT skills was not considered an arguable matter, and the link to the other 21CS was not clear. We suggested that ICT skills should be embedded

in the core subjects, since ICT can potentially bridge the gap between formal and informal learning environments. In addition, what students learn from and about ICT outside schools should be integrated in the curriculum. Similarly, what students learn at the school about ICT should be transferred to their daily lives. Moreover, 21CS should be delivered within the curriculum, which need to be redesigned, including learning and assessment methods.

Six groups of trends have been detected in the 21CS and the employment of ICT in teaching and learning. Teaching methods are the used pedagogy, general principles and strategies for instruction that fit the classroom demographics, subject area and teacher's goals. Results have shown that the use of MSC in the teaching methods was noted in both Hebron and Nablus at 28.6%, followed by Bethlehem at 21.5%, Jenin at 14.2%, whereas Ramallah came last at 7.1%, since its teachers had the least changed behavior.

Fig.8 depicts the MSC in 21CS, where 31.1% of the excerpts showed that teachers attempted to change their teaching methods. Other skills were also recorded, such as brainstorming at 26.7% and students as part of the teaching and learning process at 20%. A moderate change occurred in other 21CS, such as collaborative and active learning.

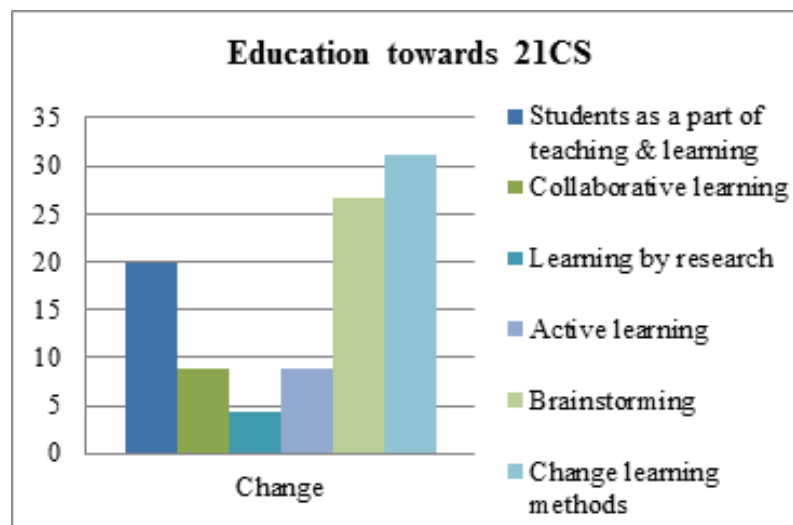


Figure 8

Change in the 21st century skills

It is necessary to find a national agenda for students' competitiveness that integrates the 21CS into the core subjects, so that students can master 21CS while learning languages, mathematics, science and other subjects. P21CS (2008) considered the 21CS as indispensable currency for participation, achievement and competitiveness in the global economy. Furthermore, Abu Ghazaleh (2013) referred to education policy-makers who widely accepted

that improved access to ICT in education could help individuals to compete globally by creating 21st century skilled work force and facilitating social mobility.

4.4 Community Changes

Community involves all stakeholders, including policy makers (MoEHE), parents, families, researchers,

youth organizations, content providers and educational organizations. The change of educational system outcomes entails collaboration among community members that affect this change. Many initiatives led to enhance teaching and learning, focusing on teachers as a corner stone to enhance learning outcomes. Although it is correct, strategies at different levels (e.g. national

policies and classroom practices) should be combined with the active involvement of all stakeholders. Fig.9 summarizes the percentage of community change. Employing ICT had an impact on community, mainly parents. It strengthened the relation of parents with their children and with teachers and schools.

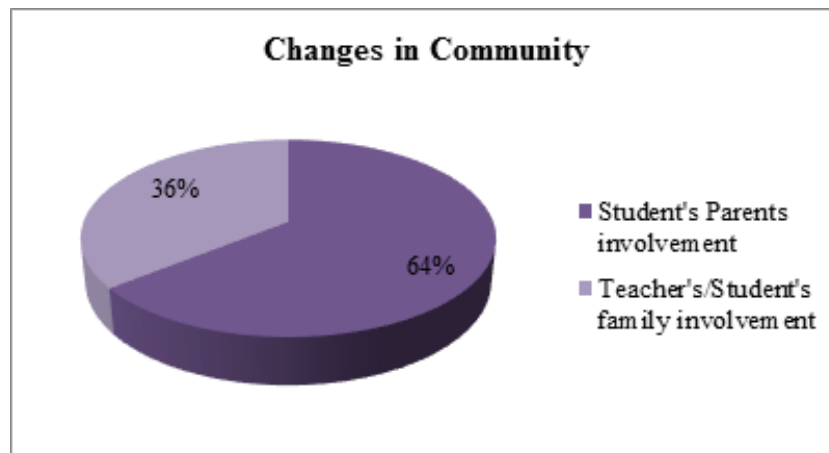


Figure 9
Change in community

Stories have shown that the lack of parents' awareness of 21CS took from teachers more efforts to implement these skills, especially ICT. Therefore, all institutes, which care for youth and curriculum, should cooperate to provide training to and raise the awareness of both teachers and students.

4.5 Obstacles

Teachers who participated in the initiatives faced many obstacles. The integration of 21CS entailed important changes in the curriculum and school's culture. Many teachers felt that the curriculum density, time restrictions, poor school-infrastructure and lack of training and technical support prevented them from using active strategies. Many families refused to have Internet, or prevented their daughters from using it,

especially Facebook. Moreover, old teaching methods, weak collaboration and knowledge exchange at the school level needed to be addressed.

Fig 10 shows the major obstacles that teachers faced while implementing ICT in education. Inappropriate or poor ICT infrastructure at school or home were the major obstacles at 31.7%. In addition, most of classrooms did not have computers, or they did but of low specifications or Internet access. Sometimes, teachers themselves did not have good ICT skills (25%), and 7% of them were unable to employ ICT or monitor its use at schools. In very rare cases (2%), parents rejected using social media in teaching their children. At the start of 2014, the Palestinian MoEHE decided to ban using social media in schools.

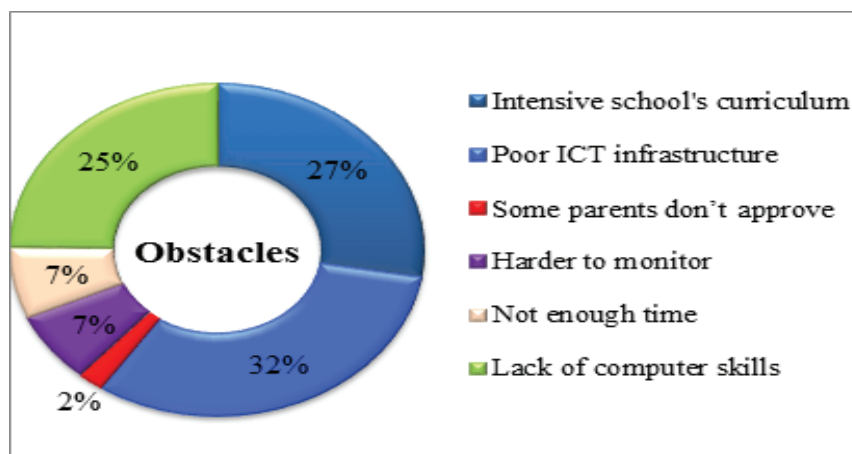


Figure 10
Obstacles

In order to overcome obstacles, teachers need professional training on 21CS in order to transfer these skills to the students. Moreover, students and their families need some training on ICT and raising their awareness on internet security. The MoEHE should redesign curriculum, improve school infrastructure, and encourage exchange of experience and knowledge among teachers.

5 Conclusion

Palestinian educators are aware of the importance of ICT integration in education and investment in ICT as a learning tool. Findings of this research revealed that despite the efforts to implement ICT in schools' education, it has not yet been promoted to the desired level. Although teaching has been gradually moving from lecture-based to ICT-based, most teachers and students have a limited use of ICT. Moreover, teachers implied that they did not have sufficient time, ICT skills nor technical support. Students on the other hand used ICT tools in many activities, but in few occasions. According to the above findings and results, educators should pay more attention to the use of ICT resources as a major component in the classroom activities. They also need to incorporate and effectively engage students in ICT-based learning.

We can summarize our conclusions as follows:

- The initiatives led to a set of successful stories. These stories can be considered to start implementing the 21CS at schools. This implementation entails great effort at the level of MoEHE and all the involved parties.
- High quality teacher training is required in order to develop the teachers' abilities to use various teaching methods and ICT tools to support students' learning and establish educational leadership at the school level.
- The schools infrastructure should be supplied with the needed ICT infrastructure and up-to-date technology to facilitate the teachers' job.
- Awareness programs are needed on the importance of 21CS skills, to encourage collaboration between different parties, such as teacher training programs and university researchers, as well as to organize conferences and debate on the importance of these skills among students and teachers.
- We need to ensure that there is a common language and understanding of the 21CS among all the communities, and assess accurately the reality of the schools, as well as develop a professional plan to integrate these skills into all subjects.
- Curriculum need to be redesigned to integrate all

the needed 21CS, including ICT. The new design should include a clear and rigorous assessment.

- Technology should be considered a powerful learning resource that can support the acquisition of 21CS. Moreover, ICT facilities ought to be made available in quantity and quality at schools to boost the opportunities of ICT use in the classrooms. Therefore, intensive ICT training should be conducted for teachers and students.

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