

TAMAM PROJECT

USING TECHNOLOGY FOR
STUDENT UNDERSTANDING

AMMAN BACCALAUREATE SCHOOL

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INTRODUCTION:

According to Wiske (year of the reference), technology is defined as “any tool beyond the ones traditionally used in classrooms. It is somewhat new and has the potential to enhance students’ understanding in significant ways”. Technology can include “video, graphing calculators, computers equipped with any kind of software, the Internet, or digital probes”.

In the last ten years, ABS took a huge leap in providing every section of the school with technology. ABS has around 400 networked computers with Internet access, 4 Educational Technology (ET) labs and 4 cluster labs. The media centre is equipped with computers and printers. Each classroom has an interactive board with a computer. The school has around 70 specific software, examples include Inspiration, Kidspiration, Coral Draw and GIS (Geography Information Systems). Online educational subscriptions include Encyclopedias, Renzulli, Turn it in, Eskidenia (data) and Rediker (management system). The school intranet is known as Learning Zone, which can be accessed by teachers, students and parents at home for learning materials and educational resources. In addition, ABS has a website that provides students and parents with general information concerning upcoming events, school policies, and mission statements.

One of the school’s goals found in the ET strategic plan is the integration of ET in the classroom. ET should be used as tool for alternative methodology in teaching. The technology will be applied effortlessly within the curriculum to facilitate teaching and student learning. All ET activities done in the classroom are archived and linked through the curriculum and posted for the school community to access via the Learning Zone.

ABS has 4 ET teachers, one IT manger, 4 ET support staff, a web master, and one E-learning coordinator. The ET department is supervised by the Vice Principal. All staff, whether new or old, is given training in ET. A workshop is given to all new staff as an in service training. Furthermore, workshops conducted by local institutions are regularly attended by staff. In addition, when new software or hardware are introduced, which occurs continuously, professional development is given on the integration of these tools within the curriculum. For example, the ICDL training and Atomic Learning were offered to all teachers. Furthermore, the E-learning coordinator conducted 3 training sessions on Smart board technology. At the end of every session, teachers had to perform a task in

order for them to graduate to the next level. Every year the ET department encourages teachers to present one good practice that highlights quality teaching using technology

The ABS board and administration supports staff by providing a large budget to purchase technological software and hardware and to train staff in order to achieve the school strategy towards improving the quality of teaching in technology within the classroom. This commitment and interest encouraged the TAMAM team to focus the innovative project on “assessing the use of technology for student understanding”.

Research question:

The main research question is “What changes in student’s performance could be attributed to the quality of teaching in technology?” In order to answer this question, we need to identify the different types of technologies used by teachers and students. We also need to determine how frequently the technologies are being used. Furthermore, teachers and students will evaluate these technologies by discussing their benefits and limitations. Lastly, we need to measure student’s performance in order to assess the effectiveness of these technologies in the learning process.

Purpose of action research study:

This action research is used to investigate the quality of teaching in technology and its impact on student performance. The evidence will show that technology either has a positive influence on the performance of students or impedes student performance. In any case, this study will allow the strategic planners to evaluate their goals and strategic plan.

Rational of the action research study in terms of the school context

The School Board invested large sums of money in hardware and software and employed experts to train staff. Therefore the need for evaluation is valid. The assessment is directed in this action research on teachers and student performance. If teachers are using technology, the evidence needs to be assessed, in order to highlight the benefits and limitations for teachers who do not use technology in their pedagogy. If the evidence is encouraging, this research should be taken as a benchmark for further investigations.

Significance of study in terms of context.

Every five years the school updates its strategic plan. In 2009 the school will prepare a plan that encompasses the next five years. This action research study will help the strategic planning committee assess their last strategic plan (2006-2010).

This study could be shared with teachers to highlight the effectiveness and values attributed to the use of technology. It also could be shared with students as they are the main measure in evaluating such an innovation in the school. This research will strengthen the conviction of the school towards using technology as a teaching tool. This study could be shared on a wider scale with the surrounding school community for many reasons. Firstly, ABS is known to be the pioneer school for many things such as establishing the International Baccalaureate Programmes. It is natural that we aspire to be role models as one of the top schools in Jordan that uses technology effectively in the classroom. With this goal established, new staff and new students will be determined to become part of such a progressive school community.

METHODOLOGY:

After the second TAMAM workshop, the school TAMAM team presented to all ABS staff the goals of TAMAM and our action research. The presentation was 15 minutes, and its aim was to share the philosophy of the project which is to “analyze local success stories to identify the human and material factors and practices that made these initiatives successful”. We also wanted them to be aware of the tools that we intend to use for data collection. We emphasized to them that their input and support will make our action research a success.

During our research project, the school TAMAM team met several times to discuss different tools we can use in order to gather information from colleagues and students. This was a long process; it lasted at least 6 weeks where we met once or twice a week. Finally, we agreed on conducting questionnaires, focus groups, and classroom observations.

In order to write out the questionnaires (student and teacher), focus group questions (students and teacher) as well as the classroom observation rubric we had to meet many times. The process was time consuming (approximately 3 months) and difficult. Our questionnaires included many questions that covered most targets in the proposal. They

were also repetitive in order to check for reliability. We also met several times with Dr. Sumaya, the consultant and coordinator of TAMAM project in Jordan, so that she can look over our ideas and see if they fit in with our research proposal. The AUB team also gave us helpful feedback on the questionnaires.

Questionnaires were prepared by the team, to assess the effectiveness of technology usage on facilitating teaching and learning.

The major headings of the teacher questionnaire were as follows (for the complete teacher questionnaire refer to (appendix, 1) :

- Part A: Teacher Background and Teaching Style
- Part B: Teacher Access to Technology
- Part C: Teacher Use of Technology Within Lessons
- Part D: Attitude of Teachers towards
 - Professional Development in Using Technology
 - Use of Technology in the Classroom
 - Unit Planning
 - Students Use of Technology
 - Need to make Technology an Integral Part of Curricular Activities
- Part E: Impact and Learning Outcomes

Teachers' questionnaire consists of eight main questions, which ask about the following aspects:

- Sources of information about teaching with technology
- students and teachers' access to computer technology in school
- integration of technology in teaching activities
- use of technology (Cognitive, digital) tools
- Teaching strategies to assess the quality of information
- integration of technology in planning and designing learning environments
- Attitude towards Professional Development and Using Technology

Students' questionnaire had the following major headings (appendix, 2):

- Part A: Background
- Part B: Technology Usage
- Part C: Support
- Part D: Resources
- Part E: Impact and Learning Outcomes

This questionnaire consists of nine main questions, which ask students to rate the following aspects of using technology from their point of view:

- Teachers' use of technology in teaching
- Usefulness of technology and its applications in learning outcomes
- Learning to use communication tools in learning
- having access to technology in the classroom and outside of school
- how skilful in technology
- finding obstacles in the use of technology
- having the technology policies
- attitudes towards technology

We handed out the questionnaires to all MYP (Middle Year Program, gr. 6-10) and JS (Junior School, gr. 1-5) teachers. Some were quick to fill them out and give them back, while others took too much time and we had to follow up on receiving them. Once we voiced this concern to Dr. Samia Al Farra, the Principal of the school, she sent an email to all the teachers emphasizing the importance of this study. As a result, 58 questionnaires were filled in by the teachers.

Table (1): Distribution of teachers according to experience, teaching level and teaching subject

		Frequency	Percent
<u>Experience</u>	<u>low 0-3y</u>	<u>6</u>	<u>10.3</u>
	<u>Med4-11y</u>	<u>25</u>	<u>43.1</u>
	<u>high more than11y</u>	<u>27</u>	<u>46.6</u>
<u>Teaching grade</u>	<u>1-3</u>		<u>4</u>
	<u>4-10</u>		<u>46</u>
	<u>11-12</u>		<u>8</u>
<u>Teaching subject</u>	<u>languages(Arabic, English, French)</u>	<u>13</u>	<u>22.4</u>
	<u>Science, mathematics</u>	<u>20</u>	<u>34.5</u>
	<u>humanities(social, history, geography, religion, business)</u>	<u>12</u>	<u>20.7</u>
	<u>Others (physical education, arts, design, IT, music)</u>	<u>13</u>	<u>22.4</u>

Finally, we decided to start on the student questionnaires, where we randomly chose one section from grade 4 to 10 (20-25 students per grade). Students sample consists of 250 students distributed according to grade level as shown in table (2).

Table (2): Distribution of students' sample according to their age and study level

1. Student Age	Grade	Frequency	Percent
from 8-10	4-5	64	26
from 11-13	6-7	90	36
from 14-16	8-10	96	38
Total		250	100

Before analyzing the questionnaires, the TAMAM team set up a coding log, with the help of Dr. Sumaya. We then moved on to work on the focus groups in order to collect data related to the perceptions of teachers and students about using technology for student understanding. The school TAMAM team randomly chose one teacher from each department as a representative for the focus group. Ten teachers were selected in total. Before conducting the focus group with the chosen teachers, we gave a general presentation about the meaning and purpose of a focus group. We used some of the information presented to us by Dr. Reema in the 2nd AUB workshop in our presentation. This way they would be familiar with the process before they participated. During the presentation we emphasized our role in TAMAM and that their support is essential for the success of this project.

We met with the moderator, Dr. Zuhair Zackaria (Head of learning and support at ABS), in advance and came up with main questions and sub-questions on what we needed to cover in the focus group.

The school TAMAM members were note takers. During the focus group most teachers were enthusiastic about sharing their methodologies and use of technology in the classroom. In total, we had three focus groups with teachers. Each session lasted one hour. The first two sessions were with the MYP teachers. The third session was with the JS teachers.

Once we had finished all of the teacher focus groups, we got together and merged our notes. We then decided to start working on getting the student focus groups, where the primary purpose is to find out how students perceive the benefits and limitations of using technology in their learning. We did two focus groups with students. The first focus group was with MYP students. The second focus group was with JS students. Two students from each grade were selected by the grade level leader. Each grade level leader is responsible for all the students of a specific grade. Selecting students wasn't randomly done. The grade leader selected students who are open-minded, principled, good communicators, and speak up fearlessly to defend their beliefs and ideas.

Questions for the student focus groups were prepared in advance by the team. During all focus groups, other questions came up; however the focus was still on the above questions.

During this process we were also working on different things the AUB TAMAM team had asked us to do. For example, we organized our notes and data in order to share them with Dr. Saouma and his team when they arrived in Amman. We met with Dr. Sumaya on several occasions in order to make sense of the questionnaire coding. We had several variables which made it difficult for us to analyze. We also worked on a presentation for the upcoming workshop in Beirut, July 2008.

We also worked on organizing the different focus group information into several different concept maps using the Inspiration software. Each focus group had its own map. We set up a comparison map between the MYP teachers and the JS teachers. We did the same for the students. This comparison map helped us understand the differences and similarities that all students and all teachers were facing. It also helped us recognize the similarities between benefits and limitations between the students and teachers in technology.

Throughout the past year before the January 2009 workshop, we met up with Dr. Sumaya several times, not just at her office but also in coffee shops, Muna's house, and many different venues. We did this in order to analyze the many variables on our questions; we also needed to relate them to our research question and proposal. That took quite some time. However, eventually we had most of the data analyzed ready and we were set to start work on the presentation for the January 2009 workshop.

As a team we had decided to use all of these tools as well as the students and teachers in order to get fair results. We thought the more sources we used the more accurate our results would be. However, once we had completed the questionnaires and focus groups we were advised not to gather anymore data, since we had more than enough data to work with.

The questionnaires were decoded by the school TAMAM team and we had help of two support staff at ABS. Dr. Sumaya transferred the data from Excel to SPSS in order to analyze and put the different variables together. She actually worked a lot on this with us, using SPSS in her office. Therefore, for the analysis of the questionnaires we depended on SPSS software.

Before we completed our presentation for the AUB January workshop we met with Lina Salem (the IT manager) in order to discuss the different strategies taking place to improve technology in our school. We did this in order to see what we can add on to this as well as to mention them in our presentation. We spoke about Rediker a new system that helps in taking attendance via the Intranet. This was implemented at the beginning of the school year 2008 – 2009. Soon we will be using it for report card writing as well.

We also talked about Renzulli, which was introduced to the school at the beginning of the 2008 – 2009 school years as well. It has begun to take off in 5th and 7th grade. This software is used for differentiation in the classroom.

We discussed many things and one of the most important things was the fact that the ET strategic Plan is due for a new look next year, therefore many of what we have done with the TAMAM may be introduced to the committee in order to begin working on implementing our action research targets. However, we were surprised to see many common elements.

Throughout the 2 years we have met twice with the heads of schools; Nora Shraydeh, Head of the Junior School; Bassma Al Nimri, Head of the Middle School and Samia Al Farra Head of the entire school. They have been very supportive and cooperative with the action research. We enjoyed keeping them updated on the findings and happenings around the school related to the TAMAM project.

In February 2009, the AUB team joined us in Amman to help us understand how to analyze the data from the questionnaires. This was helpful for us because we were able to look at our data with a different light. We got together several times after that to look at our analysis and find a way where we can put the tables into understandable words.

DATA ANALYSIS

Data from the focus groups were analyzed by looking for patterns in teachers and students responses to the asked questions, similarities and differences between students and teachers in their conceptions of using technology in teaching and learning.

As for data drawn from students' and teachers' questionnaires, they were analyzed by calculating frequencies and percentages in every part. Percentages of some responses were classified as follows:

- Low level labels percentages of responses less than 30%.
- Medium level labels percentages of responses that ranges from 30% - 70%.
- High level labels percentages of responses more than 70%.

RESULTS

I-Results of analysis of focus groups data

- Teachers' Perceptions about using technology

Analysis of teachers' responses to the questions addressed in the focus groups is presented in Mind Maps (1-4) (Appendixes, 1-4).

The "main" questions were as follows:

- Discuss the types of technologies used in planning and in the classroom.
- Explain whether technology lends itself to a more student-directed classroom.
- Explain how technology affects students, particularly student performance.
- Discuss the benefits and limitations of using technology in the classroom.

The results evolved from these Mind Maps were as follows:

Focus Group #1

Mind Map #1 (appendix, 3): Technology Usage in Different Subjects at ABS

Focus group discussion showed that technology is actively used across all subjects at ABS. For example, math uses CDs, on-line lessons, and Smart board.

Mind Map #2 (Appendix, 4): Teachers' Perceptions on the Benefits and Limitations of Technology

Teachers discussed benefits and limitations of using technology in unit planning. Teachers find search engines very useful for obtaining unit content and teaching ideas. Furthermore, frequent posting of unit plans on the school intranet allows for accumulation of material over time and on-going modification. However, teachers find learning new software and organizing unit plans on the school intranet time-consuming. Not all software is readily available, and there is a lack of technology-based material for Arabic subjects. Also, school policies can restrict the usage of some websites. Teachers also discussed benefits and limitations of using technology in teaching. Using technology in teaching increases students' attention span, interest, and motivation. It allows teachers to explore different styles and facilitates teaching. It might improve academic achievement. There was a discussion in that there was no concrete evidence to support an improvement or impediment of academic achievement. One of the limitations faced by teachers is the fear of using technology in the classroom, especially when technical problems arise. Another limitation is that using technology is not always student-centered and does not allow all students to interact at the same time.

Focus Group #3

Mind map #3 (Appendix, 5): Impact of Technology on Student Learning

Teachers discussed the impact of using technology on problem-solving, critical-thinking, communication, and teamwork. On-line simulations and animations allow us to replicate events in nature within the classroom, which can positively impact their problem-solving skills. Students actively use critical-thinking skills when conducting research. For example, checking if the information is reliable or relevant enhances their critical thinking. Using technology facilitates communication in that software allows for construction of concept maps. Technology can limit teamwork within the classroom. However outside the classroom, technology supports teamwork through emails and chat groups. There is solid agreement that technology impacts teaching. However the burning question remains on whether it impacts learning, thus student performance.

Focus Group #4

Mind Map #4: Perception of Junior School Teachers on Technology

Technology is actively used within the Junior School. The biggest benefit is that use of technology facilitates teaching. It allows for easy access to websites, expands attention span, reinforces concepts and skills, and allows for better visualization of ideas. Limitations were that Arabic teachers lacked the proper software. Furthermore, increase use of technology can impact student's handwriting and fine motor skills.

B-Students' Perceptions about using technology

The "main" questions asked to students were as follows:

- Discuss the types of technologies used by your teachers in the classroom.
- Discuss the types of technologies, which aid in your learning that you use at home.
- Explain what technology-related skills are taught in the classroom.
- Discuss your comfort level with using technology in your learning (e.g. using the internet for research assignments).
- Compare a traditional classroom with a technology-focused classroom. Discuss your likes and dislikes regarding both classrooms. Explain if it makes a difference in your learning and understanding.
- Discuss if technology improves your problem-solving skills.
- Provide ways to improve the use of technology at your school.

As observed from analyzing data related to gr. 6-10 and gr.4-5, students' responses to the focus groups questions about the advantages and disadvantages of using technology and its limitations revealed the following themes of responses(appendix, 6):

- Use of technology in the classroom grabs interest and attention of students
- Students are aware of benefits and limitations of technology as follows:
Benefits: information is readily available, allows for better visualization of concepts
Limitations: can be distracting, overwhelming amount of information on-line.

Information

on-line is not always trustworthy, less imagination and creativity, less hands on work except in a few classes.

- Students want teachers to use ET and to be more consist with teachers of the same subject.
- Students want to incorporate more technology in their learning (e.g. blogs, posting worksheets and notes on intranet).
- Contradicting views on effect of technology on problem-solving.

Results related to teachers' perceptions about aspects of use of technology in teaching and learning came as follows:

C- Teachers' sources of information about teaching with technology

Table (1) shows number and percent of teachers in sources of information about teaching with technology.

Table (3): number and percent of teachers in sources of information about teaching with technology

Source of information about teaching with technology	High 50-100%		Medium 26-49%		Low 0-25%	
	No	Percent	No	Percent	no	Percent
Conference(s)	0	0	2	3.4	56	96.6
Resource / IT personnel	7	12.1	11	19.0	40	69.0
Research Journal / Teacher Magazine	0	0	1	1.7	57	98.3
Colleague/ s	2	3.4	8	13.8	48	82.8
Internet	5	8.6	5	8.6	48	82.8

As seen in table (3), most of teachers rate low all sources of information about teaching with technology.

D- Teachers' views about students and teachers' access to computer technology in school

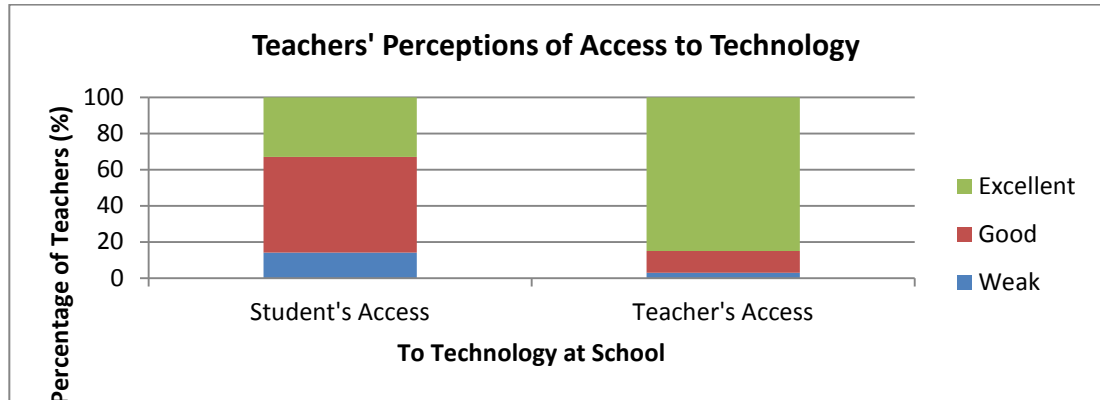
Table (4) shows number and percent of teachers in sources of information about teaching with technology.

Table (4): number and percent of teachers in sources of information about teaching with technology

Rating	Teacher's Perception of	
	Students Access to computer technology in school	Teacher access to technology resources staff
Weak	14 (8)	3 (2)
Good	53 (31)	12 (7)
Excellent	33 (19)	85 (49)
Total	100 (58)	100 (58)

Graph (1) represents results shown in table (4)

Graph (1)



As shown in graph (1), teacher's perception of student's access to computer technology at ABS is "good" and teacher's access to technology resources at ABS is rated as "excellent".

E- Teachers' integration of technology in teaching

Table (5) shows numbers of teachers in the levels of integration of technology in teaching according to their experience, teaching level and teaching subject.

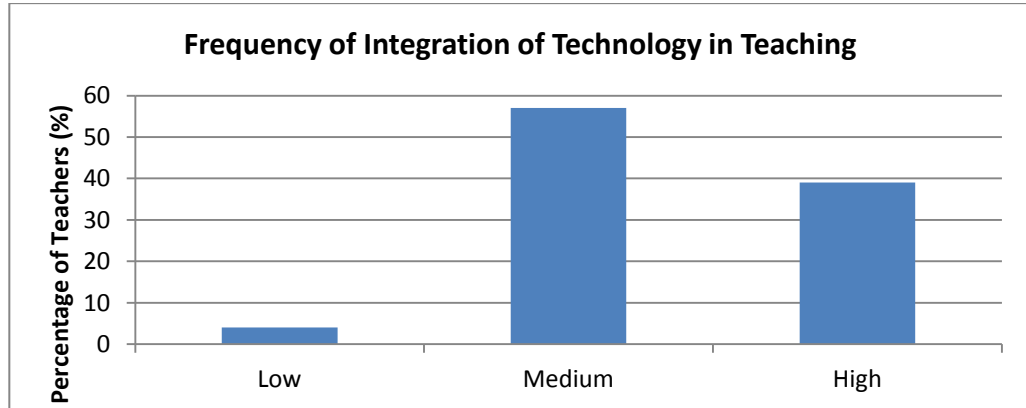
Table (5): numbers of teachers in the levels of integration of technology in teaching according to their experience, teaching level and teaching subject

how often integrate technology in teaching		Low	med	High	Total
experience	low	0	1	4	5
	Med	1	11	11	23
	high	0	10	13	23
	Total	1	22	28	51
teaching grade	1-3	0	2	0	2
	4-10	1	15	26	42
	11-12	0	5	2	7
	Total	1	22	28	51
teaching subject	Languages	1	3	7	11
	Science and mathematics	0	7	10	17
	Humanities	0	7	5	12
	Others	0	5	6	11
	Total	1	22	28	51

As shown in table (5), teachers who rate high their integration of technology in teaching are of medium and high experience, teach 4- 10 grades, teach science and mathematics.

Graph (2) represents percentage of teachers in each level of integration of technology in teaching, regardless of experience, teaching level or teaching subject.

GRAPH (2)



Graph (2) indicates that majority of teachers stated that they integrate technology with medium frequency.

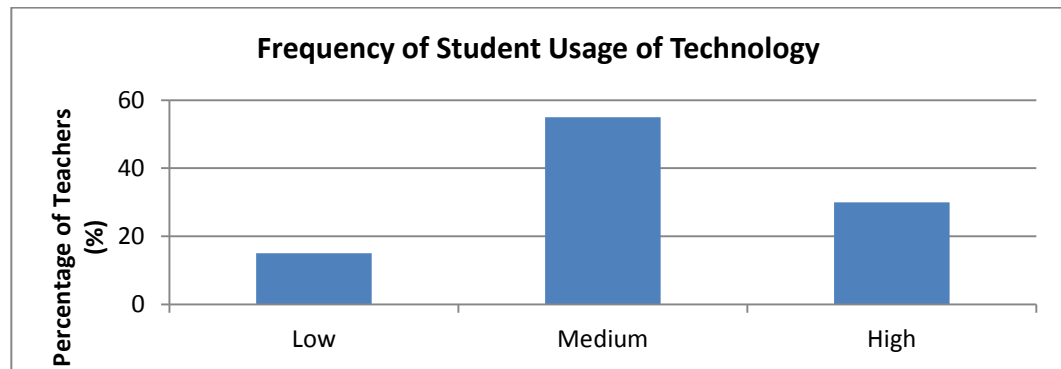
F- Teachers' perceptions of students' use technology

Table (6) shows frequency and percent of teachers' assessment of how often students use technology.

Table (6): frequency and percent of teachers' assessment of how often students use technology

How Often do Students use Technology	Frequency	Percent
Low	8	15
Medium	29	55
High	16	30
Total	53	100

Graph (3) represents results shown in table (6)

GRAPH (3)

Graph (3) indicates that majority of teachers stated that students use technology were in a medium frequency.

G- Teachers' rate of their students use technology according to their experience, teaching level and teaching subject

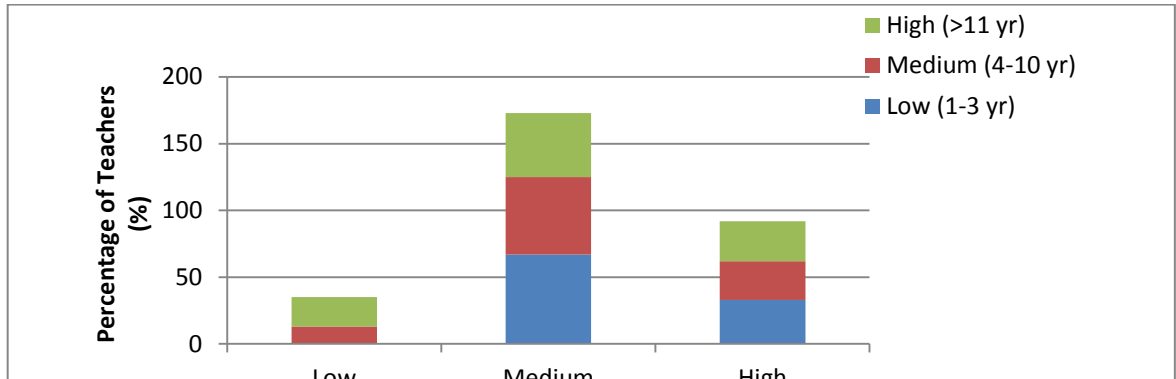
According to the data evolved from teachers' questionnaire, Table (7) shows Teachers' perception of their students' use of technology.

Table (7): Teachers' perception of their students use of technology

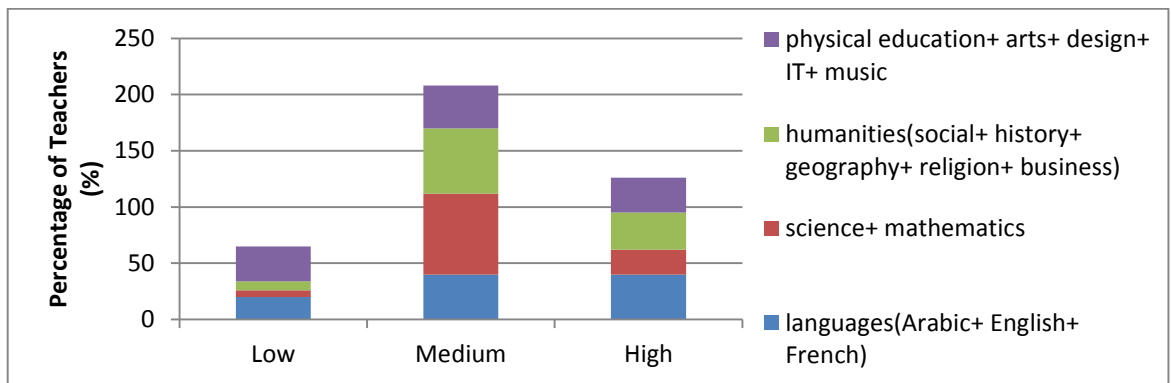
% (and Number) of Teachers that rate the frequency at which their students use technology					
		Low	Medium	High	Total
Experience	Low	0 (0)	67 (4)	33 (2)	(6)
	Medium	13 (3)	58 (14)	29 (7)	(24)
	High	22 (5)	48 (11)	30 (7)	(23)
Teaching Grade	1-3	50 (2)	50 (2)	0 (0)	(4)
	4-10	12 (5)	59 (24)	29 (12)	(41)
	11-12	13 (1)	38 (3)	50 (4)	(8)
Teaching Subject	Languages	20 (2)	40 (4)	40 (4)	(10)
	science+ mathematics	6 (1)	72 (13)	22 (4)	(18)
	Humanities	8 (1)	58 (7)	33 (4)	(12)
	Others	31 (4)	38 (5)	31 (4)	(13)

Contents of table (7) are represented in the following graphs (4, 5, 6).

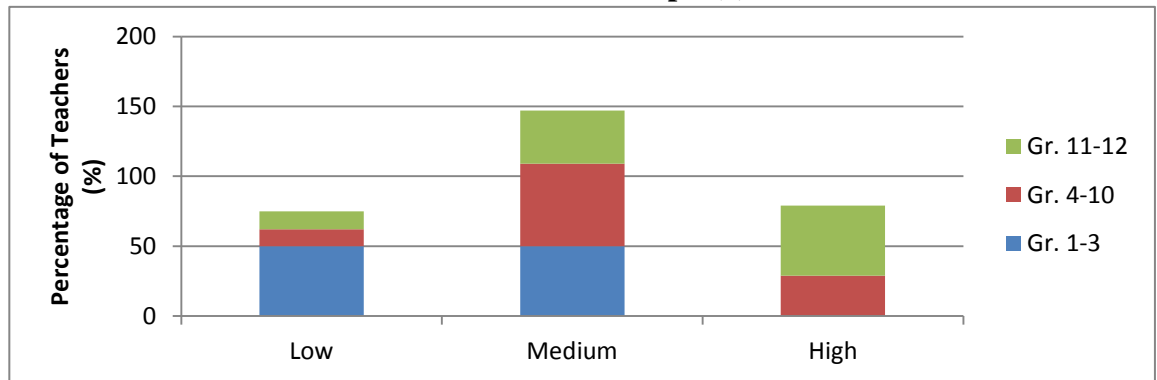
Graph (4)



Graph (5)



Graph (6)



As shown in graphs (4, 5, 6), regardless of teaching experience or subject taught, majority of teachers stated the frequency at which students use technology as medium. Also, teachers of gr. 1-3 stated either low or medium frequency for student usage of technology. Teachers of gr. 4-10 stated medium frequency for student usage of technology. Teachers of gr. 11-12 stated high frequency for student usage of technology.

**H- Teachers use of technology (Cognitive, digital) tools in their Instruction
Teachers' perceptions of students' use technology**

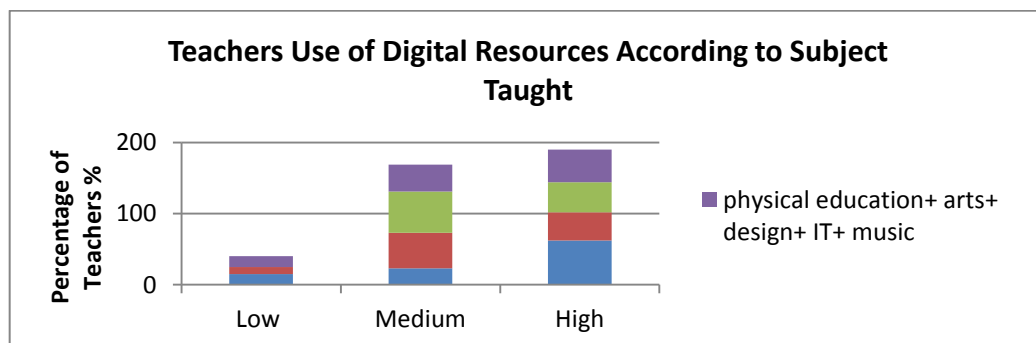
Table (8) shows teachers' use of technology (Cognitive, digital) tools in their Instruction according to their experience, teaching level and teaching subject.

Table (8): Number and percent of Teachers use cognitive and digital tools in their Instruction according to their experience, teaching level and teaching subject.

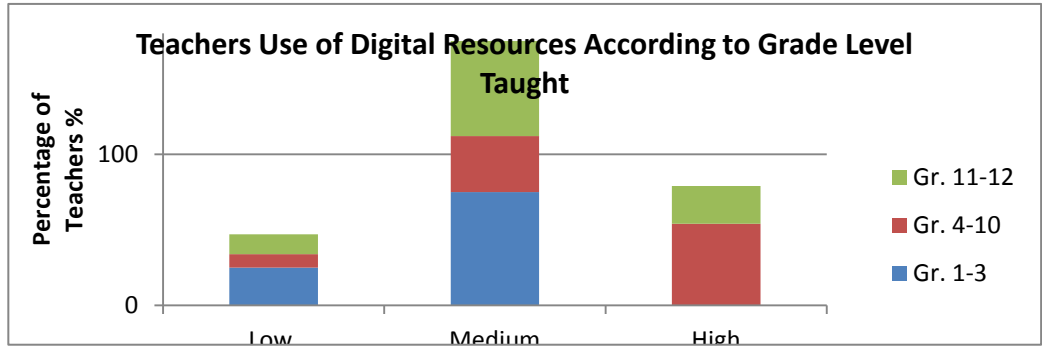
		% (and Number) of Teachers that use Cognitive Tools in their Instruction				% (and Number) of Teachers that use Digital Resources in their Instruction			
		Low	Med	High	Total no	Low	Med	High	Total no
Experience	Low	0 (0)	17 (1)	83 (5)	6	0 (0)	50 (3)	50 (3)	6
	Med	0 (0)	28 (7)	72 (18)	25	8 (2)	48 (12)	44 (11)	25
	High	7 (2)	52 (14)	41 (11)	27	15(4)	37 (10)	48 (13)	27
Teaching Grade	1-3	25 (1)	50 (2)	25 (1)	4	25 (1)	75 (3)	0 (0)	4
	4-10	0 (0)	41 (19)	59 (27)	46	9 (4)	37 (17)	54 (25)	46
	11-12	13 (1)	13 (1)	75 (6)	8	13 (1)	63 (5)	25 (2)	8
Teaching subject	languages	0 (0)	54 (7)	46 (6)	13	15 (2)	23 (3)	62 (8)	13
	science+ mathematics	0 (0)	20 (4)	80 (16)	20	10 (2)	50 (10)	40 (8)	20
	humanities	0 (0)	42 (5)	58 (7)	12	0 (0)	58 (7)	42 (5)	12
	others	15 (2)	46 (6)	38 (5)	13	15 (2)	38 (5)	46 (6)	13

Contents in table (8) which related to teachers' digital use of resources in their Instruction are represented in graphs (7, 8, 9).

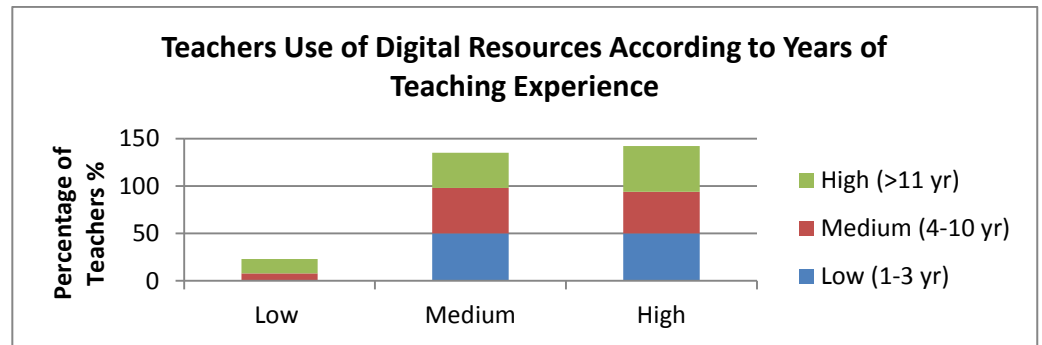
Graph (7)



Graph (8)



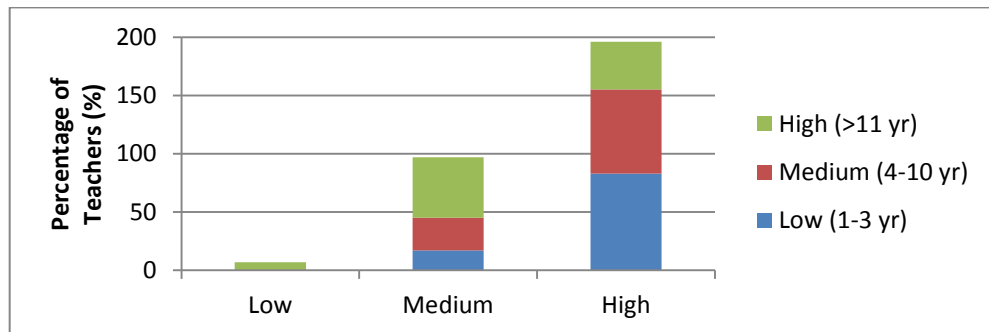
Graph (9)



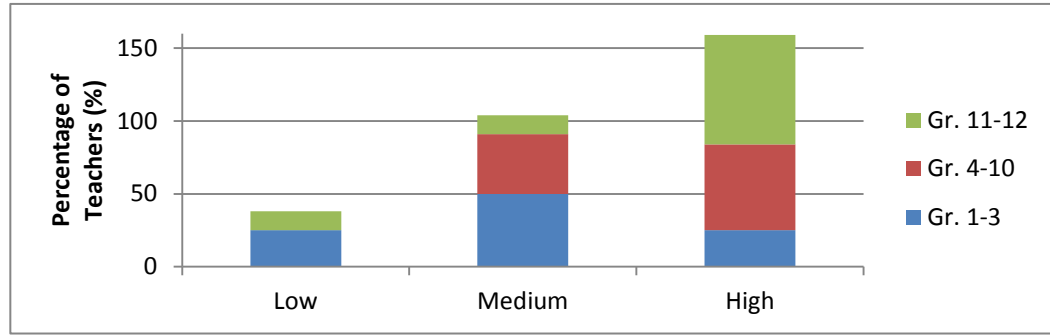
Graphs (7, 8, 9) shows that regardless of teaching experience, teachers frequent use of digital resources ranges from medium to high, teachers who teach gr. 1 to 3 and 11 to 12 use digital resources with medium frequency, teachers who teach gr. 4 to 10 use digital resources with high frequency. Also, it shows that regardless of subject taught, frequency at which teachers utilize digital resources ranges from medium to high.

Contents in table (8) which related to teachers' cognitive use of resources in their Instruction are represented in graphs (10, 11, 12).

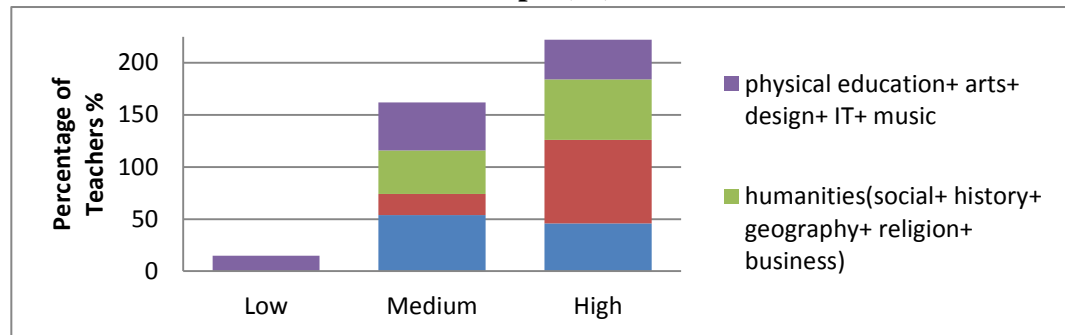
Graph (10)



Graph (11)



Graph (12)



As shown in graphs (10, 11, 12), it seems that teachers who teach gr. 4 to 12 use cognitive tools in their teaching with high frequency, teachers from gr. 1-2 use cognitive tools in their teaching with medium frequency. Also, Regardless of the teaching subject, the frequent use of cognitive tools, teachers ranges from medium to high, science and math teachers use the highest amount of cognitive tools in their instructions in comparison to other subjects.

I- Teaching students strategies to assess the quality of information

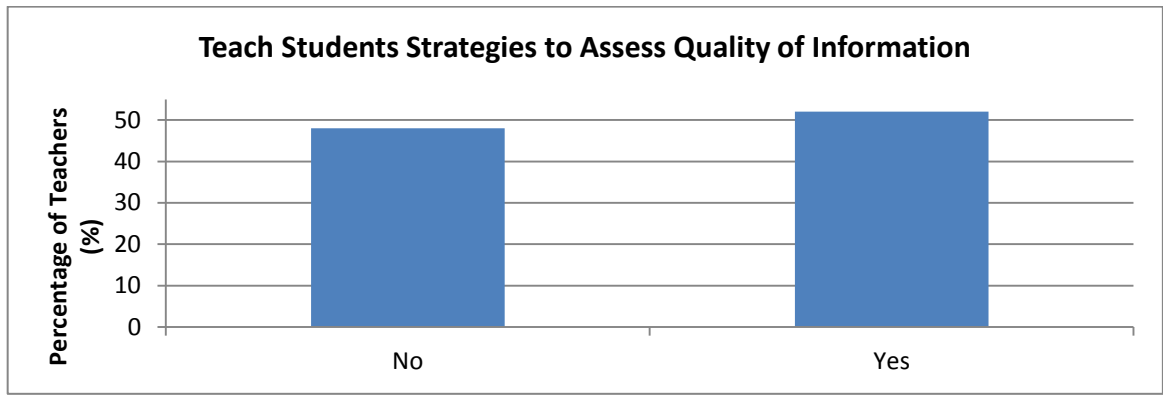
Table (9) shows results of responses of teachers to the question “do you teach your students strategies to assess the quality of information?”

Table (9): frequency and percent of teachers in teaching students strategies to assess the quality of information

Do you teach your students strategies to assess the quality of information	Frequency	Percent
No	28	48
Yes	30	52
Total	58	100

Contents in table (10) in graph (13)

Graph (13)



As shown in graph (13), there is roughly a 50-50 split when it comes to teaching students strategies to assess quality of information.

J- Teachers' integration of technology in their teaching activities

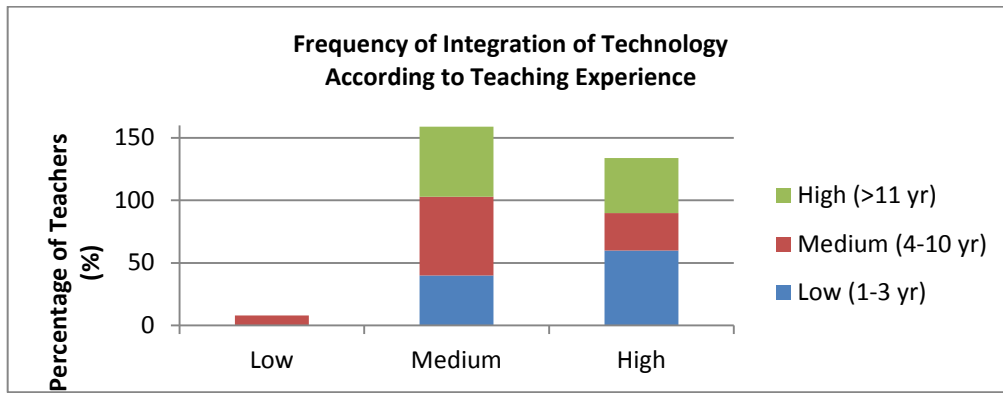
Table (10) shows results of teachers in levels of integration technology in their teaching activities.

Table (10): number and percent of teachers who integrate technology in their teaching activities according to their experience, teaching level and teaching subject

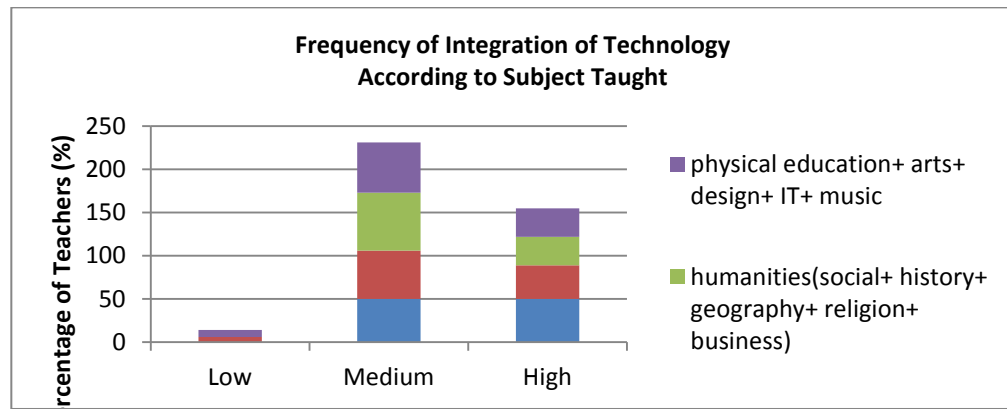
		% (and Number) of Teachers that integrate technology in their teaching activities			
		Low	Medium	High	Total
Experience	Low	0 (0)	40 (2)	60 (3)	5
	Medium	8 (2)	63 (15)	30 (7)	24
	High	0 (0)	56 (14)	44 (11)	25
Teaching Grade	1-3	50 (2)	25 (1)	25 (1)	4
	4-10	77 (33)	16 (7)	7 (3)	43
	11-12	14 (1)	71 (5)	14 (1)	7
Teaching Subject	Languages	0 (0)	50 (6)	50 (6)	12
	science+ mathematics	6(1)	56 (10)	39 (7)	18
	Humanities	0 (0)	67 (8)	33 (4)	12
	Others	8 (1)	58 (7)	33 (4)	12

Contents in table (10) are represented in graphs (14, 15, 16)

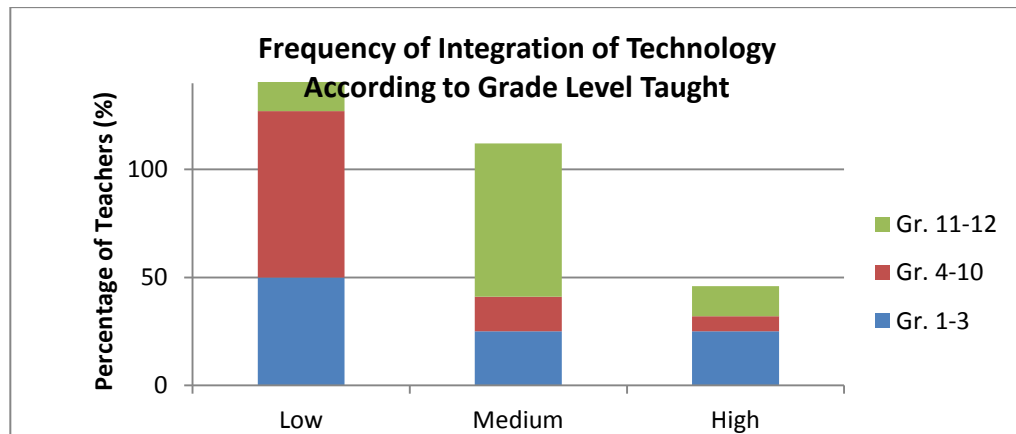
Graph (14)



Graph (15)



Graph (16)



As shown in graphs (14, 15, 16), majority of teachers with high and medium years of teaching experience integrate technology into their teaching with medium frequency. Teachers with low years of teaching experience integrate technology with high frequency.

Regardless of subject taught, majority of teachers integrate technology into their teaching with medium frequency. And majority of gr. 1 to 10 teachers integrate technology into their teaching with low frequency. Gr. 11 to 12 teachers integrate technology into their teaching with medium frequency.

K- Teachers' abilities in integrating of technology in planning and designing learning environments

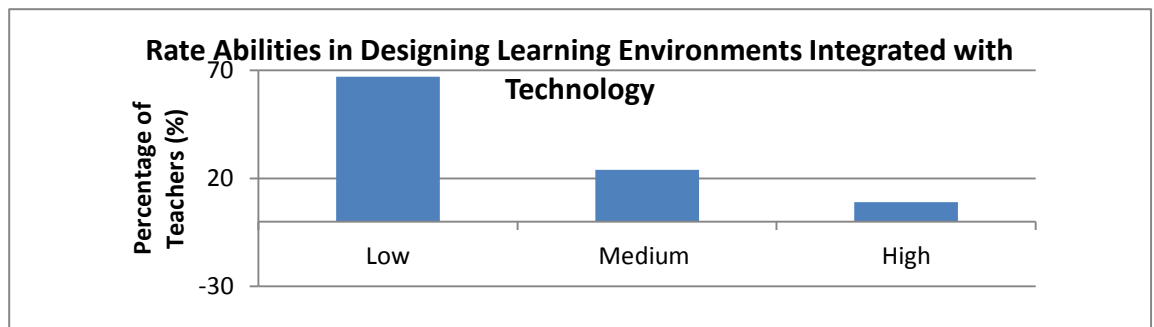
Results of teachers' abilities in planning and designing learning environments integrated with technology are shown in table (11).

Table (11): frequency and percent of teachers in assessing abilities in planning and designing learning environments integrated with technology

Abilities in planning and designing learning environments integrated with technology	Frequency	Percent
Low	36	67
Medium	13	24
High	5	9
Total	54	100

Contents in table (11) are represented in graph (17).

Graph (17)



Graph (17) indicates that majority of teachers rate low abilities in planning and designing learning environments integrated with technology.

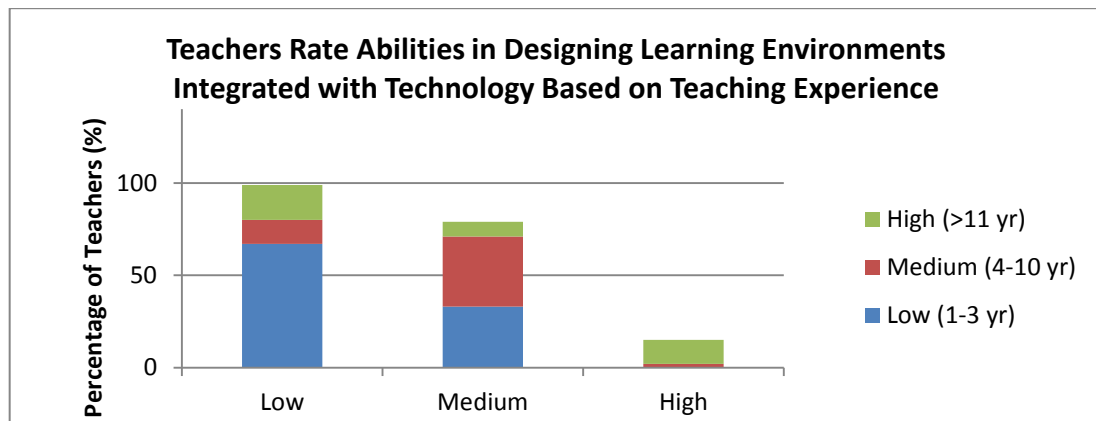
As for teachers' abilities in planning and designing learning environments integrated with technology according to their experience, teaching level and teaching subject, results shown in table (12).

Table (12): percent and numbers of t teachers’ rate of their abilities in planning and designing learning environments integrated with technology according to their experience, teaching level and teaching subject.

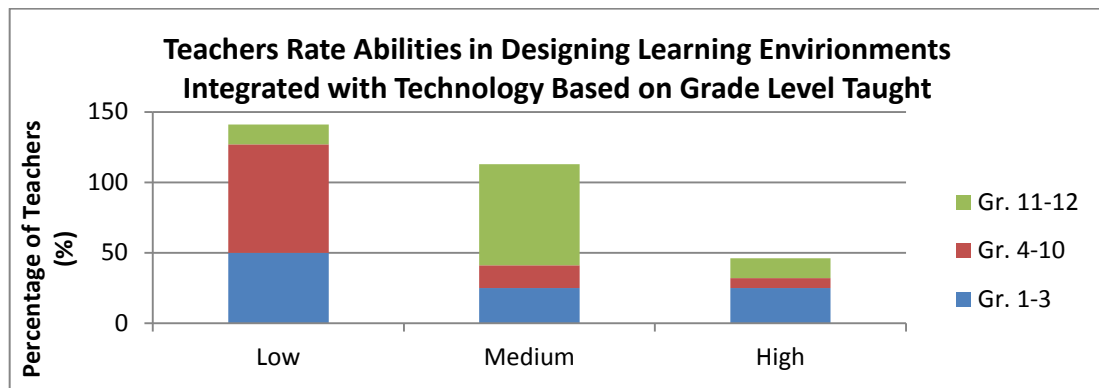
	% (and Number) of Teachers’ rate of their abilities in planning and designing learning environments integrated with technology				
	Low	Medium	High	Total Count	
Experience	Low	67 (4)	33 (2)	0 (0)	6
	Medium	13 (54)	38 (9)	2 (8)	24
	High	19 (79)	8 (2)	13 (3)	24
Teaching Grade	1-3	50 (2)	25 (1)	25 (1)	4
	4-10	77 (33)	16 (7)	7 (3)	43
	11-12	14 (1)	72 (5)	14 (1)	7
Teaching Subject	Languages	80 (8)	20 (2)	0 (0)	10
	science+ mathematics	65 (13)	20 (4)	15 (3)	20
	humanities	58 (7)	33 (4)	8 (1)	12
	Others	67 (8)	25 (3)	8 (1)	12

Contents in table (12) are represented in graphs (18, 19, 20)

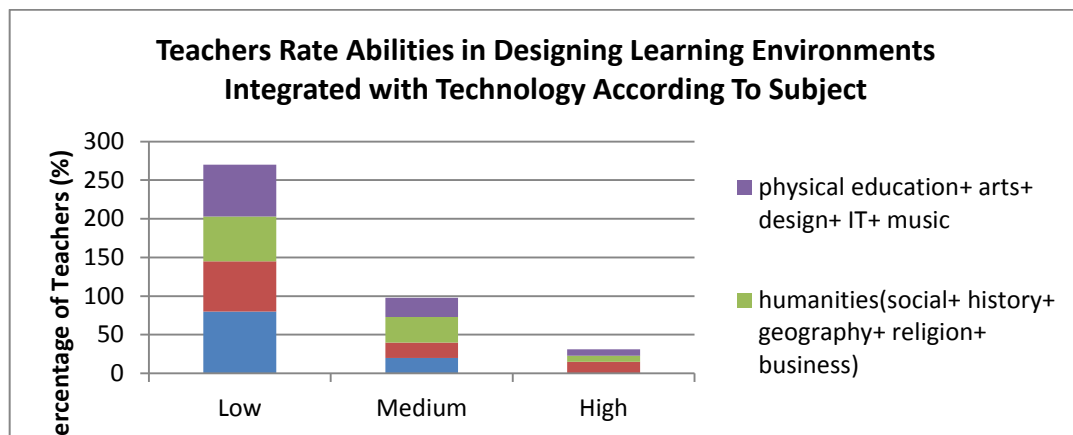
Graph (18)



Graph (19)



(Graph (20))



Graphs (18, 19, 20) show that majority of teachers with low years of experience rate their abilities in designing learning environments integrated with technology as “low”. Majority of teachers with medium years of experience rate their abilities in designing learning environments integrated with technology as “medium”. Teachers with high years of experience rate almost consistently across all 3 levels.

also, graphs show that majority of gr. 4-10 teachers rate their abilities in designing learning environments integrated with technology as low, gr. 1-3 teachers are constant at all levels in rating their abilities, majority of gr. 11-12 teachers rate their abilities as medium and regardless of subject taught, the majority of teachers rate their abilities in designing learning environments integrated with technology as “low”.

L- Teachers' Attitude towards Professional Development and Using Technology

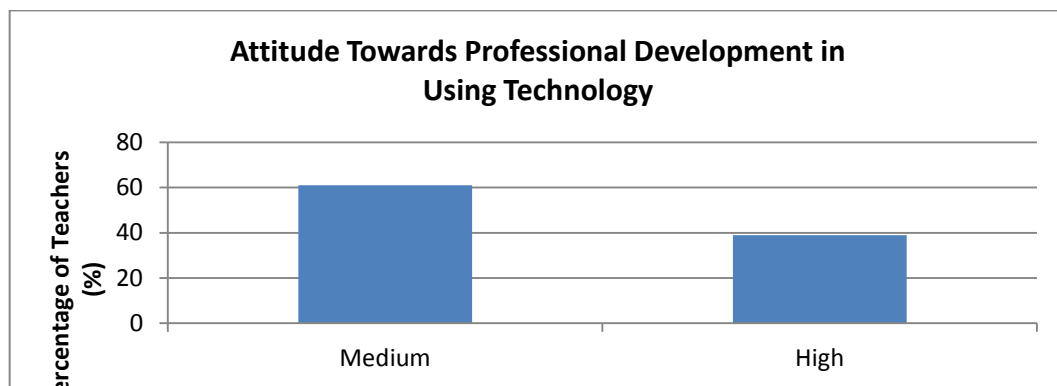
Results related to teachers' attitude towards professional development in using technology are shown in table (13).

Table (13): Frequency and percent of the level of teachers' attitude towards professional development in using technology and toward using technology in the classroom

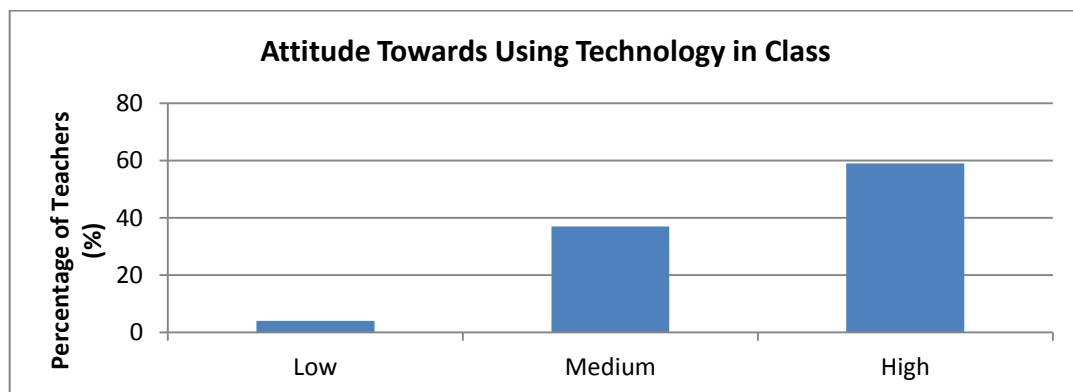
	Attitude towards Professional Development in Using Technology		Attitude towards Using Technology in the Classroom	
	Frequency	Percent	Frequency	Percent
Low	0	0	2	4
Medium	34	61	17	37
High	22	39	27	59
Total	56	100	46	100

Contents in table (14) are represented in graphs (21, 22).

Graph (21)



Graph (22)



Graphs (21, 22) indicate that teachers' attitudes towards professional development in using technology is mostly of medium level and that towards using technology in the classroom is of high level. .

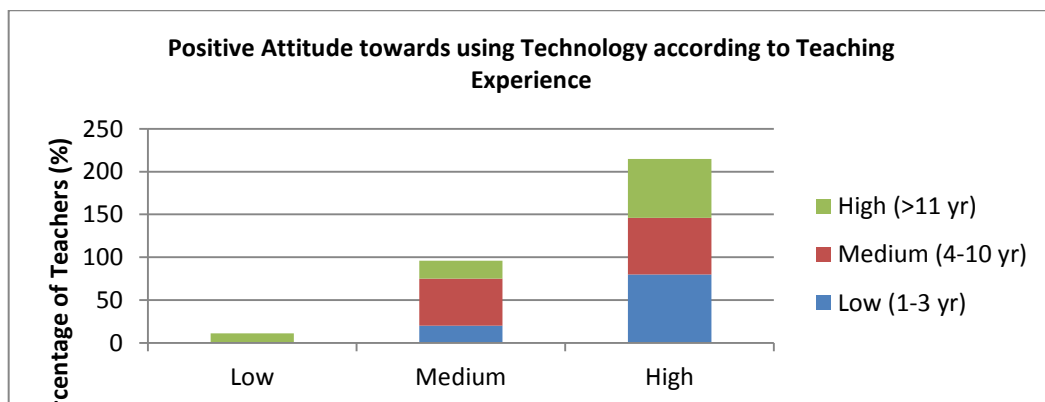
As for teachers' attitudes towards using technology in the classroom according to their experience, teaching level and teaching subject, results shown in table (14).

Table (14): percent and numbers of t teachers' rate of their attitudes towards using technology in the classroom according to their experience, teaching level and teaching subject

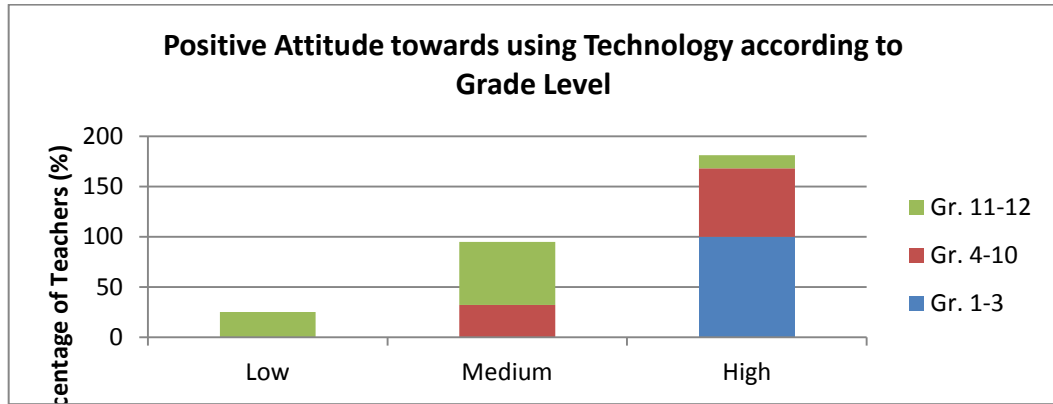
		% (and Number) of Teachers that have Positive Attitude towards Using Technology in the Classroom			
		Low	Medium	High	Total Count
Experience	Low	0 (0)	20 (1)	80 (4)	5
	Medium	0 (0)	55 (12)	66 (10)	22
	High	11 (2)	21 (4)	69 (13)	19
Teaching Grade	1-3	0 (0)	0 (0)	100 (1)	1
	4-10	0 (0)	32 (12)	68 (25)	37
	11-12	25 (2)	63 (5)	13 (1)	8
Teaching Subject	languages	0 (0)	22 (2)	78 (7)	9
	science+ mathematics	0 (0)	47 (8)	53 (9)	17
	humanities	11 (1)	44 (4)	44 (4)	9
	Others	9 (1)	27 (3)	64 (7)	11

Contents in table (14) are represented in graphs (23, 24, 25).

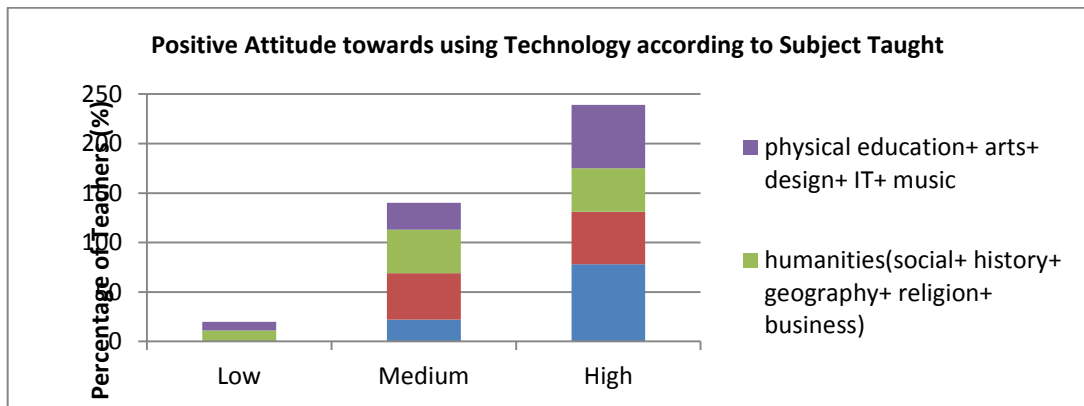
Graph (23)



Graph (24)



Graph (25)



Graphs (23, 24, 25) show that regardless of teaching experience and of subject taught, there is a high positive attitude towards using technology in the classroom, gr. 1-10 teachers have a high positive attitude towards using technology in the classroom and gr. 11-12 teachers have a medium positive attitude.

Results related to students' perceptions about aspects of use of technology in teaching and learning came as follows:

M- Teachers' use of technology within instruction

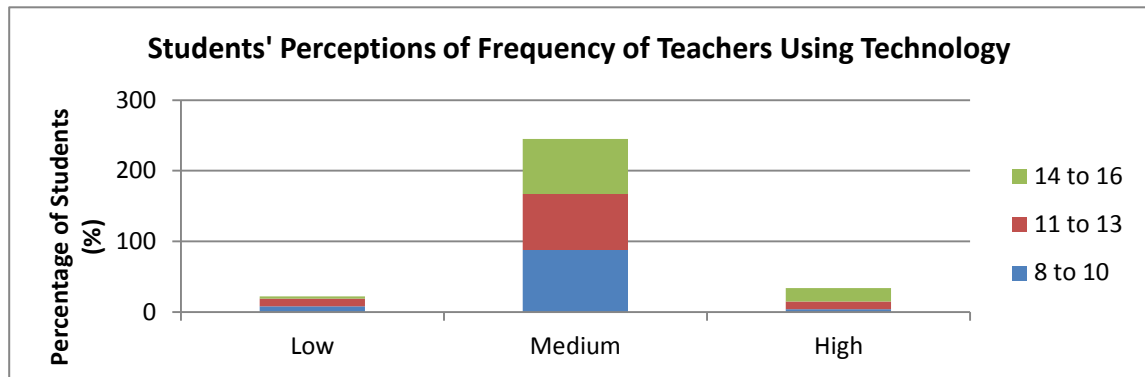
Tables (15) show students' frequencies and percentages in rating Teachers' use of technology within instruction.

Table (15): frequencies and percentages of students in rating teachers' use of technology within Instruction

Student Age Group	% (and Number) of Students that rated Teacher's Use of Technology within their Instruction			
	Low	Medium	High	Total Count
8-10	8 (4)	88 (45)	4 (2)	51
11-13	11 (7)	79 (52)	11 (7)	66
14-16	3 (3)	78 (67)	19 (16)	86

Contents of table (15) are represented in graph (26)

Graph (26)



As shown in graph (26), the majority of students, regardless of age group, rate frequency of teachers using technology as ranging from most of the lessons to some of the lessons (medium level) with higher percentage of 8-10 than 11-13 and 14-16 aged students which were almost equal.

N- Usefulness of technology and its applications useful in their learning and outcomes

Table (16) shows frequencies and percentages of students who find technology and its applications useful in their learning and outcomes.

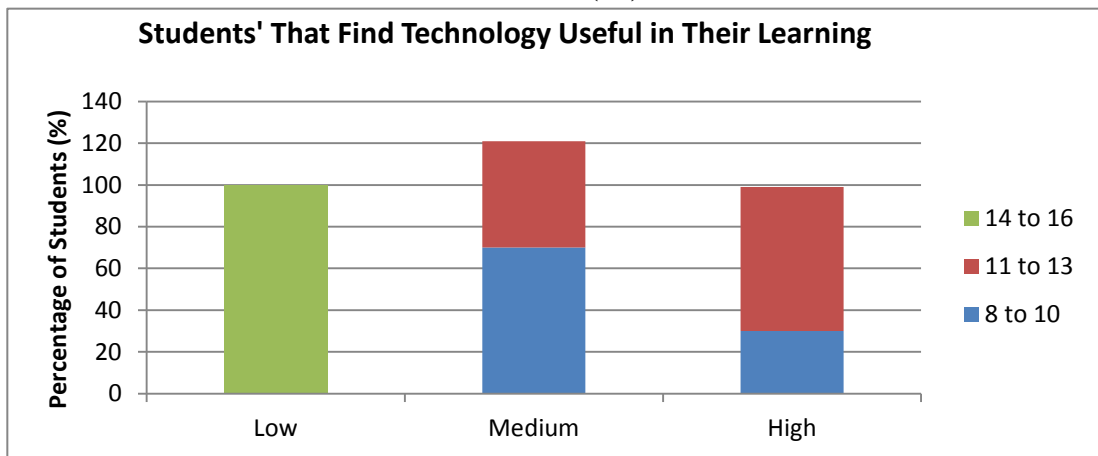
Table (16): frequencies and percentages of students who find technology and its applications useful in their learning and outcomes

Student Age Group	% (and Number) of Students That Find Technology Useful in Their Learning			
	Low	Medium	High	Total Count
8-10	0 (0)	70 (31)	30 (13)	100 (44)

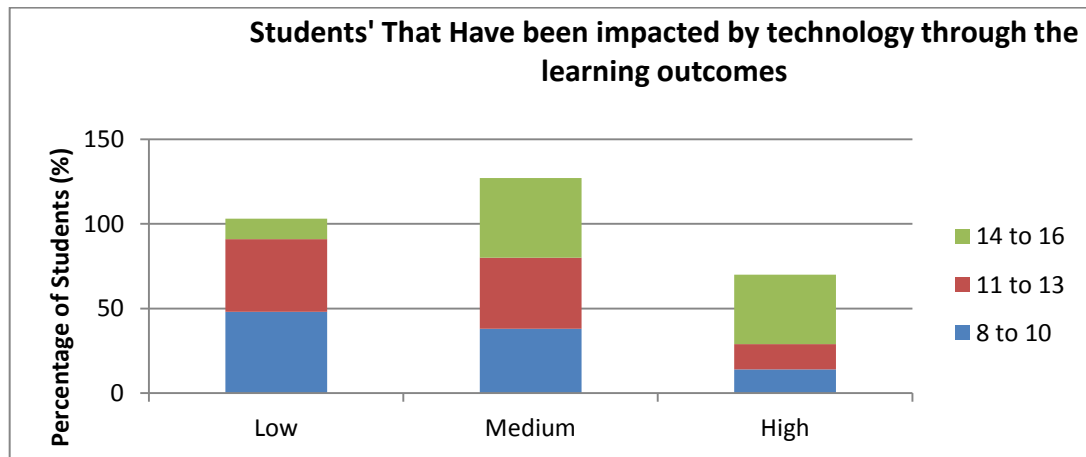
11-13	0 (0)	51 (34)	69 (25)	100 (59)
14-16	100 (6)	0 (50)	0 (23)	100 (79)
% (and Number) of Students that Technology has Impact on Learning Outcomes				
8-10	48 (17)	38 (14)	14 (5)	100 (36)
11-13	43 (20)	42 (19)	15 (7)	100 (46)
14-16	12 (8)	47 (31)	41 (27)	100 (66)
% (and Number) of Students that Rated How Useful They Have Found the Applications of Technology (for example power point, interactive white board, internet websites, digital cameras etc) as part of Their Learning				
8-10	19 (12)	33 (20)	48 (29)	100 (61)
11-13	4 (3)	26 (21)	70 (57)	100 (81)
14-16	3 (3)	21 (20)	76 (71)	100 (94)

Graphs (27-29) represent students' percentaties of students that find technology is useful in their learning, Technology has impact on learning outcomes, applications of technology are useful in their learning.

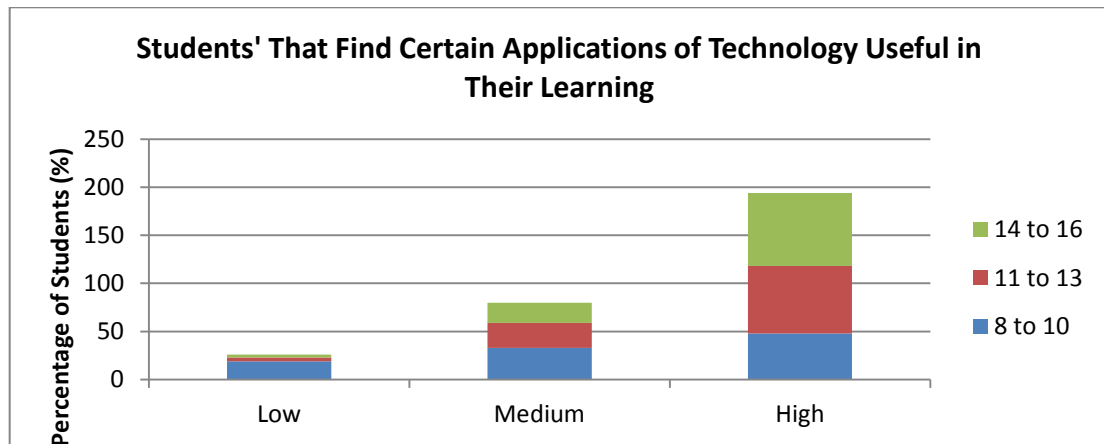
GRAPH (27)



GRAPH (28)



GRAPH (29)



Graph (27) indicates that the highest percentage was of students who think that technology has a moderate use in their learning; all 14-16 aged students think that it is useful in a low level, and most of 11-13 aged students think that it is highly useful in their learning.

Graph (28) shows that the highest percentage is for the students of the three age groups that rate impact of technology throughout the learning outcomes as medium; decreasing in percentages of all age categories of students from low through medium to high level of assessing this issue.

Graph (29) shows that students in all age groups rate high the applications of technology in their learning.

O- learning to use communication tools in learning

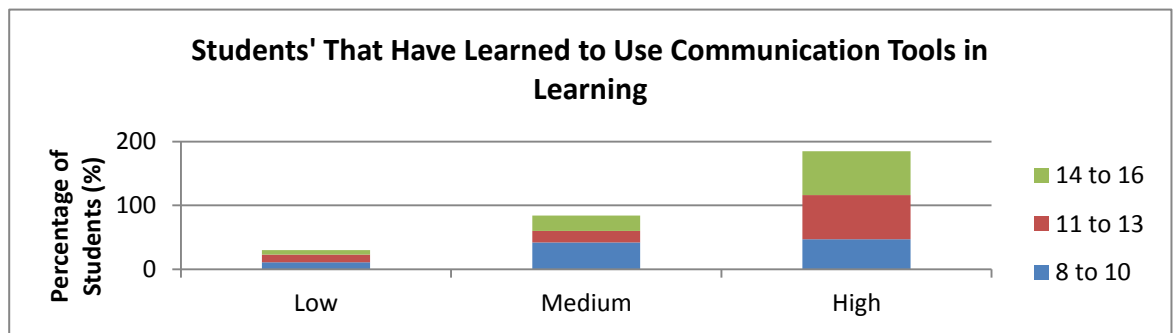
Table (17) shows percentage of students that have learned to use communication tools in learning

Table 17: Percentage of students that have learned to use communication tools in learning

Student Age Group	% (and Number) of Students that have learned to use communication tools in learning			
	Low	Medium	High	Total Count
8-10	11 (6)	42 (24)	47 (27)	100 (57)
11-13	12 (8)	18 (12)	69 (45)	100 (65)
14-16	7 (6)	24 (21)	69 (61)	100 (88)

Contents of table (17) are represented in graph (30).

Graph (30)



Graph (30) shows that most of students of the three age groups

P- Access to technology in and outside classroom

Table (18) shows percentages of students that have access to technology in and outside classroom.

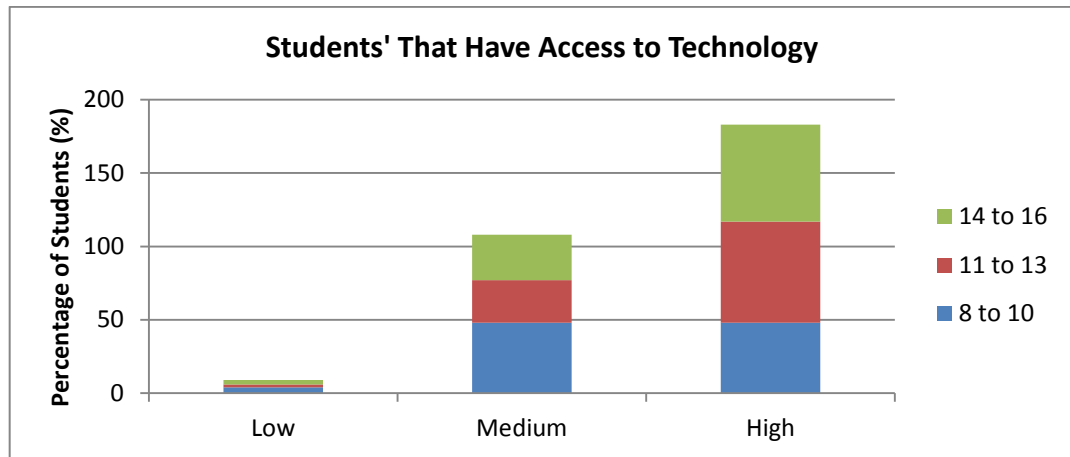
Table 18: percentages of students that have access to technology in and outside classroom

	% (and Number) of Students that Have Access to Technology in the Classroom			
	Low	Medium	High	Total Count
8-10	4 (2)	48 (21)	48 (21)	100 (44)
11-13	2 (1)	29 (19)	69 (46)	100 (66)
14-16	3 (3)	31 (27)	66 (58)	100 (88)
% (and Number) of Students that Have Access to Technology Outside of School				

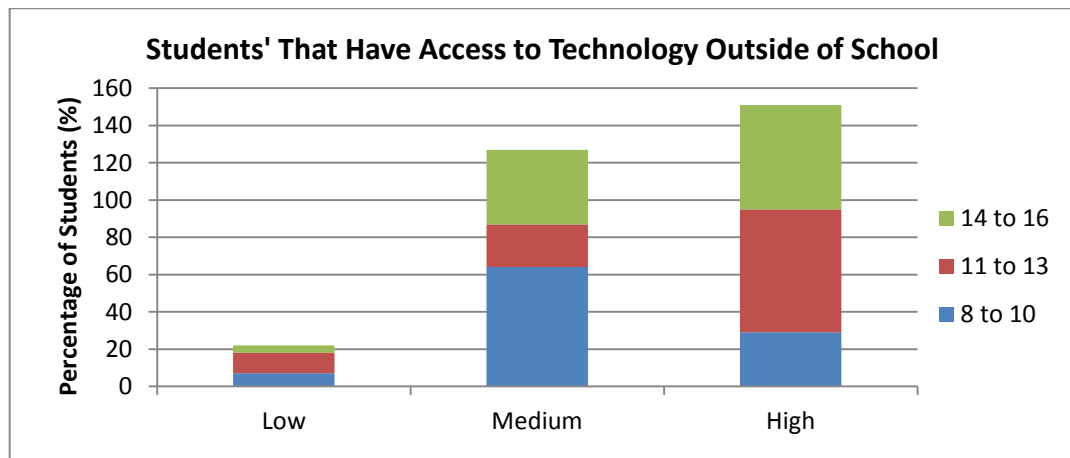
8-10	7 (4)	64 (35)	29 (16)	100 (55)
11-13	11 (7)	23 (14)	66 (41)	100 (62)
14-16	4 (3)	40 (34)	56 (48)	100 (85)

Contents of table (18) are represented in graphs (31, 32).

Graph (31)



Graph (32)



Graphs (31, 32) show that percentages of above 10 age students rate high their access to technology in the classroom and outside school.

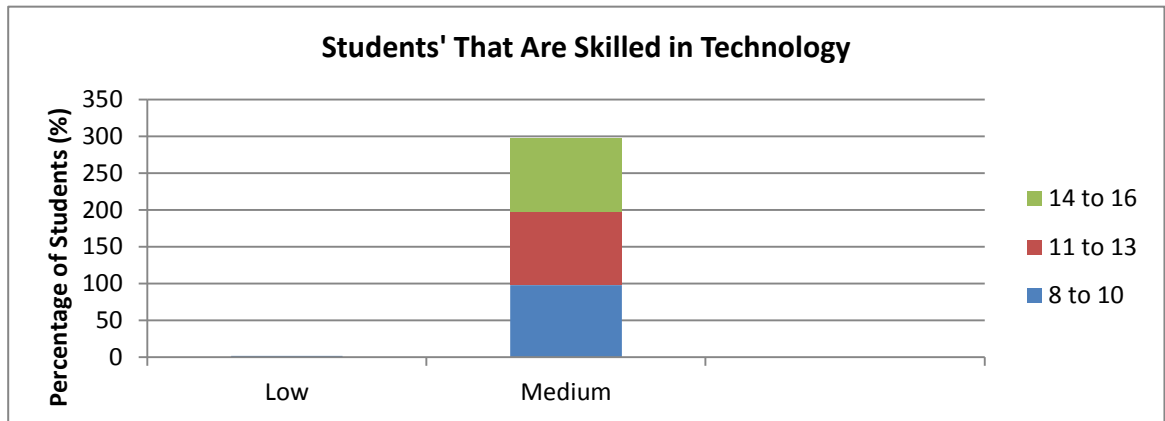
Q- How much student are skilled in technology

Table (19) shows percentages of students that are skilled in technology.

Table 19: Percentages of students that Are Skilled in Technology

Student Age Group	% (and Number) of Students that Are Skilled in Technology		
	Low	Medium	Total Count
8-10	2 (1)	98 (60)	100 (61)
11-13	0 (0)	100 (80)	100 (80)
14-16	0 (0)	100 (92)	100 (92)

Contents of table (19) are represented in graph (33).

Graph (33)

Graph (33) shows that all students rate their skills level in technology as medium.

R- Obstacles in the use of technology have access to technology outside of school.

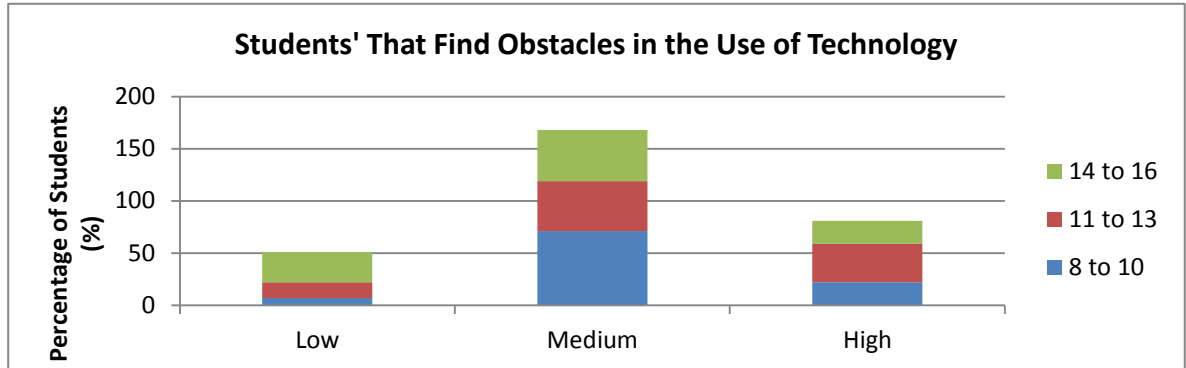
Table (20) shows percentages of students that find obstacles in the use of technology have access to technology outside of school.

Table 20: percentages of students that find obstacles in the use of technology have access to technology outside of school.

Student Age Group	8. % (and Number) of Students That Find Obstacles in the Use of Technology			
	Low	Medium	High	Total Count
8-10	7 (4)	71 (41)	22 (13)	100 (58)
11-13	15 (10)	48 (32)	37 (25)	100 (67)
14-16	29 (26)	49 (44)	22 (19)	100 (89)

Contents of table (20) are represented in graph (34).

Graph (34)



Graph (34) shows that the majority of students find obstacles in the use of technology in medium level.

S-Technology policies

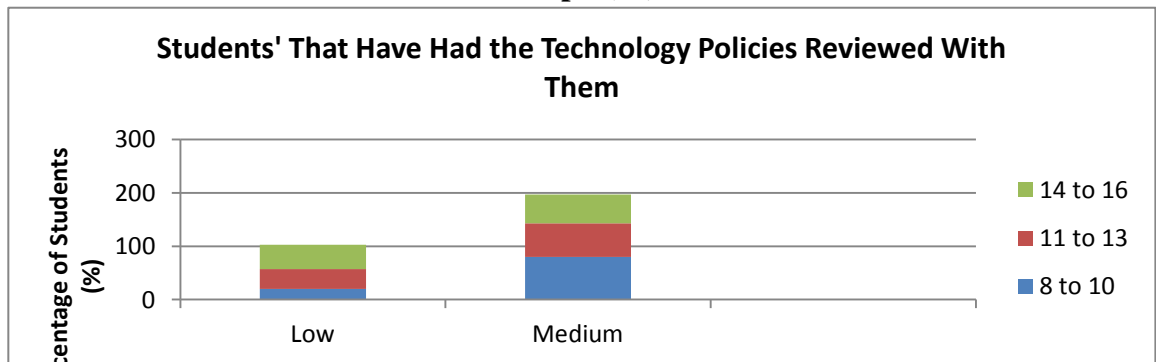
Table(21) shows percentages of students that have had the tech policies reviewed with them.

Table 21: percentages of students that have had the tech policies reviewed with them

Student Age Group	% (and Number) of Students that Have had the Tech Policies Reviewed with Them		
	Low	Medium	Total
8-10	20 (12)	80 (48)	100 (60)
11-13	37 (22)	63 (37)	100 (59)
14-16	46 (39)	54 (46)	100 (85)

Contents of table (21) are represented in graph (35)

Graph (35)



Graph (35) shows that the majority of students had received a revision of technology policies in a medium level.

T-Attitudes towards technology

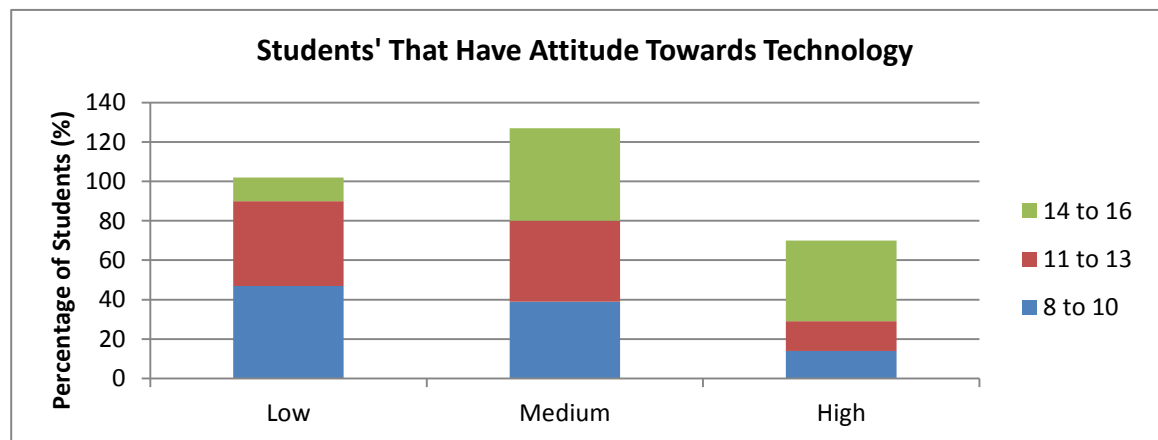
Table (22) shows percentages of students according to attitudes towards technology

Table 22: percentages of students according to attitudes towards technology

Student Age Group	13. % (and Number) : Students' Attitude Towards Technology			
	Low	Medium	High	Total Count
8-10	47 (17)	39 (14)	14 (5)	100 (36)
11-13	43 (20)	41 (19)	15 (7)	100 (46)
14-16	12 (8)	47 (31)	41 (27)	100 (66)

Contents of table (23) are represented in graph (36).

Graph (36)



Graph (36) shows that the majority of students rate their attitudes towards technology ranges between low to medium.

Conclusion

Results drawn from focus groups which held to reveal teachers' conceptions about technology based teaching and learning can be summarized as follows:

- Usage of technology in different subjects at ABS is active.
- Technology has many benefits which are, obtaining unit content and teaching ideas, posting of unit plans on the school intranet allows for accumulation of material over

time and on-going modification, learning new software and organizing unit plans on the school intranet time-consuming, using technology in teaching increases students' attention span, interest, and motivation, it allows teachers to explore different styles and facilitates teaching, it might improve academic achievement.

- Technology has limitations as, Not all software is readily available, lack of technology-based material for Arabic subjects, restrictions on the usage of some websites, lack of concrete evidence to support an improvement or impediment of academic achievement, fear of using technology in the classroom, especially, when technical problems arise and using technology is not always student-centered or allow all students to interact at the same time.
- Technology has positive impacts on student learning in the sense of improving problem-solving skills through On-line simulations and animations which allow replicating events in nature within the classroom, enhancing critical-thinking skills when conducting research to check if the information is reliable or relevant, construction of concept maps through communication software facilitations.
- Technology can limit teamwork within the classroom. However outside the classroom, technology supports teamwork through emails and chat groups.

Results drawn from focus groups which held to reveal students' conceptions about technology based teaching and learning can be summarized as follows:

- Grabs interest and attention of students
- Technology has benefits appears in the readily available information and better visualization of concepts.
- Technology has limitations appears in the distracting and overwhelming amount of on-line information on-line, information is not always trustworthy, less imagination and creativity and hands on work
- Need for be more consistency among teachers of the same subject Students.
- Need for incorporating more technology in their learning (e.g. blogs, posting worksheets and notes on intranet).
- Contradicting views on effect of technology on problem-solving.

Questionnaire results

As revealed from analysis of teachers' questionnaire data, conceptions of teachers about technology based teaching and learning can be summarized as follows:

- Low rates of all sources of information about teaching with technology.
- Good student's access to computer technology with medium use of it and excellent teacher's access to technology resources at ABS.
- Most of integration of technology in teaching is in science and mathematics classes.
- A high level of using tools as a cognitive media, specially in science and math classes.

- High use of resources as digital tools among Gr. 4-10 compared with gr.5-10 teacher.
- Half of teachers teach students strategies to assess quality of information.
- Teachers with low years of experience highly integrate technology in teaching.
- Low abilities in integrating planning and designing learning environments with technology.
- Moderate attitudes towards professional development in using technology and high attitudes towards using technology in the classroom. .

Results drawn from analysis of students' questionnaire data revealed the following conceptions related to technology based teaching and learning:

- Teachers use technology in some to most of the lessons and most.
- Low level use of technology and high its applications in their learning and learning among 11-13 aged students and moderate level among these of 14-16 years old.
- High level of rating use of communication tools in learning.
- Low level of rating their skills in technology.
- Moderate level of obstacles in the use of technology.
- High rates of access to technology in the classroom and moderate one outside of school.
- Moderate rate of technology policies reviewed with them.
- Low to moderate level of attitudes towards technology.

Discussion of the results

O- Conclusion what did we learn, what is being said by all resources for every theme, the theme that the team want to make a statement about

conclusion must be for themes (see more than one table for the same theme as paragraph
- *Similarities and differences between teachers and students regarding the perceptions of limitations of using technology in teaching and learning*

Conclusion

Results drawn from the two data resources (focus groups and questionnaire) revealed that teachers conceptualize technology as being active in different subjects at ABS in general and they rate low all sources of information about teaching with technology. They find that student's access to computer technology at ABS is good with medium use of it and that their access to technology resources is excellent. Most of teachers who integrate technology in teaching, as conceived by both teachers and students were with low years of experience, especially, science and mathematics teachers who also use it as a cognitive media. Using technology resources as digital tools was mostly among Gr. 4-10 teachers. But they showed low abilities in integrating planning and designing learning environments with technology and teaching students strategies to assess quality of information. Also, they held a moderate attitudes towards professional development in using technology and high attitudes towards using technology in the classroom. Students who were 11-13 aged rate the applications of technology in their learning and learning among students higher than that among these of 14-16 years old. All students rate high their use of communication tools in learning and rate Low their skills in technology. The obstacles in the use of technology weren't much. They don't have a high positive attitudes towards technology.

Benefits of technology based teaching and learning which were revealed from teachers' responses were, obtaining unit content and teaching ideas, posting of unit plans on the school intranet allows for accumulation of material over time and on-going modification, learning new software and organizing unit plans on the school intranet time-consuming, it allows teachers to explore different styles and facilitates teaching, it might improve academic achievement. As for students, the main benefits were, using technology in teaching increases their attention span, interest, and motivation and it offers the readily available information and better visualization of concepts.

The limitations of technology which had been mentioned by both teachers and students were, school policy makes sites difficult to access; there are pressures from students on "non-users teachers", classroom management more difficult due to decrease attention span, deteriorations of grammar and spelling skills, lack of consistency between teachers when using technology. Teachers saw some limitations which were not mentioned by students like, not all software is readily available, lack of technology-based material for Arabic subjects, restrictions on the usage of some websites, lack of concrete evidence to support an improvement or impediment of academic achievement, fear of using technology in the classroom, especially, when technical problems arise and using technology is not always student-centered or allow all students to interact at the same time and technology can limit teamwork within the classroom. As well, students had views related to limitations of using technology which were not mentioned by students which appears in the distracting and overwhelming amount of on-line information on-line, information which is not always trustworthy.

As for the impacts of technology based teaching and learning, teachers sees that there is a positive impacts on student learning in the sense of improving problem-solving skills through On-line simulations and animations which allow replicating events in nature within the classroom, enhancing critical-thinking skills when conducting research to check if the information is reliable or relevant, construction of concept maps through communication software facilitations. Students as well, didn't see this issue as positive as their teachers, they weren't aware of whether technology affect their problem-solving abilities and see it limits imagination, inhibits creativity and makes touch in teaching less. So they prefer handwriting rather than technology. To promote the impact of technology, students asked for a more consistency among teachers of the same subject for incorporating more technology in their learning (e.g. blogs, posting worksheets and notes on intranet).

DISCUSSION

Assertions Based on Results

Focus groups (1 and 3) and questionnaires have shown that technology is actively used at ABS in all subjects and grade levels. Focus groups showed the different types of technology available, which strongly relates to two conclusions made from the teacher questionnaire. The conclusions are that teachers' perceptions of students' access to computer technology is "good" and teacher access to technology is "excellent".

Teachers' integration of technology in teaching ranges from medium to high frequency (Graphs 22-26). Teachers with low years of experience integrate technology with high frequency (Graph 23). This could be because they are more comfortable with technology. We decided to see how technology is used in teaching. Therefore, we adapted Nancy Songer's categorization of technology. She stated that technology can either be used as a cognitive tool or digital resource. "A cognitive tool is designed for a specific audience and is designed to achieve particular learning goals." "A digital resource is designed for a general audience and does not specify how the particular resource is to be used for learning".

Teachers use cognitive tools with medium to high frequency (Graphs 10-12). Grade 4-12 and science and math teachers use it with high frequency (Graphs 10 B and 11). Teacher's frequent use of digital resources ranges from medium to high (Graphs 13-16). Gr. 4-10 teachers use digital resources with high frequency (Graph 14). Focus group 2 showed that many teachers believe that technology is a tool that facilitates teaching, but not necessarily learning. It increases attention span and motivates and interests students. However, there hasn't been a strong consensus on whether it leads to student understanding and thus increases student performance and academic achievement. Based on the focus group, it seems that our teachers use it more as a digital resource rather than a cognitive tool. A teacher stated that "technology can be useful for students if it is used at the right time and in the right proportion. Focus shouldn't be too much on it. It's a tool for a mean".

There is roughly a 50-50 split when it comes to teaching students strategies to assess quality of information (Graphs 17-21). Majority of science and math, gr. 1-3, and student-centered teachers do not teach students how to assess quality of information (Graphs 19, 20, 21). Science and math teachers deal with a lot of facts and figures. On the other hand, Humanities and Languages teach students these strategies. This is because they deal with

information that is based on people's opinions and interpretations. Gr. 1 to 3 teachers focus on the basic skills that must be learned before they can move on to the next step of assessing quality of information. However focus group 4 showed that using technology can allow for critical thinking. This is done through enhancement of research skills which include determining relevancy of information and assessing its reliability. One of the strategies that teachers use is have students highlight common information from different resources. Student focus group 5 supported what the teachers stated. They stated that because there is vast information on-line, one has to check if it's valid and reliable. They support the ethical use of technology through proper referencing and in text citations.

Majority of teachers rate their abilities in designing learning environments integrated with technology as low (Graphs 27-31). Teachers with medium years of experience and gr. 11-12 teachers rate their abilities as medium (Graphs 28, 31). This relates to the next point which is that the majority of teachers stated that it's not easy to integrate technology in unit planning (Graphs 32-26). Teachers whose methodology is teacher-centered stated that it was difficult (Graph 35). Focus groups 2 and 4 show contradicting viewpoints on this issue. Use of technology facilitates unit planning in terms of availability of online resources, accumulation of material over time, ongoing modification, and fostering collaborative teaching. On the other hand, there are teachers who struggle. They find it to be time-consuming. Arabic teachers are frustrated with lack of technology based Arabic material. Others find it difficult to obtain all required software, due to costs, and access certain websites at school.

Majority of teachers have a high positive attitude towards using technology in the classroom (Graphs 52-56). This relates with the next conclusion which is that the majority of teachers rank the need to make technology integral to curricular activities as medium (Graphs 42-46). Teachers whose methodology is teacher or student-centred rank the need as low (graph 45). Teachers are aware of the benefits of using technology in teaching as shown in focus groups 2, 3, and 4. It was already stated previously that technology motivates, interests, and increases attention span of students. It also allows teachers to explore different styles of teaching. For example, numerous animations can be used to illustrate a concept. Over time, teachers are becoming more comfortable with technology thus spending less time with technical issues.

Teachers are also aware of its limitations. Non-users are feeling the pressure from students. They recognize that today there is a need to use it in the classroom. Students are digital natives and think and process information differently from their teachers. They are used to receiving information quickly, prefer graphics to text, and thrive on instant gratification. Some see technology negatively influencing their classroom management. Some teachers said that they don't want to admit ignorance if a problem should arise. Some teachers are trying to make their teaching more student-centered, but don't feel that technology lends itself to that. For example, use of Smartboard in the classroom doesn't allow for all students to interact at the same time. There is a concern that technology limits handwriting and fine motor skills, and that there is a deterioration of grammar and spelling skills.

Students came up with unique ideas on why there should be a need to make technology integral to curricular activities. They said that technology increases focus and participation and decreases pressure of understanding everything in the classroom. Some even said that technology helps gain teaching time because they don't have to write down everything, since information is readily available on the school Intranet. We preach to our students on environmental issues, and to our surprise it was our students who mentioned that the use of technology is environmentally friendly.

Majority of teachers stated that students use technology with medium frequency (Graphs 37-41). Gr. 11-12 teachers stated that students use it with high frequency (Graph 41). Teachers gave examples of how students use technology and what skills it supports. They download notes and worksheets. Tools are available to construct mind maps to allow for easier communication. Teamwork is enhanced through exchanging information through email or on-line chat groups. Problem-solving skills is supported with online animations, simulations, and extra problems for practice. However, not all teachers and students agreed on that point. Student focus group supported many points that the teachers made.

Majority of teachers have a medium positive attitude towards professional development in using technology (Graphs 47-51). Focus group 4 states that teacher training at the school is available through the ICT coordinator, who connects technology with learning and teaching pedagogy. This strongly supports the statistic from the questionnaire which is that 78% of our teachers received in-service training on use of technology in the classroom. On further research using school artifacts, we noted that training of teachers on new software

(Smartboard, Inspiration, and Turn-it In) happened on a regular basis. A variety of courses integrated with technology are offered at ABS. This includes the Harvard On-line Course “Teaching for Understanding Using Technology”, CADER (Change Agent for Arab Development and Education Reform), and training in Renzulli.

Actions Recommended to be taken Based on Assertions

Our main research question was “what changes in student performance could be attributed to the quality of teaching in technology”. We collected data on the types of technology available along with its benefits and limitations. There is a difference in opinion amongst teachers and students on whether technology promotes learning and thus increases academic achievement. It is unanimous that it facilitates teaching and increases focus.

However, due to time constraint we were not able to assess the quality of teaching in technology within our school. Furthermore, we did not collect any data on student performance. Therefore, as a next step classroom observations and interviews with teachers and students are necessary tools for assessing quality of teaching. For the last 3 years, technology at ABS has been extensively used. Therefore, we need to track Junior and Middle School grades over a period of 5 years and look for a trend in student performance. And since it’s difficult to generate a control group, we can take the early years as being the control (i.e. low amount of technology used).

Another thing that we couldn’t collect concrete data on was one of our performance targets: “students become critical thinkers”. Some data collected from focus groups reflects that technology allows for critical thinking. However, there are critical thinking tests, which can be subject-specific, that students can take. Results of these tests can indicate if technology plays a role in critical thinking.

Consequences of the Actions in the Context

The reason behind choosing this research question is to justify to our students, our colleagues, and ourselves the importance of quality teaching in technology. Not all teachers at our school utilize technology regularly and/or effectively. When results of this action research are shared with the school, teachers can reflect on their teaching practices and the need for effective teaching using technology in their pedagogy. Teachers who use

technology effectively will be motivated to continue using it. They will be the role-models for the non-users.

Next year, our school's ICT strategic plan will be revisited to produce a modified plan for 2010-2015. The main belief statements of this plan are as follows:

1. To provide a strong ICT instructional programmes that will empower students to meet the high academic standards.
2. To integrate a wide variety of technologies in teaching and learning.
3. Staff should become competent users of technology as appropriate to their field of work.
4. To promote the ethical use of technology by staff and students.

The data we can present from our focus groups and questionnaires along with the analyses can allow them to reflect on whether the strategies and action plans that they put in place are effective. They can use our action research to highlight their strengths and weaknesses. And use their weaknesses to come up with improvements.

Concerns

Looking at the targets that we set for ourselves from the start, we realize the vastness of our study and the broadness of the topic. To completely meet all the targets related to technology requires time and careful planning. We were aware from the start that we needed to carry out more controlled procedures to collect authentic data. To do that, it would have been on the expense of our students. It's difficult to approach a teacher and ask him/her to not use any technology when teaching. And approach another teacher, of the same subject and grade level, and ask him/her to use technology extensively. Students have a voice in how they want to learn, and some might feel cheated from not experiencing technology.

Reflecting back to when we wrote the action plan, we should have focused on how technology impacts one skill or assess quality teaching in technology in one subject. For example, we could have gathered information only on how technology impacts problem-solving. Or we could have assessed technology teaching practices of only Science teachers.