Students' perception on Use of Technology in the Classroom at Higher Education Institutions in Philippines

Virginia Carbonilla Gorra[1] and Shyam Bhati[2*]

[1]Surigao State College of Technology
Surigao City, Philippines

[2]School of Accounting, Economics and Finance
University of Wollongong, Wollongong, Australia

[*]*Corresponding author's email: sbhati [AT] uow.edu.au*

_____

ABSTRACT— *Issue of unintended consequences of use of technology in class room is important because unintended consequences can cause disruption in class room and negate the institutional policies regarding strategic direction and intervention in teaching and learning process. Current literature on the use of e-learning for teaching focuses on factors which increases the effectiveness of e-learning but there is very little research on unintended consequences of e-learning, particularly in regard to developing countries. The present research seeks to fill in this gap in the research. This research investigates the consequences of the use of technology during classroom activities in higher education institutions of Philippines when the students are expected to do classwork and attend to their work in the college. These questions were studied using a survey method of research. The students sample consisted of 221 students from different state colleges and universities in Caraga region of Philippines. Students' perceptions on positive and negative consequences were observed. A ranking and frequency analysis method was used to calculate the consequences observed. The most observed positive consequences were instant messaging through chatting, lesson enquiry about assignments, sending and receiving e-mails, research through surfing the net including data gathering by downloading files and sharing cultural experiences with others through internet. Among the negative consequences listed by students were accessing social websites like face book, twitter etc. during class work, playing games, playing music, answering and returning calls and downloading and using copyrighted material. It is further observed that incidence of positive and negative consequences vary with the use of technology. The ranking of positive and negative consequences differ in all the three cases of use of technology - computer with internet, laptop with internet and mobile with internet. From the frequency analysis of positive, negative and net consequences of use of technology in class room it is observed that students are most likely to have negative consequences using mobile with internet. It is concluded that most students in state colleges and universities in Caraga region in the Philippines are likely to use technology in classroom for the purpose of positive consequences supporting the view that use of technology helps in enhancing learning related activities in classroom*

Keywords— Unintended consequences, technology in class room, e-learning, learning.

_____

1. INTRODUCTION

The purpose of this paper is to study the unintended consequences of use of technology in Philippine classrooms. Philippines is a developing country in Asia Pacific region. The use of Information and Communication Technology (ICT) in teaching and learning has become very common these days. Access to information increases the awareness of students, help them in increasing thinking and creativity in learning tasks, provide quick access to subject material and engage them in adopting strategies which can help in maximising the quality of learning. The process of learning can become very rich if students have access to latest information on subjects, can analyse the information quickly by manipulating it on computers through graphical displays and experiment with the information to effectively communicate their results and conclusions using the technical tools. On the other hand, technology can also be used to distract students in the class room from their learning activity. Technical tools like laptops and mobile phones can distract students from their learning activity and cause disruption to class room activity, if not used properly. Mobile phones distract students because of problem of ringing during class room discussion, use in cheating during class room assessments, multi- tasking by students and use of camera in the

class room which could lead to privacy issues. Similarly laptops and computers can be used for instant messaging and using Facebook, watching movies or videos not relevant to class room topics and distracting other students.

Technological resources such as computers, laptops and mobile phones used in teaching and learning activities have both constructive and destructive effect on academic environment affecting both students and teachers. The use of technical and instructional innovations sets off a chain of actions and reactions within education system, some of which are intended and others unintended. Unintended effects of using technology in education accompany the adoption of technology without warning [18]. These unintended consequences of use of technology in teaching and learning can cause disruption in class room, laboratories, and lecture halls and even outside the traditional classrooms. The study of these unintended consequences of use of technology in a class room setting is essential for teachers, instructors, education administrators and education planners. If the stakeholders in delivery and planning of education have proper understanding of intended and unintended consequences of use of technology in class room, they can develop strategies which can help them optimize use of technical resources and devise intervention programs in schools and colleges where needed. The purpose of this paper is to study the consequences of use of technology in class room within the Philippine context, specifically in the four state colleges and universities in Caraga Region. This study hopes to fill this gap and provide a context to policy makers in Philippines on which they can base their strategic direction and intervention in use of technology if necessary. The specific issue addressed in this paper is the nature of unintended consequences in the use of technology in the classroom. This paper is divided into following parts – next section describes the literature review, then methodology is given after that results are given and discussion are given followed by conclusions.

2. LITERATURE REVIEW

The literature review in this paper is divided into several categories. The first group of papers deal with the effectiveness of e-learning. Some of these studies argue about the effectiveness of e-learning in terms of satisfaction, motivation, enhancement of learning. For example, in the study on the effectiveness of e-learning for undergraduate students in health profession found that online learning does contribute to changes in learning, skills, attitudes and satisfaction and seems to be effective in all these attributes [7]. In their review of other studies, these authors found that 29% of studies showed higher knowledge gains, 40% showed greater skill acquisitions, 67% of studies show no difference in attitudes and 14% showed higher satisfaction with e-learning [7]. The majority of studies related to high income countries. Therefore, their results are generalizable to these countries only. Their application to low income countries like Philippines is limited. This study also does not address the question of unintended consequences of e-learning.

In a recent study, his issue of effectiveness of e-learning was examined [18]. They focus on engagement and motivation as necessary factors for knowledge gain and learning transfer, relation between learning outcomes and behaviour. They identify resources and support as essential factors for using e-learning initiatives. Learner characteristics such as age, previous online experience, gender, interaction with instructors, use of technology, online communication were identifies as contributing factors to improvement to learning. Their study is primarily based abstracts of papers reviewed and could have resulted in different conclusions of study if the study was based on full papers. These authors support qualitative research in addition to quantitative research for understanding the results of e-learning. Their study however does not address the issue of unintended consequences of e-learning [18].

Since Philippines is a developing, it is relevant to examine some of the studies on e-learning in developing countries. A study on e-learning in developing countries presented a framework for developing e-learning programs in universities [21]. The authors provided some guidelines on theoretical and practical experiences of e-learning with specific context of Iran, which is a developing country like Philippines. It was suggested that though e-learning can be very effective tool and efficient framework for learning in developing countries particularly in rural and remote area which are not easily accessible, yet lot needs to be done to make the technology easily acceptable in developing countries [21]. He suggests that well organised monitoring and control programs, support for students and lecturers in use of technology can help in improving the quality of education in developing countries. The study does not deal with the issue of unintended consequences of use of technology in learning.

The study of Oye et al [19] examines the application of e-learning model to explain the acceptance of e-learning technology in academic setting. Their study mainly focuses on the relationship of students' use of e-learning and their academic performance. Their results show that e-learning improves student academic performance . According to these authors positive perception of e-learning is crucial to foster the use of e-learning. Although students' attitude influence the intention to use the e-learning, the actual use of e-learning improves the academic performance of students. Their study is

from a developing country of Malaysia which is close to Philippines but its conclusions are in relation to e-learning perception, attitude and performance. This study does not specifically address the issue of unintended consequences of e-learning but only the intended consequences of e-learning and the mechanism to improve it.

Another paper by Lumadi et al [14] addresses the impact of e-learning on the academic performance of student- teachers. They conducted an experiment to determine if student- teacher taught using method of e-learning performed better that student-teacher taught using the traditional method of teaching and learning. Their findings suggests that e-learning has a significant influence on the performance of students as student-teachers taught using e-learning consistently perform better than student teacher taught using the traditional method. In their conclusion , e-learning was found to have a significant effect on student-teachers. They supported an initial professional development of student-teachers based on e-learning technologies, change in training approaches, strategies and activities in order to meet the educational challenges. Their study was focused on South Africa and could be useful to developing countries such as Philippines. This study however does not address the issue of unintended consequences of e-learning.

The paper by Thaket et al [23] has addressed the issue of effectiveness and usefulness of e-learning approach in teaching the maths course at level 5 in Yemen. The performance of an experimental group of 30 students studying using e-learning approach was examined and compared with the performance of 30 students the same course using a tradition learning package. It was concluded that there was a significant gain in Delayed Achievement of experimental; group using e-learning approach as compared to one using traditional learning method. The results suggests that e-learning has achieved a greater efficiency than traditional method.

Harandi [13] has also investigated the strength of the relationship between e-learning and students' motivation among students in Tehran Alzahra University. They found that e-learning is an element which affects student motivation. Their research is expected to be helpful in developing countries for educational thinkers who want to understand the effect of e-learning on students' motivation. But their analysis is limited by the fact generalisation of the outcomes cannot be made to other countries.

With particular reference to Philippines, the study of Gamboa [6] discusses the increasing prominence of the internet in the world community, the use of internet-based courses especially for advanced study where the student already has a decent grounding of the subject. This especially holds true for the study of English. According to Gamboa [6], e-learning is only applicable for student in Philippines, who knows very little English but is ashamed or embarrassed to study in a regular classroom. Although it is advisable for beginning students to study in a real classroom environment and where total immersion is still the most effective way to learn the basics of the language, online classes are becoming more of a logical choice for its anonymity. Furthermore, students can fit their studies into their schedules, and do not have to travel to find people fluent in English. These teachers can be brought directly into the student's home or office. While there will always be a place for "analog" classrooms, e-learning will increasingly become a prominent tool for those seeking to better their skills and increase their value on the world market. [6]

Another study on Philippines education by Lazarro and Mandela [13] focuses on the study of English as a language of communication in Philippines. They argue that Filipinos lack proficiency in English language and have therefore lost valuable opportunities in development of education because of lack of proficiency in English language. The lack of linguistic abilities in English could also hamper the use of technology in Philippines. This study is specific to Philippines but does not address the issue of use of technology in Filipino class rooms and resulting unintended consequences of use of technology in teaching and learning.

The literature on unintended consequences of e-learning includes the definition of unintended consequences, various theoretical models on unintended consequences and incidence of unintended consequences. Hermann (2000) define unintended effects of use of technology as those effects which are unforeseen by users of technology. Unintended consequences are those consequences of use of technology which could not be predicted at the time of introduction of technology. According to Nworie and Houghton [18] , the issue of unintended consequences of technology is crucial because they can cause disruption or distraction in the class room. The intended use of technology in the class room is to facilitate instructions and learning. Students are known to use technology in the class room to create distraction from learning and cause disruption in the class room. There are various ways in which students use technology in the class room for a purpose other than the learning activity. The computers and mobile phones are known to be used for instant messaging to friends, sending and receiving emails, playing computer games, surfing the web and activities such as shopping online. Instructors are

not able to monitor closely all students in the class room particularly when class sizes are large. These distractions indulged by students impede their learning and reduce the benefits that could be received from instructions received in the class.

Various theoretical models have been used in the literature to explain the unintended consequences of use of technology. It was argued by Blumenfeld [1] that new solutions to any problem could result in unexpected consequences or create problems which did not exist before. According to Norton [17] the social context of unintended consequences do not result from the flawed implementation of technology but law of unintended consequences is always in place at all times and place whenever a new innovation, idea or practice is adopted for use. Merton (1936) was the first to explain the causes of unintended consequences. Merton explained that unintended consequences could result from a number of factors such as ignorance, error, desire to implement processes with a purpose to obtain quick results, values of individuals implementing technology or self-defeating prophecy of individuals who seek solutions without properly understanding problems. Portes [20] attribute unintended consequences to lack of careful and sustained analysis of participants and context in which they operate. They identified many factors which could result in unintended consequences. These are – all participants not clear about the goals of group activity, some participants may have more effect on process than others, outside influence on group activity, failure to examine the context of activity. All these influences could result in a failure to anticipate an alternative result of use of technology.

Tenner [22] has attributed unintended consequences of use of technology to a revenge effect which is associated with use of technology. According to Tenner [22], complex systems cannot be completely mapped out and it is generally not possible to test various occurrences that may result from the use of these systems. Unintended consequences do not arise simply by the use of technology, but because the use of technology is anchored in laws, regulations, customs and habits and these bounds can create inappropriate applications or practice of technology resulting in unintended consequences. Gustafson and Branch [8] and Hutchins [11] describe unintended consequences of use of technology in terms of system's theory. According to these authors, systems are characterised by interrelatedness, interconnectedness, nestedness and dynamics of parts that make up the whole. When a change is introduced in a one part of the system, other parts of the system are also affected due to their interconnectedness. All the parts are however not affected in the same way or the desired way. Some wide effects may arise due to unequal response of different parts of the system to the change. Understanding the dynamics of different parts of the system can help in developing an insight into unintended consequences of adoption or use of technology. Nworie and Houghton [18] explain unintended consequences of use of technology in terms of Chaos theory. Chaos theory suggests, according to Nworie and Houghton [18], that organisations are complex, dynamic and adaptive. They exhibit stages of stability and chaos. When institutions adopt new technology for teaching and learning, a slight change in the system of education and learning could cause effect of unintended consequences. These consequences may not be easy to predict or eliminate altogether although with time the unintended consequences of technology could be reduced or minimised.

The literature on unintended consequences can be categorised into several categories. The first category of literature describes the theoretical basis of unintended consequences. These studies are described above. The next issue is if all the technology is disruptive or some of the unintended consequences can be regarded as unintended benefits or positive consequences of use of technology. Kearsley [12] regards that educational technology is mainly disruptive and causes distraction from the teaching and learning activity. Kearsley [12] stated that, educational technology has become 'primarily a distraction' from what matters most – effective learning and good teaching. The author continued to state that these unintended effects of technology are manifested in higher education, middle and high schools, and even elementary schools and thus, may carry additional implications for teaching and learning in these settings.

Fried (2008) in their study found that the level of laptop use was negatively related to measures of student learning and caused disruption in understanding of course material and course performance. Bugeja [2] reported in their study that those students who were taking laptops to their class rooms were doing activities which were unrelated to class work such as surfing the internet or sending e-mails. Fang [3] attributes this distraction to failure to involve students in the class room rather than blaming them for lack of engagement. Nworie and Houghton [18] have found that students indulged in disruptive activities using computers provided in the class room for learning activities. Students have used these computers for instant messaging with friends, sending and receiving emails, paying bills, shopping online, downloading and using copyrighted materials, surfing the web, playing computer games, downloading objectionable materials. The use of cell phones in the class room constituted a nuisance or distraction from the lecture and teaching. Sometimes students leave the class to attend a phone call on their cell distracting whole class and lecturer who may lose their train of thoughts. In some classes students answer the calls on cell phones in a low tone which distract other students around them. Cell phones have been used to cheat in examinations. Cell phones equipped with digital cameras have been use by students to record images of other students and lecturers or take pictures of answer sheets of other students, recording material for use in examinations and tests. Not all the

effects of use of technology in class room are considered negative as there could be positive unintended effects of technology such as accessing additional lecture material on internet or seeking clarification from friends through email. It is therefore necessary that all the positive and negative and positive unintended consequences are studied through empirical observation, which this study seeks to do. The methodology used in this research is described in next section.

Furr [5] conducted an ethnographic study of five higher education courses for teacher candidates offered via desktop videoconferencing. She discovered two types of incidental learning outcomes not identified as part of the formal curriculum: learning to use technology and individual and group attitudes and behavioural patterns. Importantly, the researcher also discovered adults, even those who were classroom teachers, were prone to adopt juvenile behaviours because the technology afforded a transactional distance between them and the instructor, a distance that diminished or negated an instructor's ability to monitor and control student behaviour.

Most of the literature on e-learning focuses on the positive effects of e-learning on gain in achievement and performance of students, motivation and efficiency of learning, effectiveness and useful of e-learning, satisfaction and enhancement of e-learning. There is however, very limited literature on possible negative effects of e-learning and the way e-learning is executed. Nworie and Houghton [18] have found that students indulged in disruptive activities using computers provided in the class room which could potentially be termed as negative consequences of using e-learning. Our study seeks to investigates empirically both the negative and positive consequences of e-learning in a classroom setting in a developing country of Philippines. The aim is to understand the unintended consequences of e-learning and their possible effect of learning by students. Next section of this paper gives the methodology use in this study for investigation and analysis.

3. METHODOLOGY

This research addresses the issue of consequences of the use of technology during classroom activities when the students are expected to do class work and attend to their work in the college. The question was studied using a survey method of research. The students sample consisted of 221 students from four different colleges in Caraga region of Philippines. The selected students were information technology students in various colleges who regularly used computers, laptops for their course and had access to other technology such as mobiles. The survey questionnaire was divided into three parts. Part I contained demographic information about students such as age, gender etc. Part II had questions about the frequency on use of different instrument of technology outside the class room. A Likert scale from 0 to 5 was used for recording responses by students, with zero being no access and 5 being always accessible. Part III of questionnaire had three sections related to the students' response on consequences of using technology inside the class room and kind of activities performed by students inside the class room in addition to the assigned class room task. A set of 35 questions on consequences were asked and responses obtained from each student based on a Likert Scale of 1 to 5, with 0 being the case if that activity was never done in the class room by students and 5 being the response when that activity was always performed. Data was obtained on all 35 questions on use of technology in three forms from each student - one using desk top computer with internet, second using laptop with internet and third while using mobile with internet.

4. RESULTS AND DISCUSSIONS

The research question addressed in this paper relates to the consequences of use of technology in classroom by students. The sample in this study consists of students of information technology in four colleges of Philippines. As a part of their study program the students were provided with computers and laptops to enable them to carry out the class room task. Students also brought their own laptops in class room for their use. As discussed in literature review students may perform activities in the class room which may or may not be related to their class room task. Students were asked about the response on various activities they would do in the class room during lectures or study hours and how they considered these activities to be positive (in the development of academic activity) or negative (not helpful in the academic activity). The students were asked to give their response on each activity they performed using different technology – computer with internet, laptop with internet and mobile with internet.

Table 1A: Ranking of consequences using various modes of technology
Positive Consequences

Number	Description of consequence	Ranking - Computer with Internet	Ranking - Laptop with internet	Ranking- Mobile with Internet	Combined ranking with all technologies
Positive Consequences					
1	Instant messaging through chatting	5	8	1	1
2	Designing and developing games	21	13	21	21
3	Research through surfing the net (data gathering by downloading files)	1	5	17	4
4	Presentation (preparing reports/slides)	4	3	19	6
5	Webpage designing and programming	14	7	18	13
6	Documentation (storing and data entry)	10	2	16	9
7	Downloading and installing software	6	4	19	7
8	Blogging (information updates, bulletin)	15	10	15	16
9	Advertisement (promoting webpage and products)	15	20	20	20
10	Sending and receiving e-mails	3	1	13	3
11	Broadcasting the message (news, drama series, entertainment and talk shows)	13	23	14	18
12	Creating multimedia productions	18	21	2	12
13	Lesson enquiry (assignments)	2	12	3	2
14	Online examination (quizzes and major exams)	22	9	3	10
25	Developing programming skills	16	19	14	19
26	Empowering to create and design webpage	12	11	11	11
27	Critical thinking	19	16	6	14
28	Logical reasoning	20	22	10	17
29	Representing ad expressing prior knowledge to others	18	14	4	10
Q30	Encouraging deep reflective thinking	17	15	8	13
Q31	Creating meaningful learning opportunities	8	18	5	8
Q32	Accessing ad interpreting information	11	23	12	15
Q33	Analysing the world and organising personal information	9	17	9	10
Q34	Enhancing human memory	7	12	10	8
Q35	Sharing cultural experience with others	9	6	7	5

Table 1 B: Ranking of Consequences: Negative Consequences

Q15	Cheating through texting during tests	10	7	2	8
Q16	Accessing pornographic materials and movies	8	9	5	6
Q17	Hacking files and data bases	9	10	7	10
Q18	Downloading and using copyrighted material	5	5	9	5
Q19	Playing music	3	3	3	3
Q20	Playing games	2	2	1	2
Q21	Storing notes to access during tests	6	8	8	7
Q22	Accessing social websites like facebook, twitter etc.	1	1	4	1
Q23	Paying bills and shopping online	7	6	10	9
Q24	Answering and returning calls	4	4	6	4

Table 1A summarise the results of positive consequences of use of technology and Table 1B negative consequences of use of technology in the class room. Table 1 gives students consolidated response on each consequence using three different sets of technology – computer with internet, laptop with internet and mobile. Students were provided with computers and laptops for the purpose of class room teaching but mobile phones were used by students because they had their own mobiles with them. From Table 1 some interesting results are obtained. First, students' response to ranking of consequences using three different technologies is different. As can be seen from Table 1, research through surfing the net was considered most performed activity while sending and receiving e-mails was ranked first using laptop. Students indulged in instant messaging through chatting mobile phone mostly. When the results for all the three technologies were combined, it was observed that instant messaging through chatting was the most performed activity, while lesson enquiry about assignments was the second ranked activity. Developing programming skills was ranked 19th and designing and developing games was the least preferred consequence of use of technology in the class room.

The negative consequences of use of technology in the class room are summarised in Table 1B. It is observed that students accessed social websites face book, Twitter while in class room followed by playing the games. Just as for positive consequences, use of different technology like computer with internet, laptop with internet and mobiles produced different negative consequences. The combined effect of use of all the three technologies is summarised in last column of table 1.

4.1 Frequency Analysis of Positive, Negative and Net consequences for students

Table 2 to 4 describe the frequency analysis positive, negative and net consequences of use of technology in the class room. POSITCONS is an index created to measure the positive consequences of use of technology by each student. This was measured by recording each student's response to each question on positive consequences on a scale of 0 to 5 with 0 being nil response for a particular question and 5 being Always and then adding all the responses for each student.' In the same way Negatcons measure the index of negative consequences for each student. Net consequences is the difference between positcons and negatcons for each student.

Table 2 shows the number of students and their percentage in each range with each technology. The combined Positcons are shown in last column. Figure 2 shows the frequency distribution of Positicons for each range through a bar chart.

Table 2: Frequency Analysis: Positive Consequences (Positcons)
Number and percentage of students in each category

Range	Computer with Internet		Laptop with Internet		Mobile with Internet		Average combined Positcons	
	No	%	No	%	No	%	No	%
0-10	16	7.3	25	11.2	18	8.1		
11-20	14	6.3	11	5.0	35	15.8	16	7.3
21-30	29	13.1	62	28.1	52	23.5	75	33.9
31-40	37	16.7	49	22.2	62	28.1	62	28.1
41-50	50	22.6	29	13.1	42	19.0	45	20.4
51-60	43	19.5	30	13.6	8	3.6	18	8.1
61-70	21	9.5	8	3.6	2	0.9	3	1.3
71-80	7	3.2	7	3.2	1	0.5	2	0.9
81-90	2	0.9			1	0.5		
91-100	2	0.9						
Total	221	100	221	100	221	100	221	100

From figure 1, it can be seen that a largest number of students for positcons are in the range of 21-30 followed by the range of 31-40 (out of a maximum score of 100). The distribution is slightly skewed towards the lower end of positcons indicating that most student are not able to derive full benefit of positive consequences of use of technology in the classroom in developing their learning.
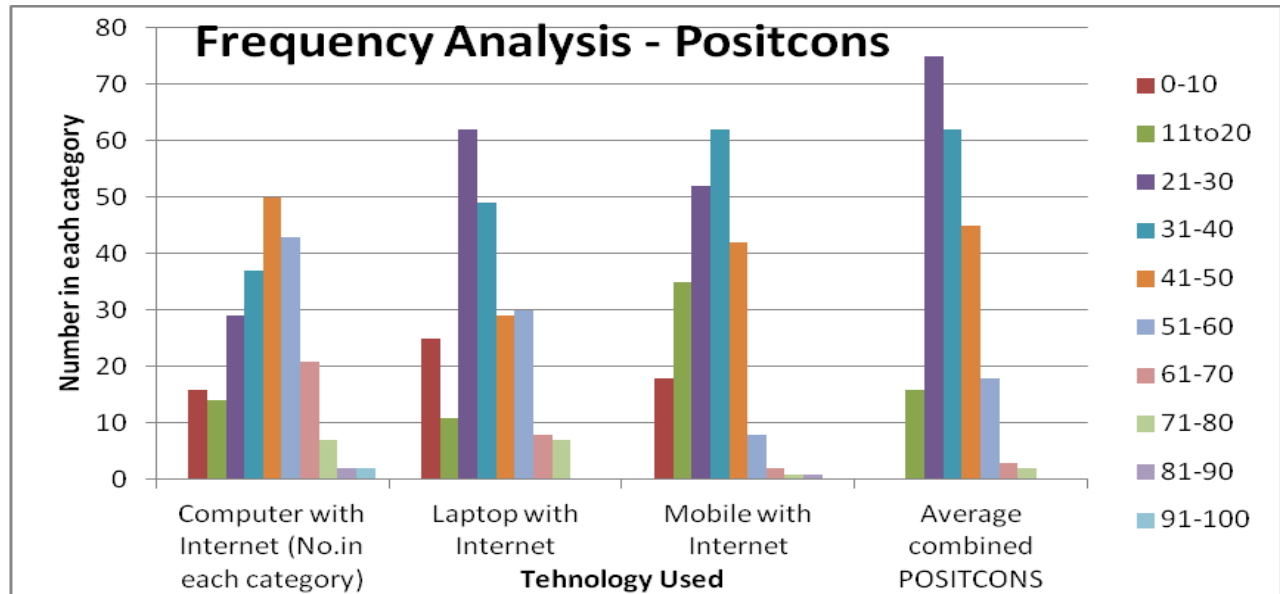

Fig 1: Frequency Analysis of Positive consequences (Positcons)

Table 3 summarize the frequency distribution of Negatcons – Index of negative consequences – using three different technologies and their combined effect.

Table 3: Frequency Analysis: Negative Consequences (Negatcons)
Number and percentage of students in each category

Range	Computer with Internet (No.in each category)		Laptop with Internet (No.in each category)		Mobile with Internet (No.in each category)		Average Combined Negatcons	
	No	%	No.	%	No	%	No	%
-10 to 0					50	22.6		
0-10	72	32.6	74	33.5	141	63.8	66	30
11-20	109	49.3	112	50.7	29	13.1	140	63.3
21-30	36	16.3	32	14.5	1	0.5	15	6.7
31-40	4	1.8	3	1.3				
Total	221	100	221	100	221	100	221	100

While Fig 2 shows the frequency distribution of Negatcons in the form of a chart.
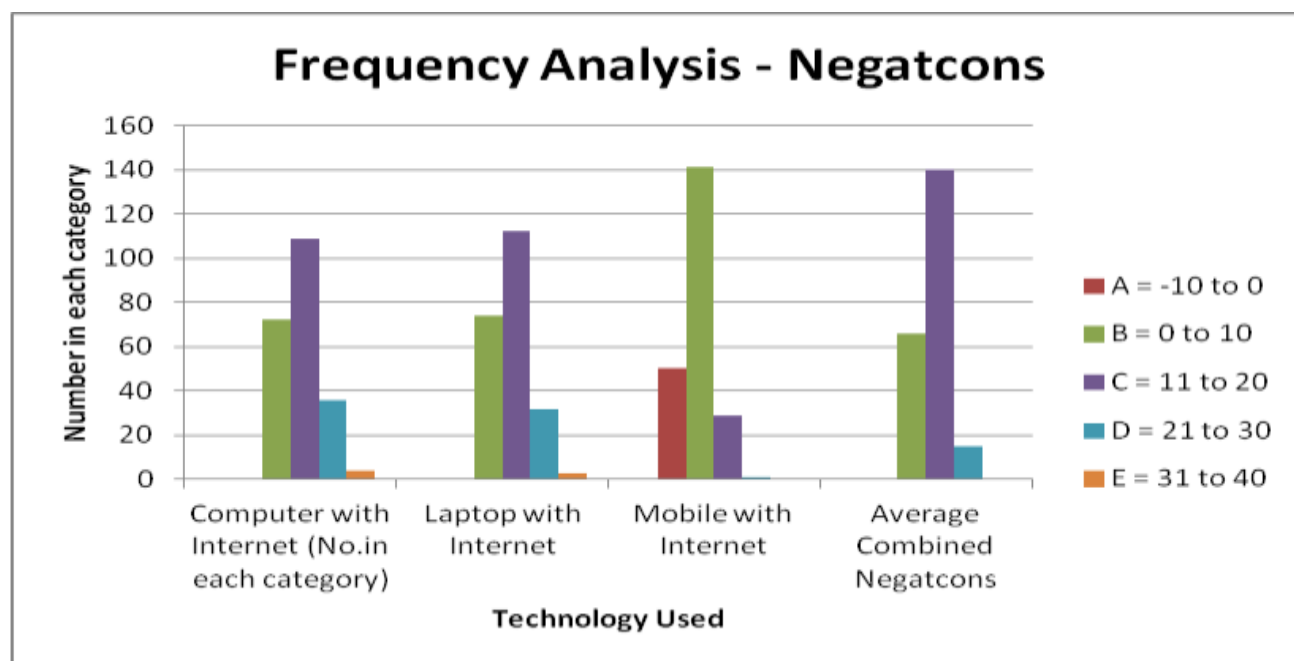

Fig 2: Frequency Analysis of Negative Consequences (Negatcons)

These results indicate that a majority of students have used technology in the class room in a way which could be disruptive to the class room learning.

Table 4 shows the index of net effect using technology in the class room in the form of Netcons while Fig. 3 shows the frequency distribution on Netcons in the form of a chart.. Netcons = Positcons – Negatcons for students.

Table 4: Frequency Analysis: Net Consequences (Netcons)
Number and percentage of students in each category

Range	Computer with Internet (No.in each category)		Laptop with Internet (No.in each category)		Mobile with Internet (No.in each category)		Average Combined Netcons	
	No.	%	No.	%	No.	%	No	%
-10 to 0			2	0.9	23	10.4		
0-10	28	12.7	45	20.4	48	21.7	19	8.6
11-20	40	18.1	62	28.1	69	31.2	90	40.7
21-30	59	26.7	62	28.1	53	24.0	76	34.3
31-40	51	23.0	29	13.1	25	11.3	28	12.7
41-50	29	13.1	18	8.1	2	0.9	7	3.2
51-60	7	3.2	3	1.3	1	0.5	1	0.5
61-70	7	3.2						
Total	221	100	221	100	221	100	221	100

It is observed from Table 4 that for at least 2 students, Netcons were negative using laptops with internet and for 23 students net cons were negative using mobile with internet. This demonstrates that students are more likely have negative consequences using mobile phones than computers. From column 4 of table 4, it is observed that no students had Netcons less than 0, when the combined effect of all the three technologies for students was combined. This shows that students are likely to use technology in class room for the purpose of positive consequences than negative consequences supporting the view that use of technology may helps in enhancing learning related activities although some students may indulge in negative consequences as well, but their number is very small.
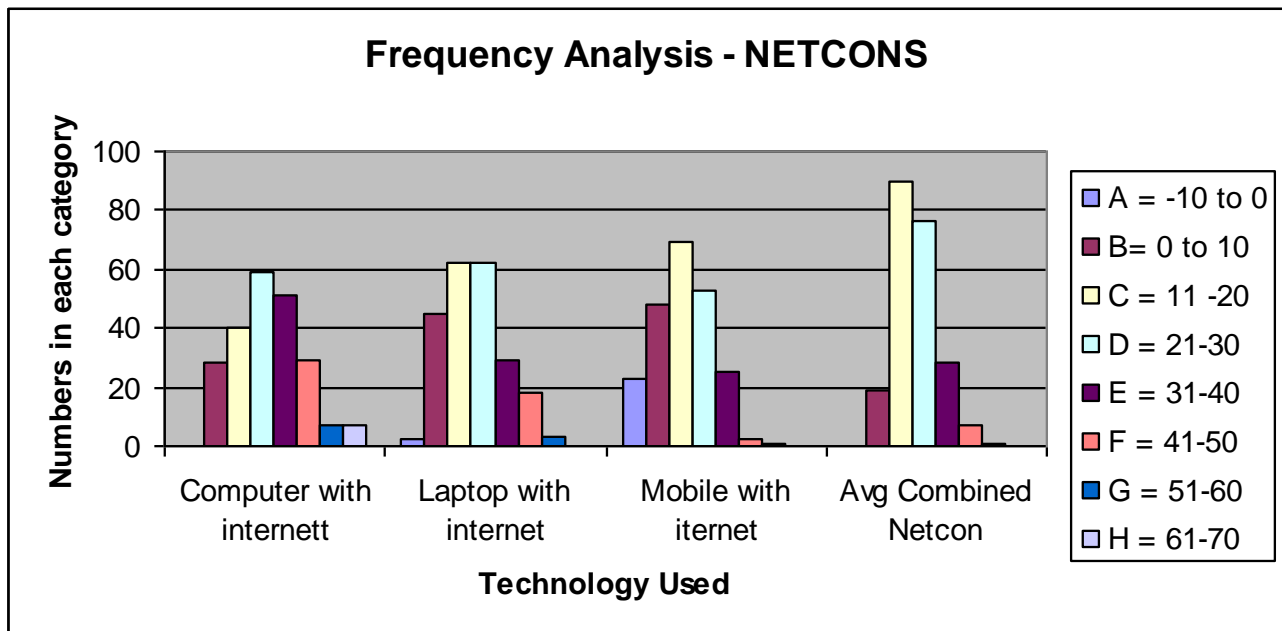

Fig 3 : Frequency Analysis of Net consequences (Netcons)

5. CONCLUSIONS

It is concluded that most students in state colleges and universities of Caraga region in the Philippines are likely to use technology in classroom for the purpose of positive consequences supporting the view that use of technology helps in enhancing learning related activities in classroom. The excitement of students in involving these technologies as part of their learning can cause also disruptions inside the classroom that being considered as negative consequences. Managing this kind of problem should be included and part of the curriculum and the concerned staff and faculty may take efforts on how these technologies being use as a tool to achieve learning environment.

The purpose of this paper is to study the unintended consequences of use of technology in class room in the context of Philippines. This study fills an important gap in the literature because there is no previous study on unintended consequences of use of technology in teaching and learning in the context of Philippines. The research question relates to unintended consequences of use of technology during class room activities when students are expected to do class work. Table 1 summarises the results of various positive and negative consequences of use of technology in class room. The results of table 1 are based on students' perception about the positive and negative consequences. It is concluded that students regard positive consequences of use of technology to be more than negative consequences. The most observed positive consequences were instant messaging through chatting, lesson enquiry about assignments, sending and receiving e-mails, research through surfing the net including data gathering by downloading files and sharing cultural experiences with others through internet. Among the negative consequences listed by students were accessing social websites like face book, twitter etc during class room, playing games, playing music, answering and returning calls and downloading and using copyrighted material. It is further observed that incidence of positive and negative consequences varies with the use of technology. The ranking of positive and negative consequences differ in all the three cases of use of technology - computer with internet, laptop with internet and mobile with internet. From the frequency analysis of positive, negative and net consequences of use of technology in class room it is observed that students are most likely to have negative consequences using mobile with internet. Further it is observed that students are likely to use technology in class room for the purpose of positive consequences as well as for the negative consequences supporting the view that use of technology helps in enhancing learning related activities in class room but technology may also be used for distracting students from their learning activities. This study however, is limited by the fact that results are based on students' perceptions about the use of technology in class room and specific to an education setting in Philippines.

6. REFERENCES

[1]   Blumenfeld, P., B.J.Fishman, J.Krajin and R.W.Marx, "Creative useable innovations in systemic reforms: Scaling up technology-embedded project based science in urban schools." Educational Psychologists Vol 35(3), pp.149-164, 2000..

[2]   Bugeja, Michael J. "Distraction in wireless class room." Chronicles of Higher Education, Vol. 53, No. 21, pp.C1-C4, 2008.

[3]   Fang, Berlin, "From distraction to engagement: Wireless devices in class room." Educause Quarterly Vol 32, No. 4, 2009.

[4]   Fried, Carry B. "In-class laptop use and its effect on student's learning." Computer and Education, Vol 50, no. 3, pp. 906-914, 2008.

[5]   Furr, Paula F., S.G.Horton and Karen McFerrin "Technologies' unintended consequences: International lessons needed to prepare teachers and students." I C. Crawford et al (Eds.), Proceedings of International Conference of Society for International Technology and Teacher Education., Cherapeake, pp.3183-3190, 2005.

[6]   Gamboa, Charity T., "The language business.", Journal of Internet Banking and Commerce, Vol. 13, No. 1, pp. 1-5, 2008. http://corraydev.com/commerce/jibc.

[7]   George, P.P., N. Papachistron, J.M.Belisario, W.Wang, P.A.Wark, Z.Cotic, K.Rasmussen, R.Sluiter, E.Riboli-Sasco, L.T.Car, E.M.Musulanov, J.Molina, B.H.Heng, Y.Zhang, E.L.Wheeler, N.A.Shorbaji, A.Majeed and J.Car, "Online e-learning for undergraduates in health professionals: A systematic review of the impact of knowledge, skills, attitudes and satisfaction." Journal of Global Health, Vol. 4, No. 1, 2014.

[8] Gustafson, K.L. and R.M. Branch "What is instructional design?", In R.A. Reiser and J.V.Dempsey (Eds.), Trends and Issues in Instructional Design and Technology, Upper Saddle River, NJ, Pearson Education, 2002.

[9] Harandi, S.R. "Effect of e-learning on students' motivation" Proceeding – Social and Behavioural Science, 181, pp. 423-430, 2015.

[10] Hermann, Allan, Robert Fox and Anna Boyd "Unintended effects in using learning technologies." New Direction for Adults and Continuing Education, 88, p.39-47, 2000. Jossey-Bass, Wiley.

[11] Hutchins, C.L. "System thinking.", Aurora CO; Professional Development Systems, 1996.

[12[Kearsley, G. "Educational technology: A critique." Educational Technology, Vol. 38(2), pp.47-51, 1998.

[13] Lazarro, Dorothy and E.M.Medalla, "English as the language of trade, finance and technology in APEC: An east Asia perspective.", Philippines Journal of Development, Vol. 31, pp. 277-300, 2004.

[14] Lumadi, M.W. "E-learning impact on academic performance of student -teachers." Mediterranean Journal of Social Science, Vol. 4, No. 14, 2013.

[15] Merton, R.K. "The unanticipated consequences of purposive social action." American Sociological Review, Vol. (1), 6, 894-904, 1936.

[16] Noessgard, S. S. and R. Orngreen, "The effectiveness of e-learning: An exploratory and integrative reviews of definitions, methodologies and factors that promote e-learning effectiveness." The electronic journal of e-learning. Vol. 13, Issue 4, 2015, pp. 278-290, 2015.

[17] Norton, R., "Unintended consequences." in D.R.Hendersen (ed.), "The concise encyclopaedia of economics." The library of economics and liberty, Indianapolis Liberty Fund, 2002.

[18] Nworie, John and N.Houghton, "Good intentions and unanticipated effects: The uni9ntended consequences of application of technology in teaching and learning environments.", Tech Trends, Vol, 5, 5, pp.52-58 2008.

[19] Oye, N.D., N.Ilahad, M.J.madar and N.Ab.Rahim, "The impact of e-learning on students' performance in tertiary institutions." Journal of Computer Networks and Wireless Communication. Vol. 2, No. 2, pp. 121-130, 2012.

[20] Portes, A., "The hidden abode: Sociology as an analysis of unexpected." American Sociological Review, Vol. 65, pp.1-18, 2000.

[21] Safaavi, A.A., "Developing countries and e-learning program development.", Journal of Global Information Technology Management, Vol. 11, 3, pp.47-64, 2008.

[22] Tenner, E. "Why things bite back." New York, Vintage Books, 1996.

[23] Thaket, T.S. and N.V.Kalyankar "The effect of e-learning approaches on students' delayed achievement in fraction maths course 5 at Yemen's public primary school." International Journal of Engineering Science and Advanced Technology, Vol. 4, Issue 2, pp. 206-213, 2012.