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Use of ICT tools (Tablet PC) to promote innovative teaching & learning and to develop students' 21st century skills at 'O' level : An action research

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ABSTRACT

This paper outlines an action research case study to obtain crucial practitioner insights into the implementation of a Tablet PC project in a State Secondary School (National College) with 'O' level students, to promote innovative teaching & learning and to develop students' 21st century skills. The research was conducted over four weeks in a French literature class of 32 students when Tablet PC's were used to enhance and innovate their engagement with a satirical comedy play. Questionnaires and feedback forms were used to collect data from the students' perspective, in addition to teacher observations. This study investigates the general attitude of students about using information and communication technologies (ICT) tools such as Tablet PC and specialist softwares, as well as the impact on teaching and learning. It found that despite many limitations in the practicalities of using Tablet PC in schools, this ICT tool positively influenced student's learning behaviours, effective teaching & learning, and helped students develop 21st century skills.

Key Words:

Technology-enhanced learning; Innovative teaching; Tablet PC; 21st century skills; Action research

INTRODUCTION

The Ministry of Education and Human Resources, Tertiary Education & Scientific Research (the ministry) in Mauritius has embarked on an e-education plan, to promote the use of ICT in the education sector. Innovative teaching strategies are encouraged, for instance making use of ICT as a supporting tool in lessons from primary to secondary level. Following many leading countries such as Singapore and Hong Kong, Mauritius is also moving towards better quality education. The vision of the ministry is to 'create the next generation of forward-looking and innovative leaders contributing to the transformation of the Republic of Mauritius into a high ranking, prosperous nation.' Considering the Basic Education policy features of Mauritius (NYCBE, 2019), a lot of emphasis has been placed on the use of ICT in education. This is in order to develop 21st Century life skills, the '*abilities for adaptive and positive behaviour that enable individuals to deal effectively with the demands and challenges of everyday modern*

life' (UNICEF, 2003). These skill sets refer to advanced problem-solving attitudes used appropriately and responsibly for the management of personal and professional affairs in the modern day. Conscious of the growing importance of such skills, the ministry is empowering teachers and curriculum developers to innovate teaching strategies, such as through the use of Tablet PCs.

Background Study

In today's information or knowledge society, the focus of education has expanded whereby conceptual and metacognitive knowledge are considered increasingly important. Economic changes due to globalisation and the polarisation of new job structures are important driving forces for the need of 21st Century skills in today's labour market. Three worldwide organisations, namely the UNICEF, UNESCO and WHO have listed ten fundamental dimensions in this skill set. These are ICT literacy; problem solving; critical thinking; effective communication; decision-making; creative thinking; interpersonal collaboration; self-awareness; empathy and coping with emotions. Lai and Viering (2012) recognised that ICT is at "the core of 21st Century skills". Specifically, it is regarded both as (a) an argument for the need of such skills, and (b) a tool that can support the acquisition and assessment of these skills.

ICT tools are used in the education field, successfully applied to learning, teaching and assessment. Increasingly, ICT is considered a powerful tool for educational change and educational reform. Fu (2013) showed that proper use of ICT tools can help to raise educational quality and connect learning to real-life situations. The same study reviewed how the use of ICT in the teaching and learning process has contributed to enhance student's learning experiences. While using these technologies, such as laptops, tablets and interactive whiteboard, teachers have been able to develop more innovative approaches to teaching and learning, transforming the teaching environment into a more learner-centered one.

'21st century schools' are those that embed learning opportunities aimed to help students develop 21st Century skills, for example to think for themselves and collaborate to work with others. Most are equipped with emerging ICT tools as a means to support teaching and encouraging interaction among students. More and more educational institutes are now making technologies more reachable, equipping educators with ICT tool facilities, so as to encourage them in innovating their teaching strategies. Indeed, many countries have been implementing the use of Tablet PC in the educational system. According to the BBC (2016), almost 80% of primary and secondary educational institutions in the United Kingdom make use of tablet computers. Further, a case study in Hong Kong showed the Pui Ching Middle School has encouraged students of Form one since 2013 to make use of their Tablet PCs in different classes. Through this resource, students have access to the news, read poems or watch learning media on the screens. These students of Form one were a pioneering group in a school already at the vanguard of e-learning. The school had already set up the appropriate infrastructure so as to give support to the students by building its own online learning

system with various teaching materials and activities. This case study demonstrates an aligned commitment by the various stakeholders at this school to promoting a 21st century education.

In 2010, the ministry in Mauritius took the initiative to implement the use of ICT tools in the Mauritian education sector. An agreement with the "*Delegation Interministerielle à l'Education Numérique en Afrique*" (DIENA) was signed for the implementation of the Sankoré Project. The aim of the Sankoré Project was to help Africa achieve the 'Education for All' Sustainable Development goals through digital empowerment and by digitalising classrooms. Countries enrolled in this project had classrooms equipped with a laptop and interactive projector. The content of class lessons were digitalised and projected on the white board. The content projected to students was interactive so as to encourage students to participate and be active learners. As a result, schools in Mauritius saw the traditional black board replaced by the white board and interactive white boards in primary institutions. In schools, primary and middle school level textbooks were converted into eBooks. These measures made learning materials more accessible and cost effective for students. Tablet PCs were distributed to 'O' level students by the ministry. By 2014, the provision of Tablet Computers to over 26,000 students and educators of Form V in all government and aided secondary schools was completed. 20,700 tablets were distributed to 'O' level students and 5,400 to educators. The Tablet Computer was equipped with pedagogical contents relevant to the 'O' level curricula, aligned with the teaching of Cambridge GCE 'O' Level syllabi for Mauritius (MOE, 2019). The tablet computers can be used for educational purposes on both online and offline modes. As stated by the ministry, "*the purpose of the PC Tablet project is to primarily provide Mauritian students with an enhanced leaning experience in a growingly technological 21st century environment*" (Ministry, 2015). The main goals with the implementation of the Tablet PC project was to encourage a paradigm shift in teaching and learning at Secondary Level in Mauritius, which is to embed technologically enhanced learning opportunities aimed to help students develop 21st Century skills. Alongside this, the government also targeted improved pass rates of students at Cambridge SC /GCE 'O' Level using a diversification of pedagogy by making use of multimedia tools, so as to increase completion rate of the first cycle of secondary education and thereby an increase in the transition rate to upper secondary education and ultimately to higher education and further training. They also targeted better preparedness of students and educators for 21st century skills.

Research Objectives

The aim of this research was to examine the impact of the use of ICT tools, such as Tablet PC, software and social network such as Facebook online platforms forum discussion on students' learning behaviour and how far can ICT tools help to arm students with 21st century skills. The objectives of the study are to investigate how the implementation of ICT tools in education such as Tablet PC and embedded software,

1. influenced students' learning behaviours.
2. enhanced effective teaching and learning at O-level.
3. enabled students to develop 21st century skills.

It is believed that this research will help Educators as well as Curriculum researchers to have a comprehensive understanding of whether or not ICT tools such as the tablet PC are important or useful in the teaching and learning process in Mauritian schools, and whether or not ICT tools such as the Tablet PC can contribute to promote skills at school. It will also facilitate putting in place new practices and new strategies of using ICT tools. In Mauritius, it is essential to note that teachers are not only being asked to make use of technology (Rughooputh, 2015) but they are also encouraged to share their knowledge with their peers and teach others. This study therefore paves the way forward, in an attempt to improve the effectiveness of the teaching and learning process through the use of the ICT tablet PC tool implemented by the ministry.

METHOD

The concept of research is to produce knowledge whereas action research creates knowledge based on self-reflective enquiry. It involves the active participation of researchers in conducting a study within their own professional situation, in order to rationalise and justify their own practices, their understanding of these practices, and the situations in which the practices are carried out. The term 'action research' has long been related with the work of Kurt Lewin (1945), who considered this research methodology as cyclical, dynamic, and collaborative in nature. Each cycle is comprised of a self-reflective circle of planning, action, observation and reflective-evaluation about the impact of the action (see figure 2.1). Through recurrent cycles, action research has been used successfully to deepen and develop educational practice. For this study, action research was seen as the most appropriate method since critical self-reflection is key to investigate the real-life experiences of real people in real situations.

The Context of the Study

This action research was carried out in a State Secondary College situated in the north of Mauritius, with a population of about 1,000 female students. A girl's college that started its operation in 1978, it has placed itself on the educational map at the national level since 2006. The college became a National college due to the high academic performance of its students. This secondary school provides ICT tool facilities to educators and encourages staff as well as students to make use of ICT in education.

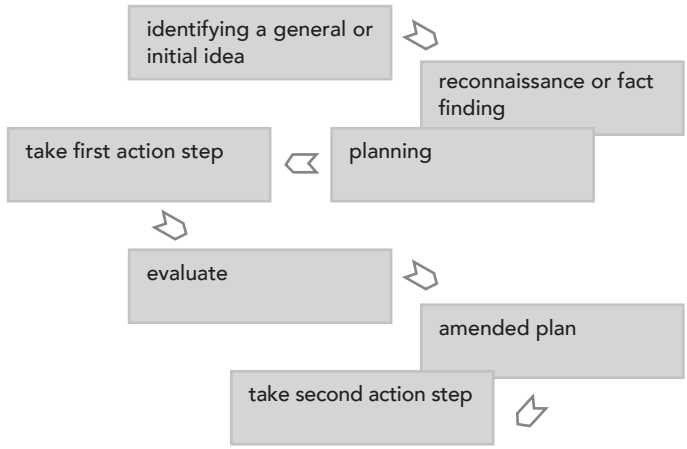

Figure 2.1: An Action Research Cycle (Infed.org, 2018)

In line with the vision of the ministry to make full use of ICT in the education sector and to promote skills in youngsters, the school's aim is also to *"prepare students with the 21st century skills, the skills that students will need to succeed in school, work and life."* (Leelachand, School magazine 2014). The goal of the school has always been to give quality education to its students and to provide students with opportunities to develop themselves. The school started a journey of educational transformation with ICT integration to develop the school into an ICT-capable school.

The Sample Set

This action research was carried out within the researcher's educational practice. To enable students to become independent learners, activities were organised inside and outside the classroom over four weeks. The sample selected was 'O' level students of French literature, since only the 'O' level students received the Tablet PC. The 'O' level is a programme of two years (form IV and form V), these students took their Cambridge School Certificate exams at the end of 2016. The class was composed of 2 sections, the form V Trochetia and the form V Violet. The French literature class consisted of a total of 32 students at SC level, that is the 'O' level.

The action research was carried out through different classroom activities when students were studying the literature textbook '*Topaze*' written by French author Marcel Pagnol, a satirical comedy play. Since students of French literature are not regularly exposed to plays in Mauritius, studying this play presented certain challenges. It was observed that learners faced difficulties in understanding deeply the different acts and scenes. Based upon anecdotal student feedback, this difficulty arose since students were not exposed to the facial and intonation expressions of the different characters. This is why implementing innovative ICT tools may promote effective teaching strategies, allowing students enhanced learning opportunities and skills development while making use of their Tablet PC.

Ethical Considerations

Ethical standards require that the researcher does not put participants in a position where they can be at risk of harm for their participation. The researcher is responsible to carefully evaluate the potential for harm to arise and behave according to appropriate ethical standards.

To avoid any harmful research practices, ethical issues were taken into consideration before doing this research. Participation was voluntary and there was no coercion nor deception. In this research ethical protocols such as: informed consent, confidentiality, anonymity, and reliability and viability were followed.

- Confidentiality

It was clearly specified in the survey questionnaire and feedback form that the identity of the respondent would remain private and confidential and any piece of data given by the respondents would not be revealed to any third party.

- Informed Consent

The rector of the school was informed of the nature of study to be carried out and none of the participants were forced to take part in this research. All respondents participated at their own will. All research participants gave their informed consent to participate. For this study, students and their guardians were informed about the research to be carried out and they all gave their consent to participate.

- Validity and Reliability

Academic integrity, validity and reliability of the research was guaranteed while doing this research.

Limitations of the Research

All potential effort has been put behind this research to maintain its validity and reliability. Yet there were certain things which acted as barriers in this study. There were a number of limitations listed below:

Late distribution of the Tablet PC: Since the main ICT tool to be used during this action research was the Tablet PC, no activity could be started until its distribution, which was delayed from the ministry.

Time Constraints: Time was indeed one of the major obstacle in this research. There was very limited time to conduct this study.

Lack of proper infrastructure: Use of tablet and software such as Iprof, need wifi connection to work. A major problem noted was the lack of wifi connection. Activities could not be carried out in class. Instead permission was needed from the rector to carry out the activities in the lecture theatre where WIFI is available, but connectivity was poor.

Lack of skill with the tool: Since it was a new tool and no workshop was done to initiate students to the Tablet PC, students had first to learn how to deal with the new device.

Lack of pedagogical support: The Tablet PC has not been able to be exploited to its fullest since many software such as 'YouTube', 'google', 'chrome' have been blocked by the ministry.

The Data Collection Phase within Action Research Cycles

For this research, data was collected through questionnaires and observations designed to meet the research objectives. The researcher personally administered the questionnaires to students at school. One of the advantages was that, the importance of the research was personally presented to the participants and its significance explained to them to motivate honest answers by emphasising their contribution to the research. Moreover, any doubts regarding the meaning of the questions were immediately clarified to ensure that the participant is able to answer the questions easily. Participants were given ample time to answer the questions.

Observation method was also carried out in this research work to analyse students' behaviour during the different activities. Using this method, the observer adopted a passive role. While implementing ICT tools in the teaching strategy, the researcher worked closely with the participants. This method enabled better understanding of the influence of the use of the Tablet PC in the classroom on the students since their reactions and motivations were observed using the criteria designed to meet the research objectives.

With the means of the Tablet PC, classes were conducted through the Classroom Management Software in order to enhance the teacher-learner interaction. All tablets were equipped with interactive and multimedia contents for the main subjects (Maths, English and French) as well as options such as Science, Economics, Arts and Oriental Languages. Tablets were also loaded with security features such as Antivirus, Educator & Parental Control and Web Filtering. They also had some applications, such as the Digi Library Application, that worked in offline mode. An illustration of the Tablet PC is seen in figure 2.2. It should be noted that Tablet PCs of educators and students were different. Teacher's tablets were equipped with more options, including the ability to monitor students' tablet; to share their screen with all students in the class; to transfer files to and from students; to conduct quizzes and real-time surveys with results analysis; as well as creating whitelist and blacklist of apps and URLs.

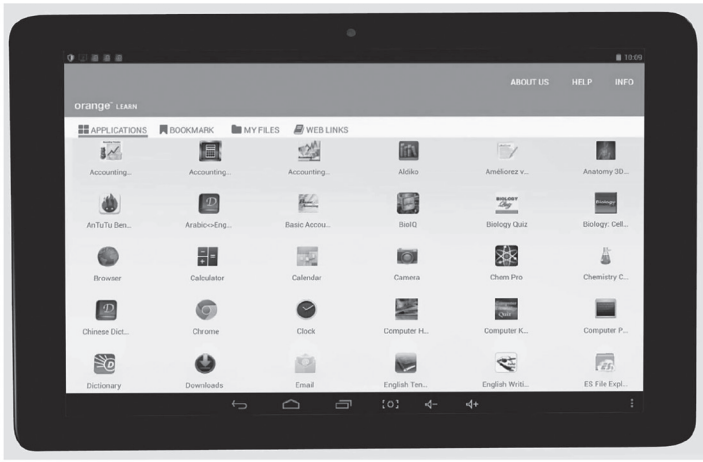

Figure 2.2: An Illustration of the Tablet PC

Initially a pilot test was conducted, to familiarise with the Tablet PC and the WIFI connection. A small group of students went into the lecture theatre with the researcher and connected each tablet to the wifi connection. Using the software Iprof an online class was created, while students created their respective accounts to connect themselves to the online class. After a few trials, this pilot testing was successful.

2.6 Action Research Cycle One

Step 1: In the first cycle of the action research, step one consisted of making use of the new ICT tool that is the tablet PC newly given to all O' level students and educators. To start with, the main idea was to watch a video together based on the drama textbook, *Topaze*. Since the software 'YouTube' is blocked on the Tablet PC by the ministry, neither students nor the teachers had access to it. The researcher therefore had to download a short video of Act 1, Scene 3 from home on the laptop using YouTube. Before the next class started, this video was transferred through pendrive on to Tablet PC, and viewed using the OWL Player software as shown in figure 2.3.

Step 2: During the next session, the video saved in OWL player was then shown to the students, using the software IProf which is a delivery platform for education. Since the IProf software works with an internet connection only, this session was held in the lecture theatre as it was a Wi-Fi spot. An online class was created using IProf where all students were accepted in the class. Using the software IProf this particular video was shown and everyone could see the same video instantly, as shown in figure 2.4

Step 3: After viewing the video, students were asked to answer two text-based questions on the particular scene watched. Now supported with the visual, they attempted the task while using the software Ms Word 2013, as illustrated below. Software such as the Microsoft Office suite was used and many students used Microsoft Word to write notes or annotate typed work, as shown in figure 2.5.

Figure 2.3: Video of the Play Topaze Viewed in the Software OWL Player on the Tablet PC

Figure 2.4: Learning Materials for the Class Created with IProf Software

Figure 2.5: Students using MS Word 2013 to carry out a Learning Task

Evaluation after the activity:

After this activity, students submitted their answers online using Gmail for correction and feedback. Students were quite enthusiastic and showed interest in the session since it was their first experience of working with the Tablet PC in class. Students found this activity much more interesting than that of the traditional pen and paper. Fu (2013), suggested that the different learning styles of students can be accommodated for easily using technology in education. While students were tackling the question and answers, they were all trying to help each other with the use of the Tablet. In this small group, collaborative work was encouraged among themselves. The "Tablets for Schools" evaluation study (Condie & Munro, 2012) evidenced collaboration and stated that *"tablets appeared to be facilitating more collaborative learning, especially through its role in improved communication*". The class became more lively and interactive as students were eager to collaborate with their peers. The quality of the student responses was also noticeably improved.

Action Research Cycle Two

Using tablet computers in literature class can encourage creativity through role plays, theatrical performance and creative writing. The second action research cycle focused on studying the development of other 21st century skills such as creative thinking and decision making. The next activity was role play, allowing students to develop their video making skills while their peers performed on stage.

Step 1: Upon reflecting after the first action research cycle, simply viewing the video, as shown in figure 2.6, and encouraging participation was not enough to develop 21st century skills. Thus the idea of using ICT to make clips to develop their creativity. Creativity has been defined by Dede (2010) as *"a process that shows balance of originality and value. It is a skill, an ability to make unforeseen connections and to generate new and appropriate ideas. Creative learning allows the learner to go beyond notional acquisition and focuses on thinking skills. It is based on learner empowerment and centredness."*

Figure 2.6: Students Viewing the Video on the Tablet PC

This activity started with two willing participants proposing themselves for the role play. They prepared themselves to play the characters. For this session, they were asked to get on the stage platform and to perform the act. Once more, the lecture theatre was used, allowing us to make better use of the Tablet PC. The main idea of this activity was to get students involved and engaged in the session, allowing them to express themselves and develop their creative abilities.

Step 2: On the day of their performance, as shown in figure 2.7, they were filmed and observed by their peers. Students watching the role play, used the Tablet PC to record video through the 'camera app'. These files could then be saved and reviewed at a later date.

Figure 2.7: Students Performing an Act on Stage

While filming, students took more interest in the activity. After the role-play, students were asked to watch and comment on the video. A creative classroom platform was created. Dede (2010) describe Creative Classrooms as innovative learning environments that completely embed the potential of ICT to innovate and modernise the learning and teaching practices.

Afterwards, students were encouraged to engage into a group discussion online, sharing their views and ideas on the interpretation of the played character and in their understanding of this act, thus developing their critical thinking skills. Lai and Viering (2012) define critical thinking as the ability to analyse, interpret, evaluate, summarize, and synthesize information.

Step 3: After the group discussion, there was an activity to help students to develop skills such as cooperative and collaborative learning. Since most of the youngsters are connected to Facebook, this social network was used and the videos and questions were posted online. A student and the researcher were administrators and the others were added as participants. This online platform was created to encourage students to share their views and discuss questions from the different texts books.

Evaluation after the activity: During the group discussion, students were very eager to participate, to voice out their opinions without hesitation. Many who would usually hesitate to participate in class, were engaging in discussions. The Facebook account was successfully created and all the students were added. The videos were posted so as to encourage critical skills and encourage students to discuss. Moreover, further questions on this play were posted for students to engage in more discussion and to allow students to share their ideas and views.

RESULTS

In this study two questionnaires were designed for student participants, to collect primary data with a view to fulfil the objectives of this research project. One survey form was carried out after the first cycle with the Tablet PC while implementing the action research on the use of ICT tools. After the second cycle different activities were carried out with the Tablet PC, and a feedback form was given to students to complete. The majority of the 32 students participated fully in the action research and the data collection phases.

Results of the First Action Research Cycle

The first findings gave a clearer picture of student's internet accessibility and usage of the tablet PC's. Figure 3.1 shows 92% of the students have easy access to internet and activities such as the online forum discussion platform. Figure 3.2 demonstrates 65% of students use their Tablet PC more than 2-3 times a week. Only 10% of students state that they rarely use their Tablet PC, less than once a week. The Tablet PC is not a tool that the students use very frequently, since it is a new tool for them and they have not yet been acquainted with it.

Figure 3.3 illustrates the confidence of students while using their Tablet PC for the first time during class lessons. Most of the students rate themselves from being 'good' and 'very good'. The majority of the students are 'digital natives' and they learn to use technology very quickly.

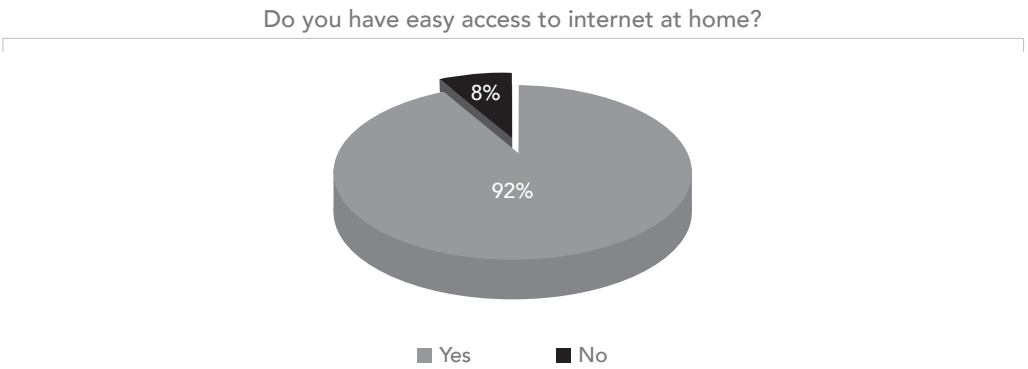

Figure 3.1: Students Ease of Access to Internet Connection

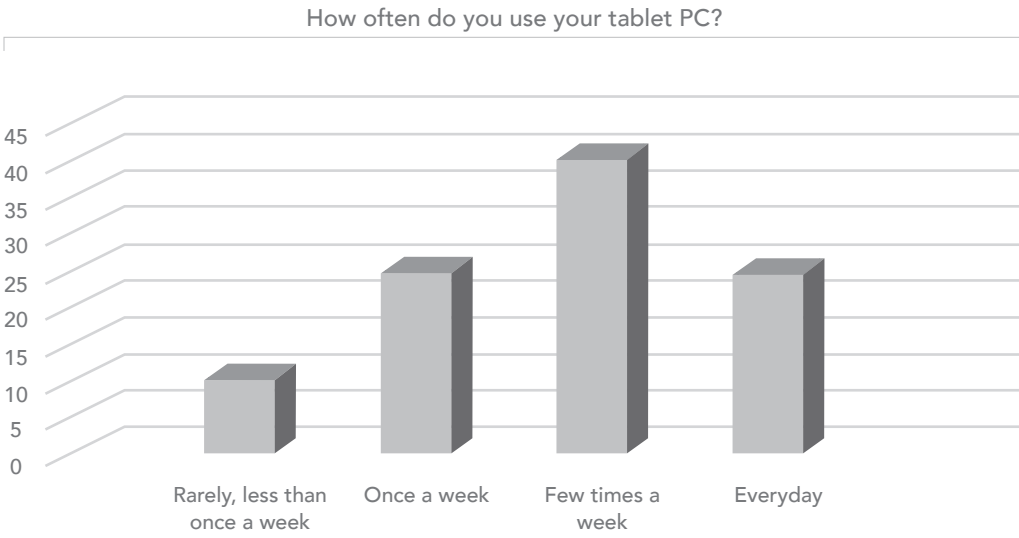

Figure 3.2: Students Usage of the Tablet PC

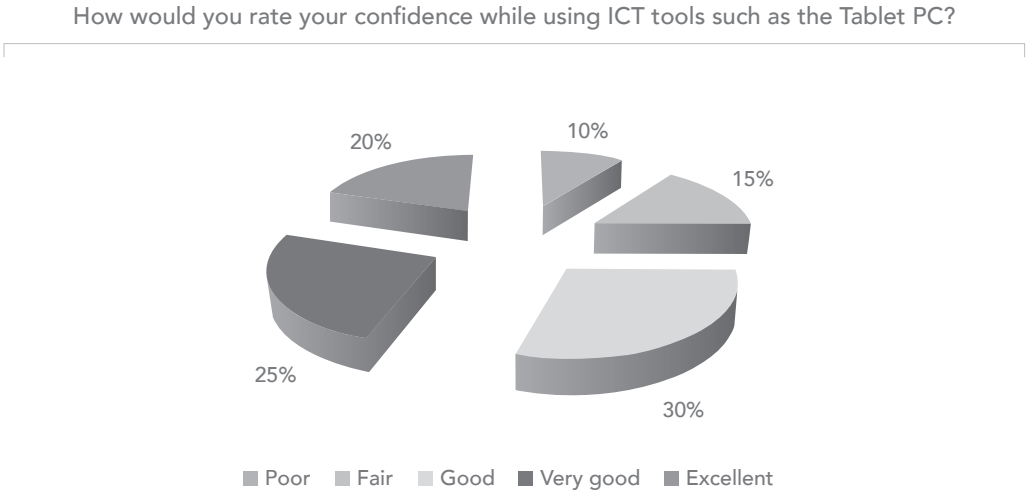

Figure 3.3: Confidence of Students while Using Tablet PC

Figure 3.4 shows how seriously students would treat a task given through the use of tablet PC after the first trial session. The feedback has been positive. The students showed their eagerness to innovate learning behaviours with the use of tablet PC. The majority showed enthusiasm to work seriously with this ICT tool. A few students showed reluctance to use Tablet PC in class lessons. These were positively correlated to those students who do not have easy access to the internet at home (Figure 3.1).

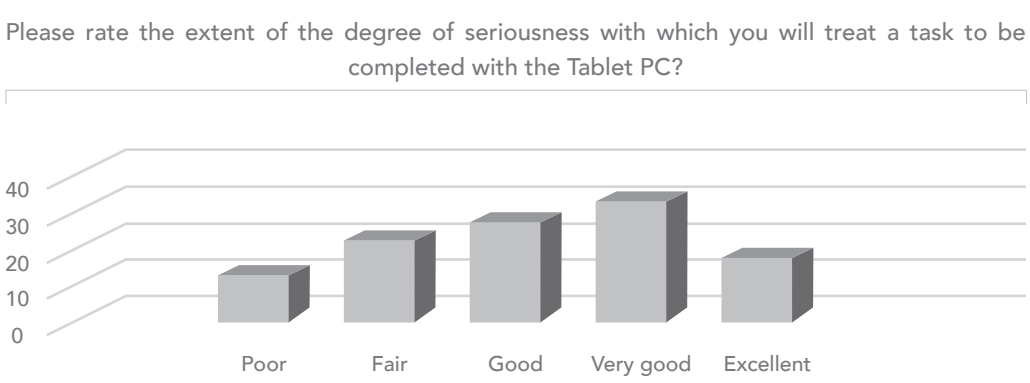

Figure 3.4: Seriousness of Students while using ICT tools for a Learning Task

Figure 3.5 shows the appreciation of the students after the first session of using the Tablet PC. During this session, the IProf software was used on a trial basis and an 'online class' was created. The majority of students showed a positive attitude and they showed their interest as this activity was new to them. They have never used the Tablet PC before in any other class lessons. This was their first experience of the tablet PC as a teaching and learning tool and feedbacks were quite positive. Fu (2013) stated that Tablet PCs had a very positive impact in learning (only diminished when there were technical problems). Students seemed to relate to Tablet PCs differently from the way in which they related to other computers, mentally connecting Tablet PC usage to innovative Teaching & Learning whereas computers are for the use of learning ICT skills. This shows that the implementation of ICT tools in this class positively influenced student's learning behaviour.

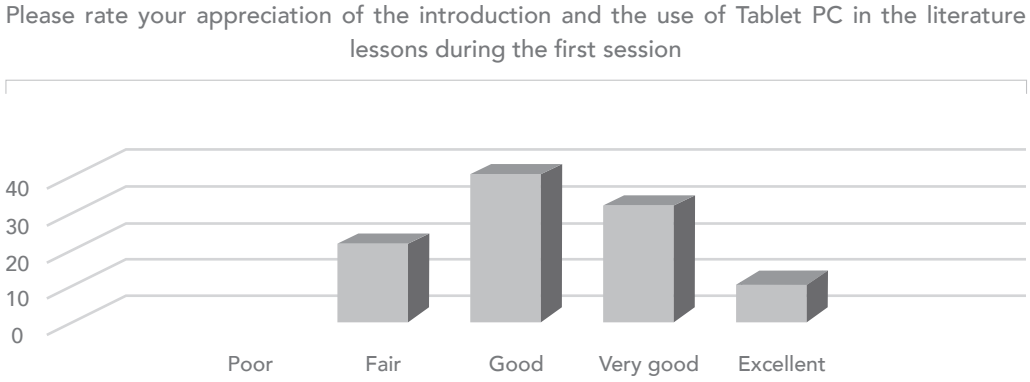

Figure 3.5: Appreciation of Students for using the Tablet PC in their Learning Session

After the first trial activity, figure 3.6 shows that most of the students were very eager for the upcoming activities. They were curious and enthusiastic since they wanted to see how the activities can be carried out with the Tablet PC. There

is an overwhelming appreciation by students of the use of tablets in their classroom work. This new teaching style engaged students for the upcoming activity. Condie and Munro (2012) reported how new strategies teaching and learning strategies can have a significant impact on the learning of the students and how technology had already transformed aspects of their teaching and could do so in the future, *"The result of using Tablet PCs alongside these approaches was that staff had begun to expand their use of ICT into preparation and teaching in both classrooms and sports areas"* (p. 51). However, about 20% of students did not appreciate this approach to use Tablet PC in class lessons. These 20% positively correlated to those students who do not have easy access to the internet at home (Figure 3.1). This shows that their exposure to such technology is limited and their appreciation of them is also limited for the majority of these O' level students the implementation of ICT tools in this class positively influenced effective teaching & learning with their teacher.

Figure 3.7 demonstrates the opinion of students on the development of new skills while using the tablet PC during the activities, in and outside the classroom. 50 % of the participants agreed with the fact that use of Tablet PC can help them in achieving new skills, whereas 30 % stated 'maybe'. The 50% who were unsure or answered 'no' also stated that the short time available to engage with the Tablet PC (only four weeks) was a limiting factor for them to develop new skills, This shows that the implementation of ICT tools in this class positively influenced half the students' opinions regarding development of 21st century skills.

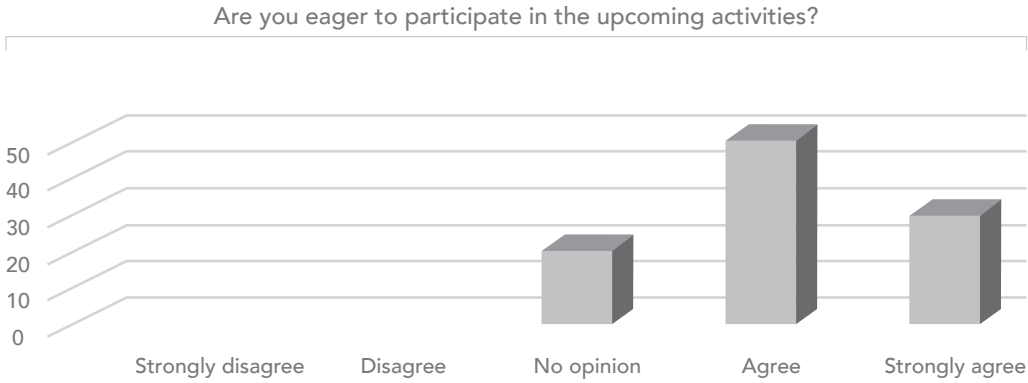

Figure 3.6: Eagerness of Students for Upcoming Activities

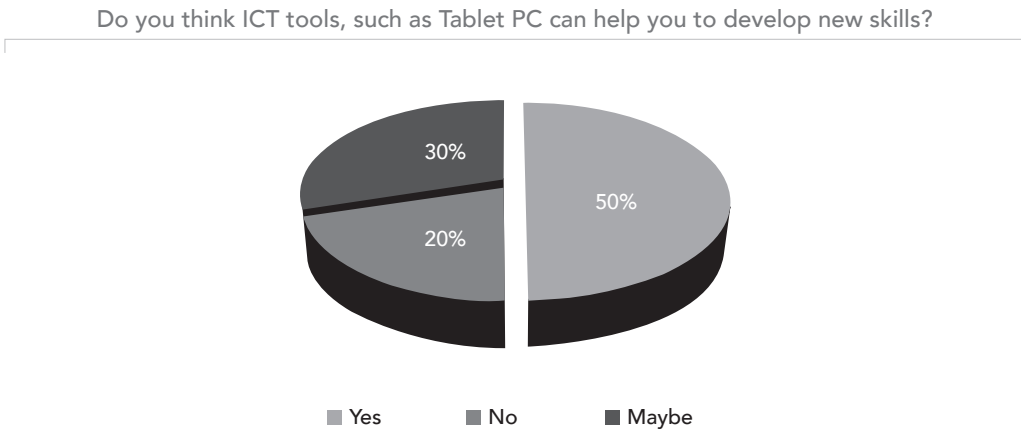

Figure 3.7: Tablet PC tool Developing New Skills for Students

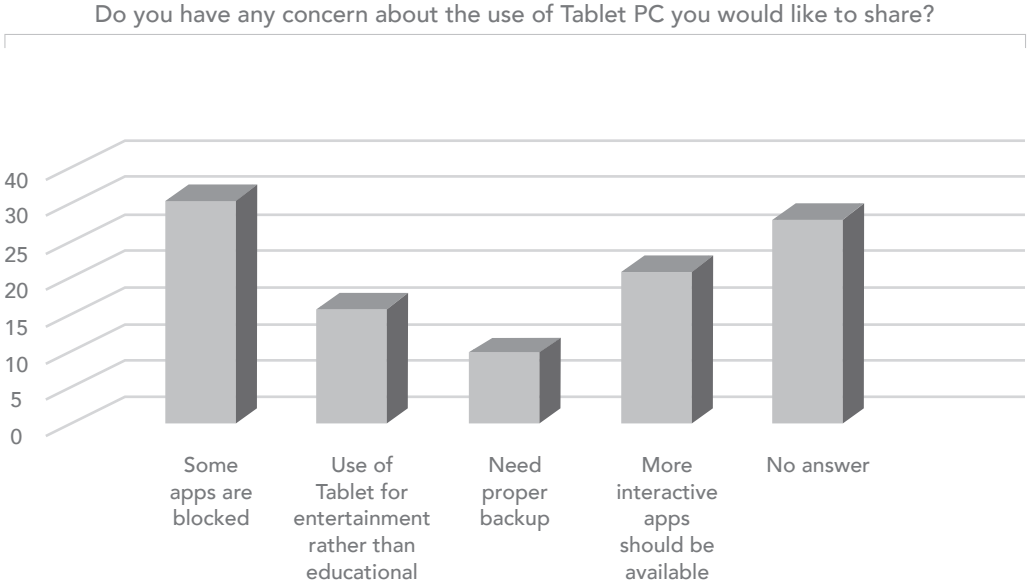

Figure 3.8: Concern of Students about Tablet PC Usage

Cycle one of the action research study evidenced certain limitations to implement ICT in this class. Figure 3.8 illustrates the concern of students about the Tablet PC after the trial session. One of the main concerns stated by the learners was that some applications such as 'YouTube' which is already installed on the Tablet are blocked. Also, the Tablet PC might be used for entertainment rather than for educational purpose, while a few suggested that the tablet PC should have a proper backup to save data.

3.2. Results of the Second Action Research Cycle

After having performed the activities with the use of the Tablet PC through the different cycles, students were given feedback forms to fill. This method has been used to allow further analysis of the action research.

A very high percentage of the participants thought that the experience gained with the Tablet PC in the teaching and learning process was on the overall a good experience, as observed from figure 3.9. 83 % of the participants responded positively. The high percentage shows that the students engaged well in such activities as they responded positively and participated in such activities. Such a response is similar to a report from British Educational Communications and Technology Agency (BECTA) (2004) stating that learners commented how learning was now fun and more enjoyable, they were becoming motivated to learn when introduced to Tablet PCs in the class. This evidences a positive influence on student learning behaviours.

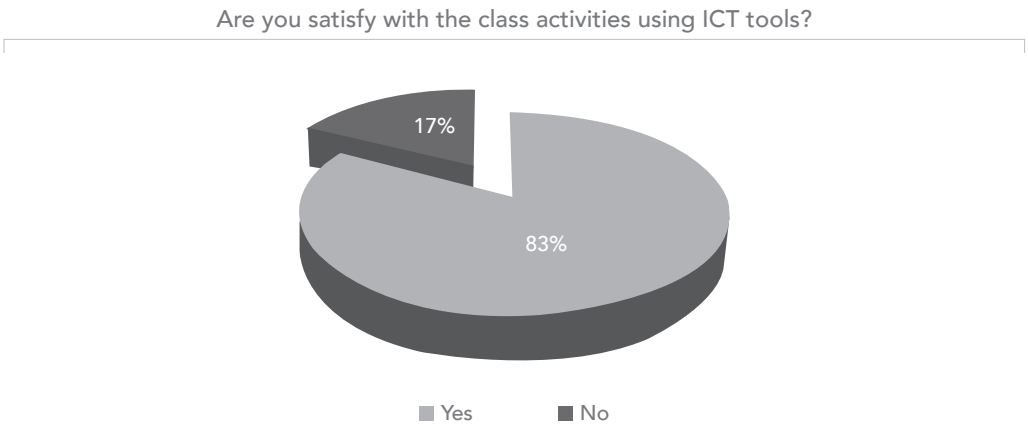

Figure 3.9: Satisfaction of Students with Teaching & Learning

The majority of the students as shown in figure 3.10, 75% of the participants rated the cognitive level of learning activities as 'good' or 'very good'. Activities performed kept the learners engaged and interested. This shows that the implementation of ICT tools in this class positively influenced effective teaching & learning with these O' level students.

Figure 3.9: Satisfaction of Students with Teaching & Learning

As illustrated in the figure 3.11, a great majority (75%) of the students agreed that such activities can help them to be motivated and captivated. Hence, we can see that use of Tablet PC can indeed prove to be beneficial to innovative teaching while keeping them motivated and interested. Keane and Keane (2015) agreed that the use of the Tablet PC increased motivation, and hence was likely to have a positive impact on learning outcomes.

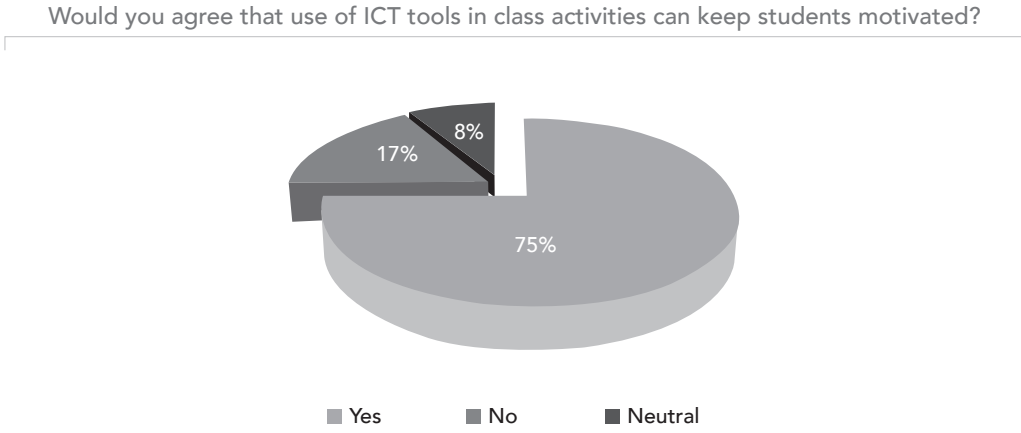

Figure 3.11: Motivation of Students

As shown in figure 3.12, most students that is 84 % of students say that use of ICT tools had helped them develop new skills. As Fu (2013) stated, three important characteristics are needed to develop good quality teaching and learning with ICT, namely: autonomy, capability, and creativity. ICT tools can help students to develop different skills, such as collaborative learning. Learners are given more opportunity to build the new knowledge onto their prior knowledge.

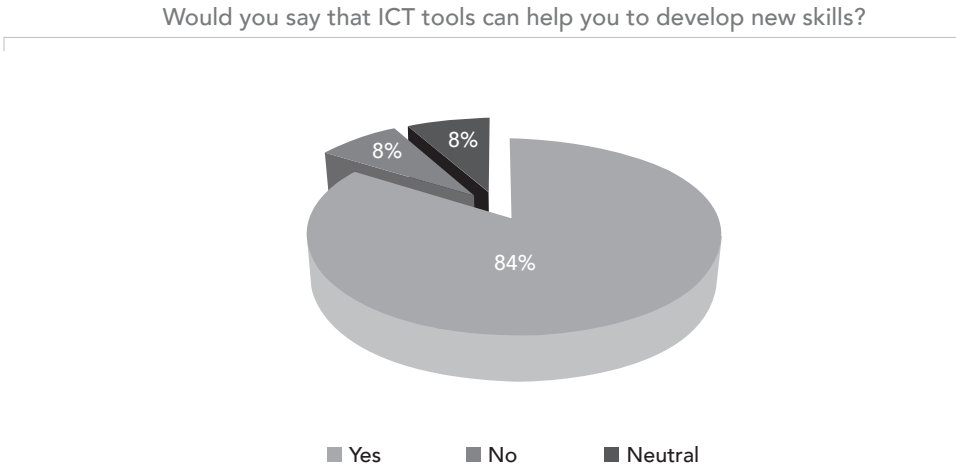

Figure 3.12: Developing New Skills

After the different activities, students were asked to assess themselves, to assess how far they think that use of ICT has helped them to develop skills such as decision making, critical thinking and creative thinking. As shown in Table 3.13 most of the students agreed that these activities helped them to enhance their critical thinking as well as their adaptability skills. The quality of the student responses was also noticeably improved. Based on a constructive learning approach, ICT helps students focus on higher-level concepts rather than less meaningful tasks (Keane & Keane 2015). Most people agree that "schools need to develop creativity in students" (Condie & Munro (2012) and emphasis put on innovation is today greater than ever also in the education sector. The study demonstrated the significant connections between studying with ICT tools and the acquisition of critical thinking skills. A more frequent exposure in the ICT environment can foster students' higher critical thinking skills. This shows that the implementation of ICT tools in this class positively influenced student opinions regarding development of 21st century skills.

Table 3.13: Developing Life skills

	Percentage (%)				
Skills	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
Decision making	–	–	16.7	66.6	16.7
Critical thinking	–	–	16.7	83.3	–
Creative thinking	–	8.3	25	58.4	8.3
Interpersonal Collaboration	–	–	–	83.3	16.7
Problem solving	–	8.3	25	66.7	–
Effective communication	–	8.3	16.7	75	–

Table 3.14 demonstrates students' statement on the effect of use of ICT tools in the teaching and learning process. Most of the feedback shows to be positive. 83.3 % of the participants agreed that ICT make class lessons more interesting. 58.4% and 16.6 % responded positive to the fact that they found that use of Tablet helpful in classroom. Moreover, 83.4% agreed that Tablet PC allows them to complete tasks more quickly. All of the participants agreed that ICT in the teaching and learning process do keep the class more active and more interesting than the traditional teaching method. As Fu (2005) stated, using ICT allows learners to communicate, share, and work collaboratively anywhere, any time. It may give them the opportunity to analyse problems and explore ideas as well as to develop concepts.

Table 3.14: Rating Statements

	Percentage (%)				
Statement	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
Uses of ICT tools keep class activities more interesting.	–	–	–	83.3	16.7
I find use of Tablet PC helpful in classroom.	–	–	25	58.4	16.6
Tablet PC allows me to complete task more quickly.	–	8.3	8.3	83.4	–
ICT tools can keeps students more active in class.	–	–	–	83.3	16.7
I find use of ICT Tools in lessons delivery better than traditional teaching delivery.	–	–	–	75	25

Figure 3.15 shows the constraints that students have had to face during the different activities done. The majority, that is 80% of the participants claims that time frame was the biggest problem. There was only a limited time in which the study was conducted.

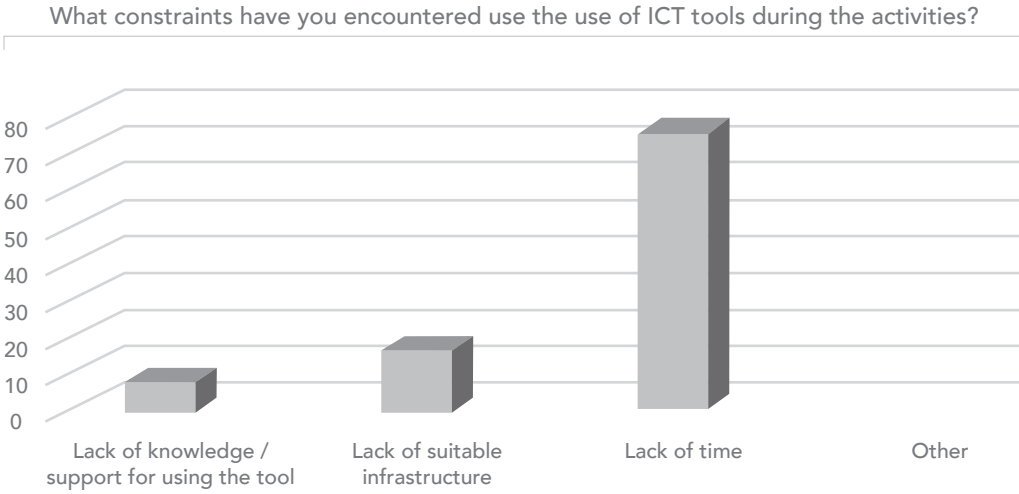

Figure 3.15: Constraints during Activities

Figure 3.16 illustrates means as to how these activities can be improved. Most of them requested to be given more time to be allocated to such activities. Whereas in our research, time had been the major problem due to upcoming examinations. Students remained focus on the preparation of the examinations which was the priority. Many students recommended that educators should try and make more use of ICT tools in their lessons.

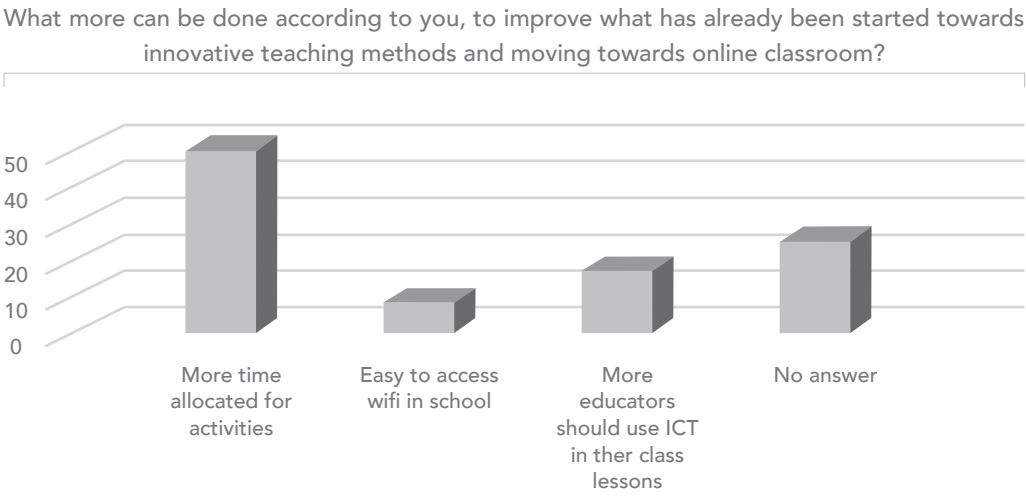

Figure 3.16: Improvement Proposal on utilising ICT in Classroom Activities

Therefore, schools are strongly advised to integrate technology, ICT tools across all of the learning areas and among all learning levels.

DISCUSSION & CONCLUSIONS

This paper outlines an action research study aimed at providing insight into the implementation of the Tablet PC project at secondary school level, to promote effective teaching & learning and to develop students' 21st century life skills. In this piece of research, it has been observed that adding new media and new technologies to teaching strategies in Mauritian schools can help to gain learners' interest. A modest proportion of these students did not have any significant prior exposure to the internet or new technologies and for these students this new learning environment was challenging and not fully appreciated. However, for the majority, the research findings have shown that the implementation of the Tablet PC has had a positive impact on student's learning behaviours and effective teaching & learning at O' level. Even though 'time' has been a major limitation and there were many other practical limitations, the activities allowed most students to develop 21st century skills to a certain extent, such as critical thinking, working in collaboration and communication skills.

The following suggestions have been proposed to assist the approach of the ministry and to allow educators and students to make maximum use of the Tablet PC.

- Give easy access to internet, wi-fi connection should be made available throughout the school infrastructure, so that Tablet PCs can be used in classroom.
- Give access to more software and apps such as 'YouTube' and media on the Tablet PC to facilitate interactive and pedagogical support.
- More workshops should be held to encourage educators and even students to make use of the Tablet PC in their class lessons, irrespective of their subject taught.
- Pedagogically focused workshops and seminars should be organised to shift the learning from a teacher-centred to a child- or student-centred approach.
- Provide students with more opportunities to get more involved in the activities while using ICT, hence allowing them to develop 21st century skills.

To conclude, we can say that this action research is only a modest step towards innovating teaching strategies and trying to develop 21st century life skills in our youngsters since many improvements are yet to be done.

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