ICT Role in Yemen Basic Education and Awareness of Teachers

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Abstract

In the last decade, the rapid growth and development in the information and communication technologies(ICT) motivates schools and institutes to enrich and add a new dimension to the teaching and learning process in terms of using infrastructures, communication and information technologies. Twenty years ago, ICTs were very limited in Yemen as central to the overall learning process. Even in the most advanced schools in Sana'a the capital city; also, ICTs not considered central to the teaching and learning process. Now the information and communication technologies and their direct interaction to the society living standards and style of life have forced themselves gradually in the education process as part of new potential for positive changes. This study has gone through these vital changes in Yemen schools and education in general. It was aimed to have a deeper insight view into Yemeni primary & secondary schools and their ICT usage in relation with their education policy followed, also to have an insight look to teachers' opinions and attitudes against the use of ICT in the teaching and learning process. The result obtained and recorded, it was very promising in terms of setting up education policies and encouraging schools and institutes to change their education culture from typical style to a more modern and sophisticated learning that based on ICT.

Keywords: ICT, Yemen, School, Education, Learning Process.

1. Introduction

Yemen approved the National Strategy for Primary Education 2003-2015, the National Strategy for Technical Education and Vocational Training (2005-2014), in addition to the national strategy for the development of higher education 2006-2010 [1]. The majority of these strategies are looking forward to achieve the primary objectives of the integration of IT in the different stages of education [2,3]. The national ICT Policy meant to determine the long-term ICT goals, that support the mission of strengthening the education capacity in Yemen and to define the strategies that required reaching this goal [4]. Although the formal decision of such a policy is at the governmental level, it is important that all the actors support the policy and have a sense of ownership for it. The Yemeni educational institutes expected to define the long-term ICT goals they consider necessary in supporting the national educational goals. Subsequently they should distinguish common goals that must be coordinated at the national level, and institutional goals, that would be more suitable for achievement, within the domain of their own educational institute. Yemen was included in the Fast Track Initiative for the development of education presented by the World Bank. There are currently more than 600 schools equipped with computers. In addition, Internet service introduced to 55 percent of the Republic's schools, in addition to a dedicated computer course that introduced to secondary education. At the same time the Yemeni government, through the newly formed Ministry of Higher Education and Scientific Research (MoHESR) has the intention to improve the quality of education in order to produce better-qualified graduates of the institutes for Higher Education (HE) [5]. In such a context, the effective use of ICT in the educational setting is necessary, as prerequisite issue. A review of the ICT status in Yemeni HE demonstrated that the current situation was disorganized, threatening waste with parallel efforts leading to less than optimal results, or even failure. This was reason for the MoHESR to strengthen the capacity of higher education institutes (HEIs) to plan for ICT growth before rushing into specific ICT projects. The results of this initiative are the national ICT policy and the subsequent national master plan for ICT HE in Yemen and institutional-specific master plans for the implementation phase of ICT in the sector. A specialized IT center established in the Ministry of Higher Education as part of a program to establish an IT institute that will link Yemeni universities to a single information network. A number of public and private universities facilities are also teaching a number of ICT courses like Communication, Engineering, programming, computer science, and information science, but the curricula are not being updated enough to keep pace with rapid developments [6, 7]. Unfortunately, the

government of Yemen did not announce clearly and specifically its ICT policies in a well-organized manner to be understood as a separate entity within its general national policy; as the ICT projects are taking a considerable amount of the yearly budget of the country [8].

1.1. Problem statement:

A challenging and promising project in Yemen was supposed to be active and ongoing; it was called (INTALEQ) and stands for "Innovations in Technology-Assisted Learning for Educational Quality". It was supposed to be implement in 20 schools. These schools distributed within the capital Sana'a, Aden, Taiz and Hadramout. Starting February 2009.The project was supposed to focus on science and math subjects teaching through the web. For first grade of secondary education with skills and materials to prepare their students for the 21st century. Helping the country's educators learn how to integrate technology into the classroom and providing them with digital learning resources that fit the Yemeni curriculum. Unfortunately, this project and some other similar projects not implemented [9,10,11]. On the one hand, if those similar projects implemented and executed in a proper manner as planned then certainly the benefits of those kinds of projects were short-termed benefits that existed at that time for one complete year in the best scenario [12]. On the other hand, if the same conducted and performed in a poor manner, then this is another serious failure. Moreover, the same unsatisfactory progress existed in the sector of ICT vocational training and technical education that faces a number of specific challenges such as:
•Few number of schools has a limited ICT infrastructure.
•Irregular distribution of these schools among governorates of Yemen.
•Under-utilization of current ICT infrastructures in the schools.

One of the main factors that should focus on properly in a detailed manner is to understand reasons behind projects failures in terms of improving education performance at these schools. In fact, there are plenty of factors strongly affect the project success or failures. Such as limited resources, budget, ministry or school education policy …etc. Nevertheless, the study of teachers' perception and attitude towards the integration of ICT in teaching and learning process has importance that is more significant [13]. Hence, teacher perception study should include all factors influence that perception in a positive or negative way. Motivating and encouraging factors as well as frustrating factors and difficulties are all influencing

factors to teacher perception should considered in a form of research questions such as:

- What subject or course are you teaching mainly?
- What type of ICT hardware are you using for teaching? Tick all that apply
- What type of ICT software are you using for teaching? Tick all that apply
- How frequent ICT used in terms of teaching, management or something else?
- How would you describe your computer skills? Tick one only
- How did you gain skills in using computers? Tick all applicable
- Why do you think you are using ICT in your teaching?

In addition, the set of statements relates to barriers and factors that hinder ICT use considered in a similar form such as:
- Please state down in your own words the 3 things which are considered the most obstacles in preventing you from using ICT in your teaching (or use it very little):
- Does your school have ICT written statements?
- Do you have any idea if the Ministry of Education has an ICT policy?
- What about ICT use in education in general and how ICT use seen?
- What do you think will happen to the role of the teacher? (Tick as many as you like)
- What do you hope will happen in the future?
- What is the condition and level of ICT usage in Yemen schools?
- What is the impact of educational policy on ICT teaching in terms of hardware and software?
- Is there any resistance toward using ICT from teachers and staff to the ICT?
- What are the role of the government to encourage ICT usage?
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- What are the role of the government to encourage ICT usage?
- What are the motivators and encouragements for using ICT in teaching?
- What are the factors that obstruct teachers from using of ICT?
- What are teacher's views and opinions on the future utilization of ICT in education?

1.2 Research Objectives:

The study targeted to achieve the following objectives:
•To provide rich descriptive information on ICT usage in Yemen schools.
•To investigate the impact of educational policy on ICT teaching practice.
•To develop a theoretical perspective for teachers on why to use ICT in their teaching practice.
•To recognize the supportive influences on ICT usage
•To recognize the motivators and encouragements for using ICT in teaching
•To classify the factors that obstructs teachers from using of ICT.
•To explore teachers views and opinions on the future utilization of ICT in education.

2. Background of the Study

The country of Yemen has not made a major development during the last decade in implementing ICT in the teaching and learning environment in basic education [14]. The efforts made (if any) didn't meet the fast growth in other world countries in terms of both public and private primary & secondary education infrastructure and the related opportunities of incorporating the technologies of information and communication into such infrastructure [15,16]. If this situation remains, it will have undesirable impact on the outreach and the sustainability of education system in general and specifically on the future opportunities of enhancing the education policies with more ICT delivery. By analyzing the situation in developing countries and third world countries that have almost a similar situation to Yemen, it indicates that the teacher is the main factor that should focus on, regardless to common barriers and constraints such as budget, time, and education system policies. Therefore, this study mainly targeted teacher perspective and attitude to ICT involvement in the basic education system [17,18, 19]. In another word, the purpose of the study is to identify strengths, weaknesses, opportunities and threats of the ICT integration in education of Yemen. It also, assess the awareness of teachers to the same in order to carry out all needs and assessment requirements for the ministry and school's policies improvement, regarding the same and to build the awareness to the importance of the role played by the ICT policy field executers who are the teachers.

3. Research Methodology:

This section provides an explanation of the research design, methodology, and justification for the selection of methods. It also describes research instruments for data collection and analysis. In addition to verification and validation, techniques utilized the analysis.

4.1. Instruments:

Since the research is concerned with teacher's perceptions and feelings towards many issues related to the use of ICT in education, we had no choice to better explore and understand them other than plying data collection tools that associated with qualitative approaches [20].

❖ Interviews focus on social interactions and socially constructed meanings, and have concentration on the individual [21]. Nevertheless, the interviews would not be enough to obtain a widespread picture of the current situation or enough to generalize the findings. Hence, a questionnaire also applied in this research. Now combining questionnaires with interviews would not mean combining qualitative and quantitative models or paradigms in one research, it is rather integration between both at an apparent level in a single model or paradigm [22] and giving the research more coverage. Moreover, the combination of qualitative and quantitative analyses addressed in the field of case study research. Many experts in the field of socio-scientific research suggest using and combining several methods and called cross-examination to obtain results that are more valid. Cross-examination or triangulation when particularly exists on the combination of qualitative methods and quantitative methods are the best scenario in order to gain deeper insight and a more general view of the object of research. Actually, triangulation by integrating quantitative and qualitative steps of analysis, which always supports scholars to be more confident of their findings and can lead to a synthesis or integration of theories [23]. To have a better understanding of the research methods, the data collection procedures described here. The research consists of two phases: the first phase of the study was done through conducting interviews and site visits with schoolteachers and the second phase conducted through questionnaire. Firstly, the interview divided into two parts covering the two main themes of the study. Teachers were asked very general questions (i.e. general views on ICT in education), then they were introduced to the research issues (i.e. teacher's ICT usage and their perceptions of it, and ICT educational policy of schools or ministry of Education). Such interview was a semi-structured. It was open to allow new ideas to come up during the interview, because of what the interviewee says.

❖ Questionnaire designed then distributed. For statistical analysis of the responses. The questionnaire included a number of questions, which were of two types open-ended and closed-ended questions. An open-ended question asks the respondent to formulate his own

answer, whereas a closed-ended question has the respondent pick an answer from a given number of options. Unfortunately, there are some limitations in terms of interviews as well as questionnaires, the interview limitations occur and increase in the following cases:

- Conservative society like Yemen where the cultural setting somehow separate males from females and restrict face to face interviews with some teachers of the opposite gender, so the interviews were not done.
- One of the schools participated in the study is located in Aden, which is 350 KM far from Sana'a; therefore, phone interviews took place instead.
- Analyzing and interpreting qualitative interviews is very time consuming and not carried out properly.
- Some teachers may be due to their personality or mood did not feel convenient having an interview and they suggested a questionnaire instead. The reason might be different that they need to free up, sometime from school-congested schedule, for the interview to be hold.
- Misunderstanding of questions exist and cannot be detected and clarified at that time.
- There is a possibility that Interviewees (here are teachers) have not described their true perceptions and feelings.
- The compromise between Good-looking Questionnaire with minimal number of pages and terms of quantity and quality. Design and layout with a less number of pages may affect the questionnaire's content.
- Demographic limitation with the fact that respondents must be able to read the questions and respond to them.

4.2. Sampling Technique

It generally known quantitative studies usually use a much larger sample size than qualitative studies; this is because qualitative research usually aims to reflect the diversity within a given population instead of seeking a statistical form of representation.

4.3.1 Interviews & Questionnaire Sampling

For the Interview, five teachers elected from different experiences regarding their responsibilities in the school. Therefore, interviews included teachers with ICT coordinating responsibilities, and classroom teachers. In this study, teachers interviewed selected based on

purposive sampling technique. The goal of purposive sampling is not to randomly select units from a population to create a sample with the intention of generalizing. The goal is rather to focus on particular characteristics of a population that are of interest, which will best enable you to answer your research questions [24].

As for questionnaire sample, simple random sampling selected. Simple random sampling method used for population-based surveys. Rapid surveys are no exception, since they too use a more complex sampling scheme. The main reason is to learn the theory of sampling with the fact that simple random sampling is the basic selection process of sampling and is easiest to understand. If everyone in a population could be included in a survey, the analysis featured would be very simple. The average value for equal interval and binomial variables, respectively, could easily derived using some formulas. Of course, when measuring everyone in a population, the true value occurred. Thus, there is no need for confidence intervals. When the true value in a population estimated with a sample of persons, things get more complicated [25].

4.3.2 Schools Selection

Five schools selected for study in Yemen. Such selection based on the significance of the case for the objectives of the study, rather than statistical model. Diversity factors taken into consideration for the selection of schools included type (private / government), language of instruction, level of education, gender type (male/female) for secondary schools, enrolment (50 pupils to 500 students for primary schools), and geographic location. In order to emphasize on the diversity factors taken; the table 1 below shows major factors of diversity in selected schools where:

•Among five selected schools, which are located in major cities; four in Sana'a and one in Aden.

•Among selected schools are three English speaking school, and two Arabic speaking schools.

•Three of the selected schools are private and the other two are public.

•Three of the schools are mixed gender (male & female) students; one was gender male school, and the last one was gender female school.

•Finally, two schools were elementary schools; the other two mixed elementary/secondary, and the fifth one was secondary school.

Table1: Schools and their major factors of diversity

School	Type of ownership	Gender	Type of education	Language of instruction	Location
Turkish school	Private	Mixed	Elementary & secondary	English	Sana'a
Abaan school	Government	Female		Arabic	Aden
Kids Planet school	Private	Mixed	elementary	English	Sana'a
Hawrash school	Government	Male	Elementary & secondary	Arabic	Sana'a
Manarat school	Private	Mixed	elementary	English	Sana'a

Schools characterized into either positively or negatively by the following:

- Teachers trained in ICT;
- Student access to computers for at least one hour per week during coursework and one hour for self-directed use;
- Use of ICT as an educational tool (in teaching, learning, auto-learning and research);
- Access to information related to the establishment (school results, training needs of school teachers, calendar, etc.);
- Commitment to making achievements in ICT durable.

4.4 Validity & Reliability

To ensure the validity of the tool, the questionnaire revised by a number of intermediaries with knowledge in ICT related issues to education and its applications. In testing the questionnaire's validity, the requirements of the subjects are checked if they really covered the research problem, also the questions are checked whether they are easy understandable, and cause no confusion to participants when answering them. Researcher after consulting the concerned to critic the paragraphs of the questionnaire in terms of comprehensiveness, adequacy, and clarity of the paragraphs; he had to measure those amendments if they reflect the appropriate design for what it should measure in this subject. Reliability is the degree to which an assessment tool produces stable and consistent results. In this study; researcher will use the test-retest reliability to measure the reliability obtained by administering the same questionnaire twice over a period which two weeks to some individuals. The results from first time and results after two weeks correlated in order to evaluate the test for stability over time. The obtained correlation coefficient indicated the stability of the results or scores.

5. Theoretical Framework:

The theoretical framework shows dependent variable, independent variables and relations between them. In fact, dependent variable concerns about the efficiency of ICT in Education in Yemen; which means the productivity measures towards a successful implantation of Information & communication technologies in the teaching and learning processes. Whereas, independent variables concern about direct relationship with the dependent variable. Such variables indicated in figure1 and listed below as the following:

- Teacher perception towards ICT in Education
- Reasonable Financial support
- Encouraging ICT policy from Ministry of Education or School
- Availability of ICT educational models and Training
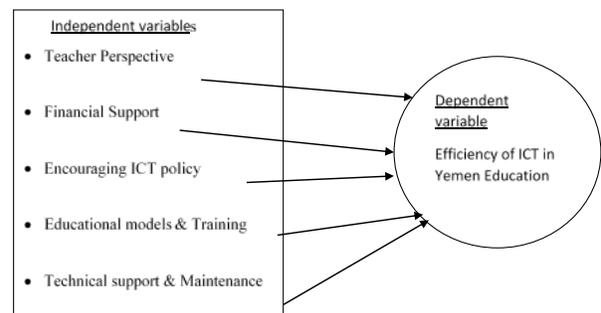- ICT Technical support & Maintenance

Figure 1: Theoretical Framework Summary

Based on the above a detailed planned overview on the design and methods of the study was prepared; describing the two main phases of the research: an initial qualitative phase, followed by survey development and administration. Figure 1 below describes the overall research design, which made to ensure the consistency and comprehensiveness of the study. Research questions carefully linked to the research design and methods in a way that answers the questions and satisfies the main seven objectives stated in section 1.2.
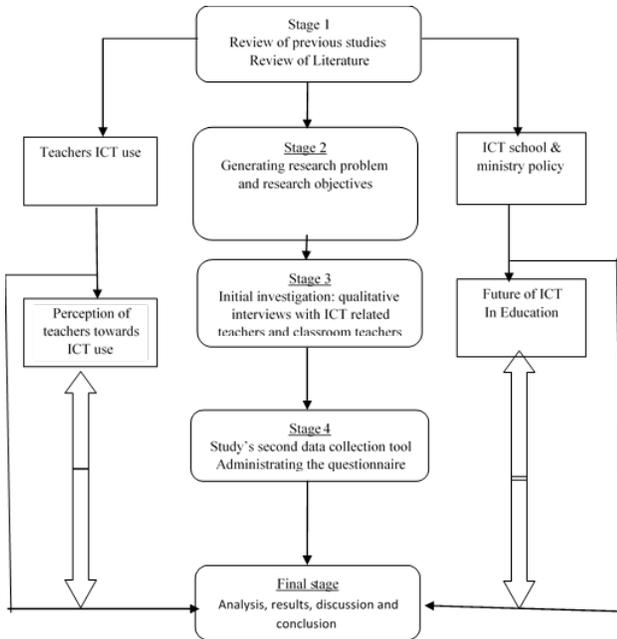
Figure 2: Overall Research Design

6. Analysis of Experiment Results:

This section focuses on methods, instruments and design framework implementation in addition to presentation of findings derived from such techniques and collected data.

6.1 Interviews and Site Findings

The main purpose of the interview specified for ICT infrastructure availability in schools, important items are recorded in table 2.

Table2: ICT infrastructure availability in schools

School	Computer Lab & Equipment	Technical Support & Maintenance
Turkish school	➢ 2 computer lab with 26 networked PC's in each lab ➢ Most of classrooms equipped with an interactive whiteboard ➢ Laptop to every teacher ➢ Total of 100 PC's + laptops ➢ PCs in staff room ➢ Printers available for teachers and many times for students ➢ Nonstop Internet connection ➢ School website	➢ Maintenance department in school ➢ More than one technician provide support for all the school ➢ Sub-contract for on-demand support from vendors ➢ Equipment warranty
Manarat school	➢ One computer lab with 22 networked PC's ➢ Some classrooms are equipped with a PC and Data show. ➢ PCs in staff room ➢ Printers available for teachers and sometimes for students ➢ Internet connection ➢ School website	➢ On-call maintenance contract ➢ Phone technical support is used ➢ ICT teacher provides technical support
Kids Planet school	➢ One multimedia room with PC and fixed projector ➢ One computer lab with 17 PC ➢ Portable data show ➢ 2 PC's & 1 laptop for Admin	➢ Rare cases of contracted services from a free lancer ➢ ICT teacher provides basic technical support
Hawrash school	➢ Printers fully allowed to staff & teachers and restricted use by students ➢ No school website ➢ One resources or multimedia room ➢ one PC & data show projector in resources room ➢ One computer lab ➢ 21 networked PC's in Lab ➢ 2 Printers available for teachers ➢ Internet access for teachers and very limited for students ➢ No school website	➢ICT teacher provides technical support. ➢ Limited support from the ministry only on complicated escalated problems.
Abaan school	➢ One Lab and the same is the resources multimedia room ➢ 25 PC & one data projector ➢ Limited printing facilities ➢ There was Internet access but now disconnected. It used to be for teachers only. ➢ One laptop for the school head ➢ No school website	➢ ICT teacher provides technical support. ➢ Limited support from the ministry only on complicated escalated problems. ➢ Aden local provider equipment warranty

School	School Management Awareness	Teachers & Staff Training
Turkish school	➢ Teachers must use ICT in interactive teaching ➢ Minimum level of ICT skills required ➢ Preferential treatment for teachers who use ICT. ➢ A plan to copy the Turkish initiation started by Ardogan to Yemen where all students will get Ipad. A pilot project started and still under review.	➢ Initial training course for new teachers ➢ Knowledge transfer sessions by Expats local teachers & staff ➢ Continuous tailored ICT training courses based on teachers needs
Manarat school	➢ A cancelled policy of giving laptops to students ➢ Semi-interactive learning ➢ E-mail communication with parents ➢ Promotion of teachers" ICT use ➢ Promotion of effective utilization of school website ➢ New teachers should have minimum ICT skills	➢ Well organized in-school training by a trainer. ➢ Periodic ICT training programs to staff & teachers. ➢ Acceptable outside ICT training for key staff.
Kids Planet school	➢ primitive school plan for ICT implementation ➢ Simple promotion of teachers" ICT use ➢ Facilitate teachers" ICT training ➢ Students are not allowed to bring laptops	➢ Outside training funded by school to ICT teacher ➢ Teacher-teacher training
Hawrash school	➢ ICT teacher provides technical support. ➢ Limited support from the ministry only on complicated escalated problems.	➢ ICT dedicated teacher trained by ministry. ➢ Teacher-teacher training ➢ Unplanned in-school training by ICT teachers
Abaan school	➢ Students are not allowed to bring laptops ➢ No school plan for ICT implementation ➢ Minimum encouragement of teachers" ICT use.	➢ ICT dedicated teacher trained by ministry. ➢ Teacher-teacher training ➢ Outside private training by teachers themselves and on their pocket.

Most of interviewed teachers had positive views about the importance of ICT introduction to schools. Teachers tried to provide detailed answers to some questions but some of them could not give precise answers on the part of the ICT usage, on the other side many of the interviewees could not answer the part related to the school or ministry of education policies related to ICT introduction to primary schools. It is noticeable from the below table 5.1 that private schools by far have exceeded the government school in implementing the ICT in the process of teaching and learning, this is simply because private schools can overcome the budget constraint more easily while both

kinds of schools share the same other constraints. There is, a considerable number of government schools, that have moderate computer labs, and this is because of donations that come from European Union and other donating organizations. The biggest one was on 2010 where two hundreds schools around Yemen was equipped with a computer labs.

1.1 6.2. *Questionnaire's Findings*

Questionnaire finding focuses on some important factors, which listed as follows:

1) Participants' features that include age, gender and experience in teaching. Table3 and figure 3 show the results.

Table 3: Participant's' features

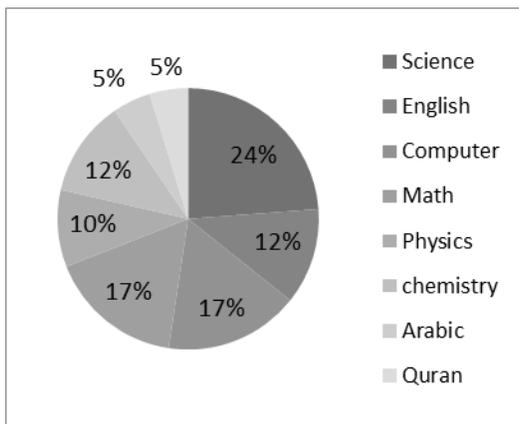|					
1)	Age range (years):	17%(20-29)	26%(30-39)	38%(40-49)	19%(50+)
2)	Gender:		38% Male	62% Female	
3)	Experience of teaching in number of years): 2%(1) 21%(2-5) 26%(6-10) 50%(11+)				

Figure 3: Teachers with subjects of interest

2) Teachers' Use of ICT in terms of computer access at home as well as at school. Table 4 shows a positive high rate of access to computer at home and school. However, access does not mean full usage; it just means that computers are available for use.

Table 4: Access to Computers

You have good access to a computer at home	**72%** Yes	**28%** No
You have good access to a computer at school	**82%** Yes	**18%** No

3) Teacher's use of ICT in terms of hardware and software in teaching, Figure 4 and Figure 5 shows a positive high rate of access to computer at home and school. However, access does not mean full usage; it just means that computers are available for use
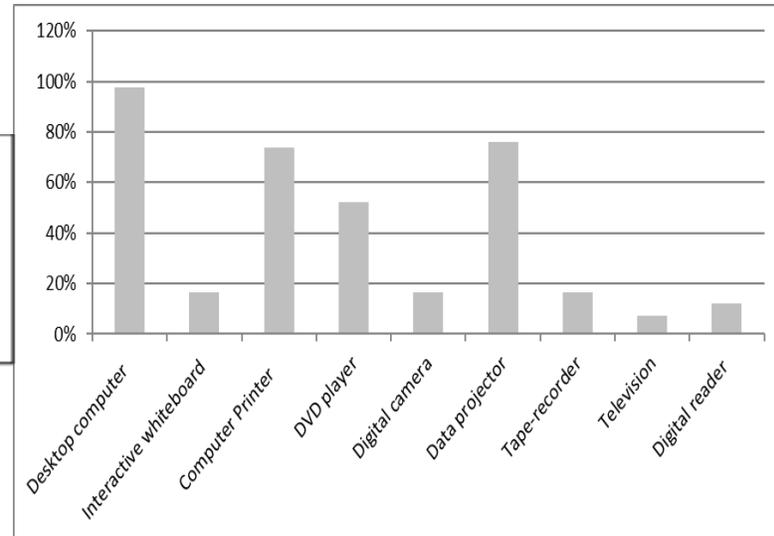

Figure 4: Hardware used in teaching

Figure 4 above illustrates that a PC or a desktop computer is the common hardware used by all teacher as a mean. Data projector comes after with also high percentage of usage bearing in mind that most of data projectors need a PC to work with. Printer also is a tool for teacher to distribute specific topics to student in addition to teacher admin work of preparing exams and registering students score. If this study made three years ago, we would find Zero percentage of interactive whiteboard usage, but as seen above there is a promising value that for sure will increase in the future. In some countries, the interactive white board, which considered as top scale hardware used for integrating ICT in education at least from teacher's perspective.
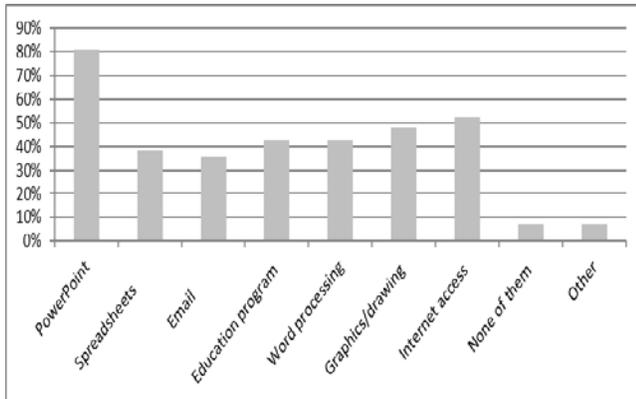
Figure 5 ICT Software used in teaching

ICT software used in teaching is actually different from ICT software used by teachers; as the second can be a lifestyle usage of the teacher and is not related to the teaching process. From the figure 4) PowerPoint application was most used software and this is because it is the most known presentation application by everyone; and this also explains why data projector was a major hardware in ICT. Internet access mentioned as a second, followed by graphics and drawing applications. It was expected that Word Processing tool a higher rank but may be some teachers thought it different and didn't know it is MS-Word which was reported to be used by almost half of participants. Educational programs unfortunately are not the major software used. In some private schools, the ICT educational programs are part of the curriculum and are part of the teaching delivery process. While in government schools, it is up to teacher to decide on the software used and the delivery process.

5) Use of ICT in other aspects such as internet access, emails, administration and communication. Table 5.3 shows the results.

Table 5: Frequency Rate of ICT Use

Purpose	Very often	Often	Some times	Rarely	Never
How frequent, ICT used when you are teaching classes?	17%	33%	21%	21%	7%
How frequent, Email used for professional purposes?	31%	24%	21%	12%	12%
How frequent, Internet access is used for retrieving information, ideas etc.?	14%	17%	31%	17%	21%
How frequent, ICT used for administration purposes (e.g. reports, students' records, etc.)?	50%	24%	12%	10%	5%
How frequent, ICT used for communicating with students?	12%	17%	21%	26%	24%
How frequent, ICT used by your students in classroom lessons you are teaching?	17%	21%	24%	19%	19%
How frequent, ICT used for communicating with other teachers and school colleagues?	24%	33%	24%	0%	19%

ICT used by students in the classroom had a lower value, which reflects that student's hand-on time is somehow limited to the computer lab and not in the classroom. Half of teachers (50%) reported that ICT used very often for

administration purposes (e.g. reports, students' records, etc.). However, Internet access not often used for retrieving information and ideas.

6.3 Obstacles and Barriers in using ICT in teaching & learning

1) The set of statements relates to barriers and factors that hinder ICT use, six statements to the things, which obstruct teachers, were not enough to cover all areas and things, which hinder teachers from making efficient use of ICT in teaching and other related professional duties. As shown in Table 6; Five-point scale was used to show the extent or degree to which teachers agreed or disagreed with each statement. The above table shows the percentage of teachers selecting each of the response keeping in mind that only one degree of agreement/disagreement selected as asked by the questionnaire, and this is to avoid the ranked order based on the combined strongly-agree/agree or disagree/strongly-disagree percentages.

Table 6 Obstacles in using ICT for teaching

Obstacle	strongly agree	Agree	Neutral	Disagree	strongly disa
Lack of educational models on how to use ICT for learning.	21%	31%	7%	19%	21%
Insufficient number of computers and resources	55%	24%	14%	7%	0%
School time organization (fixed	43%	24%	17%	12%	5%
School space organization (classroom size and furniture, etc.)	31%	19%	17%	26%	7%
Pressure to prepare students for exams and tests	36%	24%	5%	17%	19%
Lack of awareness of ICT advantages. ICT not seen as a whole school priority.	60%	12%	7%	21%	0%

The top ranked statements, which got agreement levels (strongly agree + agree) was "Lack of awareness of ICT advantages. ICT not seen as a whole school priority" with (60% + 12%), "Insufficient number of computers and resources" got (55% + 24%) in addition to "School time organization (fixed lessons time, etc.)" statement with agreement level of (43% + 24%).

6. 4 Teacher perception towards ICT & education future

1) Views about ICT use in education in general, and how ICT use is seen, twelve statements were presented using a five-point scale (ranging from strongly agree to strongly disagree) to define teachers' views, feeling, and perceptions towards the use of ICT in education.

Table 7: Teacher perception towards ICT

perception	strongly agree	Agree	neutral	disagree	strongly disagree
Greater efficiency throughout the school	29%	45%	24%	2%	0%
Communication channels are increased through email, discussion groups and chat rooms	29%	31%	31%	10%	0%
ICT makes teaching enjoyable, changes routine.	36%	33%	19%	5%	7%
ICT has an important part to play in teaching and learning generally.	57%	29%	7%	7%	0%
ICT improves students result performance.	24%	19%	38%	14%	5%
Using ICT can save time and effort	31%	38%	5%	17%	10%
ICT increases cooperation between teachers	10%	29%	45%	12%	5%
ICT has a positive influence on student's interaction and attention	45%	31%	19%	5%	0%
ICT use improves teachers & students research skills	33%	50%	10%	7%	0%
Ability to represent concepts, experiments, and natural phenomena	43%	31%	10%	10%	7%
ICT use maintains quality in all lessons delivered during the day	33%	26%	24%	12%	5%
ICT makes work easier	21%	43%	12%	17%	7%

Table 7 shows the percentage of teachers selecting each of the response or view related to this topic and shows positive perceptions in general from teachers towards ICT use in education. This shown by all statements, which achieved a higher percentage of agreement except for the statement "ICT increases cooperation between teachers" which got less agreement in compare with others. The top

ranked statements which got agreement levels (strongly agree + agree) was "ICT has an important part to play in teaching and learning generally" with (57% + 29%), "ICT use improves teachers & students research skills" got (33% + 50%) in addition to "ICT has a positive influence on student's interaction and attention" statement with agreement level of (45% + 31%). On the contrary; the statement "Using ICT can save time and effort" was the most rated disagreement by teachers, which reflects a dominating impression that using ICT is a time-consuming task and needs appropriate preparation and in return, it is extra time and effort instead of saving them.

2) What do you think will happen to the role of the teacher? (Tick as many as you like), role of teacher in the future is still under debate everywhere for its ambiguity in determining exactly the role played by schoolteachers in the future. Nevertheless, our participating teachers have ranged the future changes from a superficial change such as "Teacher will not have a text book" to a deep serious change like "Change to facilitator and advisor" or "Change in terms of relationship with students".
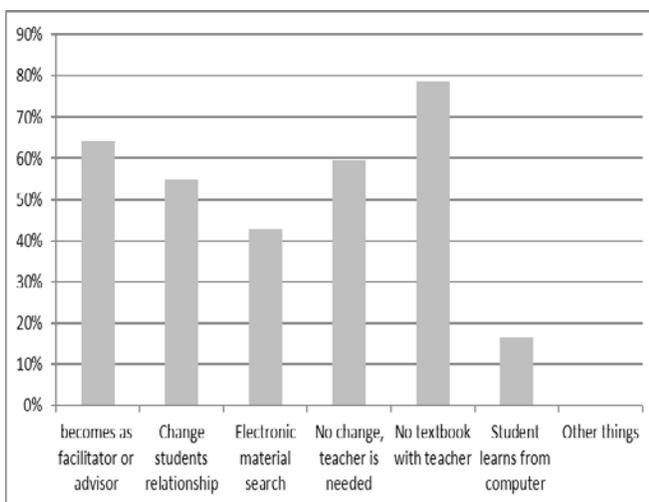

Figure 6: Future role of teacher

As shown in figure 6, the most chosen response was "Teacher will not have a text book" with a

percentage of (79%). After that, it was "Change to facilitator and advisor" response with a percentage of (64%). Nevertheless, 60% of teachers believed that their role would not change since students need someone to teach and guide them where to find information.

3) What do you hope will happen in the future?
•Teacher - Take care of teachers in terms of salary and standard of living (16 comments)
•System - Renew and improve the education system in general (12 comments)
•Student – student respect for teachers and knowledge in general (3 comments)
•Training – Continuous ICT training either internal or external (13 comments)
•School setup – plenty of computer labs and computers (8 comments)
•Curriculum - customized electronic curriculums (4 comments)
•Generic – wish the peace and development to Yemen (2 comments)

7. Conclusion and Recommendations:
  1) Introduction

This section summarizes the whole research work based on the results of data analysis. It also provides the general recommendations out of this study and the future recommendation and suggestions to continue the same study on a large scale and have a solid assessment on ICT integration in teaching and learning process and current situation of Yemeni schools.

  2) Discussion

There is no clear policy from the ministry of education on the use of ICT in schools, and hence the relationship between this ambiguous policy and the general perceptions towards ICT is definitely lacking in Yemen basic education. Yemeni teachers are not encouraged to make routine use of ICT in their teaching and learning process under such relationship. All private schools and institutions; which are intending to provide ICT experience in their education programs, realize very well that they will bear all costs and hence provide higher prices for

students who are our targeted people to develop. Hence, ministry of Education and ministry of vocational and technical training along with outside supporting countries donors should think of a mechanism with which costs of such integration of ICT shared between them and private schools. On the university level, some private education institutions tried to make a number of courses available for students to study through the websites within an initiative to adopt the idea of distance education. However, there were many limitations since distance education applications are still in their establishment period in Yemen.

3) Conclusion

In Yemen, the biggest barriers to a successful ICT implementation in Education are many, and they summarized, under main categories of constraints such as:
- Teacher motivation constraint
- Know-how constraint
- Budget constraint

Moreover, Yemeni educational organizations and mainly the ministry of education seems not be able at that moment to handle other related issues to the ICT implementation such as arrangement, organizing, inspections, staff preparation …etc. Hence, it should be the whole nation problem where prime minister and president of country have to be concerned and responsible about it. It should be on the top list, of the country master plan, and should not be underestimated. Throughout the study, it is obvious that teachers are the main factor and play a crucial role in promoting or delaying the usage of ICT in the classroom. Moreover, they can easily convey their opinions and principles to their students and affect their attitudes towards ICT usage in the learning environment. Hence, it is important to understand and appreciate teachers' attitudes towards this challenging topic and study their perceptions towards computers in general. This will ensure to some extents that

students of this generation and the next generation will have equal and fair ICT experience in their learning process compared to other nations.

4) Recommendations and Future Work

Ministry of Education with the help of other education authorities including private schools have to setup proper and clear guidelines to leverage the ICT role in education to another level of real practice. This achieved, by setting up education policies that force or at least encourage schools to change their education culture from typical style to a more modern and sophisticated learning experience.

References

[1] United Nations New York, "Yemen Profile of the Information Society", 2009.

[2] Ministry of Planning and International Cooperation, "YEMEN COUNTRY REPORT" UNESCO, Yemen Report - http://www.unesco.org

[3] WikiPedia (http://en.wikipedia.org/wiki/Yemen)

[4] The National Report Ministry of education," Yemen National commission of Education & Culture and Sciences".

[5] Yemen TVET and GTZ (German Organization for Technical Cooperation)

[6] WikiPedia "Information and Communications Technologies in first nation's schools "2009 / 2010.
    - http://en.wikipedia.org/wiki/Yemen)
    - http://en.wikipedia.org/wiki/Semi-structured_interview

[7] Dr. A. AlThawr- "Youth in Technology for Community Development Situation analysis" - Sana'a University - August 2009.

[8] UNICEF, "Situation Analysis of Children in Yemen", 2014, available at https://reliefweb.int/sites/reliefweb.int/files/resources/Yemen_Situation_Analysis_report_-_English_Final.pdf

[9] M. Moses, "Introduction of ICT in Schools and Classrooms in Cameroon", 2008.

[10] M. Mbangwana, "Introduction of ICT in Schools and Classrooms in Cameroon", In K. Toure, T.M.S. Tchombe, & T. Karsenti (Eds.), 2008.

[11] M.AlSharija, "Innovative leadership by school principals: Embedding information communication and technology in Kuwaiti schools", JJ Watters - Journal of International Education Research, 2012

[12] S. Wheeler, "The role of the teacher in the use of ICT", Keynote Speech delivered to the National. Czech teacher's conference, University of Western Bohemia, Czech Republic, May 2000. Retrieved from http://www2.plymouth.ac.uk/distancelearning/roleteach.html.

[13] J. Hinostroza, "ICT in education policy and practice in Chile: Does it correlate?", 2010 Paper presented at the 4th IEA International Research Conference, Gothenburg, Sweden, 1–3 july

[141] D. Light, "The role of ICT in enhancing education in developing countries: Findings from an evaluation of the Intel teach essentials course in India, Turkey, and Chile", Journal of Education for International Development, 4(2), 1-15, 2009

[15] E. Byker, "ICT in India's elementary schools: The vision and realities", The International Education Journal: Comparative Perspectives, Vol 13, No 2, 2014

[16] Oyaid, "Education policy in Saudi Arabia and its relation to secondary school teachers' ITC use, perceptions, and views of the future of ICT in education", (Unpublished doctoral dissertation). University of Exeter, Exeter, UK, 2009

[17] A. Pellicia, " What is the Role of ICT Teachers in 21st Century Teaching and Learning?: An Argentinian Perspective", Online edjournal, Vol. 1, No. 1, Nov. 2010.

[18] Hamdy, A. (2007), "ICT in education in Egypt", official report, available at: www.infodev.org (accessed April 12, 2010).

[19] Hamdy, "ICT in Education in Sudan". Infodev, World Bank, 2007, USA. Available:

http://www.infodev.org/en/Publication.430.html

[20] Bamenda and Langaa, "ICT and Changing Mindsets in Education" Mali: ERNWACA / ROCARE.

[21] Ministry of Labour, GTZ & UNESCO, accessed through www.unesco.org, 24 June 2008.

[22] A. Bryman, Social research methods (2nd ed.), New York: Oxford University Press, 2004.

[23] A. Diekmann, Empirical Social Research: Basics, Methods Application (10th Ed.), Hamburg: Rowohlt, 2003.

[24] Laerd Dissertation, "Research strategy – Purposive sampling",   available at: http://dissertation.laerd.com/purposive-sampling.php

[25] R. Frerichs, "Rapid Surveys", (Unpublished), 2008, [Online] Available   at: http://www.ph.ucla.edu/epi/rapidsurveys/RScourse/RSbook_ch3.pdf.

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