

## Tertiary Institutes in New Zealand: Identifying Gaps in Technology

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### ABSTRACT

This work in progress research paper is part of a multi phase study. Objective of this study is to evaluate e\_Learner's understanding of computer network and security and identify the gaps if any, in the e\_Learner's understanding. Based on the gaps identified suitable steps would be taken to alleviate the problem. In the preliminary phase of the study, authors have conducted a survey among their students. Authors would like to enhance the scope of their previous study to cover several tertiary sector institutions in New Zealand to study this issue further. They conducted the initial survey among their students to identify how much e\_Learners comprehend about computer networks and their security, covering fraud, identity theft etc? The preliminary survey has provided an appraisal of students' understanding of computer network and security. The survey results show that majority of students have one or more computers at home and many of them have broadband connectivity too. About sixty seven percent of the participants have multiple computers networked together to share computing resources. The survey results showed that only sixty percent of participants could fix their network and computer related problems. It was encouraging to note that seventy eight percent of the participants were aware of security issues. However, on an average only twenty two percent of the participants were taking appropriate measures to mitigate any security related issues on a regular basis. This second phase of the study is expected to cover a New Zealand wide diverse segment of students to remove any sample bias. The authors intend to include a web based survey among several tertiary institutions in New Zealand. Based on the analysis of the survey results of this expanded study, authors would apprise other participating tertiary institutes of the survey results and inform them of the development of the intranet site (Authors' institute) where relevant information of the subject area would have been placed by then. A follow up survey of the student groups would be taken up in phase three of the study once they have had sufficient opportunity to use the information on the web site.

*Key-words:* e-Learning, technology, security, education

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### INTRODUCTION

This work in progress research paper is part of a multi phase study. Earlier phase authors had conducted a survey among their students to evaluate their students understanding of computer network and security and identify the gaps, if any, in their understanding of technology from the e\_Learner's perspective. The survey results show that majority of students have one or more computers at home and many of them have broadband connectivity too. About sixty seven percent of the participants have multiple computers networked together to share computing resources. The survey results showed that only sixty percent participant could fix their network and computer related problems. It was encouraging to note that seventy eight percent of the participants were aware of security issues. However, on an average only twenty two percent of the participants were taking appropriate measures to mitigate any security issues on a regular basis. In the current phase of their research authors plan to enlarge the scope of their research and cover several tertiary sector institutions in New Zealand to study this issue further. This survey will provide a bigger picture by way of an unbiased sample as well as relevance of the results across the whole of New Zealand. In this paper a brief summary of the previous phase results have been presented. The authors have modified the old survey to suit the web survey format. Web survey links will be sent to several tertiary institutes New Zealand wide, to cover a larger and diverse segment of students. This study is proposed to be a web based survey among several tertiary institutions in New Zealand. Based on the analysis of this of this expanded survey and the ensuing results, a web based site would be developed which would cover the relevant areas that need emphasis for a home area network user. Authors would apprise other participating tertiary institutes of the survey results and inform them of the development of the intranet site where relevant in formation of the subject area would have been placed. A follow up survey of the student groups would be taken up in the subsequent phase of the study once they have had sufficient opportunity to use the information on the developed web site.

Before embarking on this research, authors did the literature review about Home Area Networks (HANs) and their security and explore if any education providers were concerned about students constrained in the use and understanding of HAN related computer technology. If

this was true, what was being done to educate the students about the technology and related cyber security issues? Some of the organizations taking action in this regard are quoted and cited in the next section.

### **Literature Review: Networking and Security**

It is obvious from Paul McCloskey's [16] article "universities Seek 'Clean Slate' for Internet security" talks about a group of universities and researchers trying to solve many issues relating to Internet security", that education Institutes are worried about computer security issues.

Stalking other persons using electronic communication devices is known as "Cyberstalking" [5]. The interception of emails, chat rooms, instant messaging, etc. are some examples of Cyberstalking. It may be possible for an intruder to take charge of individual computers and networks resources and use them as launching pads for attacking other computer system. In authors opinion not many students are aware of Cyberstalking.

Besides commonly known virus and scams there are many email frauds. On the CNN [9] website it is stated that e-mails, known as a "phishing" scam exploits the loophole in the IRS website and people who succumb to the scam could be giving away their account details.

On the Internet there are several articles that suggest how to trouble-shoot home network problems. This is also an indicator that people need help in home networking. Microsoft has published an article about how to troubleshoot your home computer network. The article starts with "Depending on how elaborate they are, home networks can be complicated. Unfortunately, because of this complexity, problems occasionally happen. Fortunately, you can usually solve these problems yourself. In most cases, finding the problem is a matter of going through a series of steps to eliminate potential issues one by one until you find the source of the problem". There are several other websites such as home networks [17], to help general public to sort out their home computer network problems.

There's a way to combat any networking issue – it's just a matter of being prepared and knowing what the most common problems are, so that you'll have the necessary tools at hand to make whatever corrections are needed as smoothly and quickly as possible [18] people are facing problem with home computer networking. Authors feel that education institutes need to address this issue to help their students and staff locally as many students need more support than what is available over the Internet. In the last part of the literature review, authors have quoted and cited, what some of the universities are doing in this regard.

Ron Teixeira [11], executive director of the National Cyber Security Alliance, points out that it is important to educate higher education communities about risk and precautions needed to be taken while using the Internet.

Jean Marie Angelo wrote the following about Virginia Commonwealth University (VCU)[12] in her article "Keeping students cybersafe: educating students about online dangers is a security issue not to be forgotten"VCU is incorporating online safety education into VCU 101, a student orientation class. "We have to tell students how to use websites safely," says Lepley. "We can't assume that because [people are] of age to be in college they are sophisticated about the ways of the world." (BNET, 2008)

Victoria university [13], Illinois university [14], Seattle Pacific University [15] also have Help-Desk on their university website to advise / help staff and students with Computer configuration, networking, security related issues.

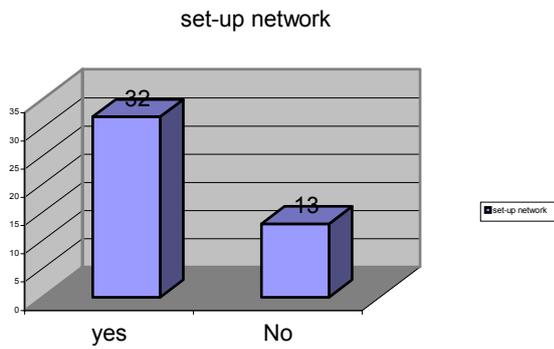
The above references to web articles show the concern some of the organizations have and the steps they are taking to rectify them. In the following section the authors describe in brief about their organization and e-Learning scenario in general. The aim of the study was to ascertain the need before any action / steps are taken.

### **Brief Summary of Previous Study**

The survey conducted by authors in the previous phase was for evaluating students' understanding of Internet technology. In this survey there were 18 questions. Some blank space was provided for specific/ open ended comments. Forty six students participated.

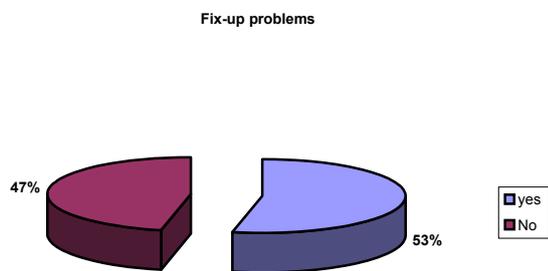
Authors found that majority (except one student, forty five had computer(s) students had computer(s) at their homes. Among the students who had computer(s), 82% had broad band. Out of forty five participants 30 students had multiple computers at home. Fifteen students who had single computer, eight of them were international students. Among the students who had multiple computers, eighteen participants had a hybrid (wired and wireless ) computer network at home.

Authors requested all the Participants (all 45) to answer if they were capable of setting up their computer network at home and connect to Internet service provider too. Authors were very pleased with the response. A good number of participants (Thirty two participants out of forty five participants) had the capability to setup home computer network while rest of them (20 participants) had to ask for out side help. Figure 1 below shows these statistics.



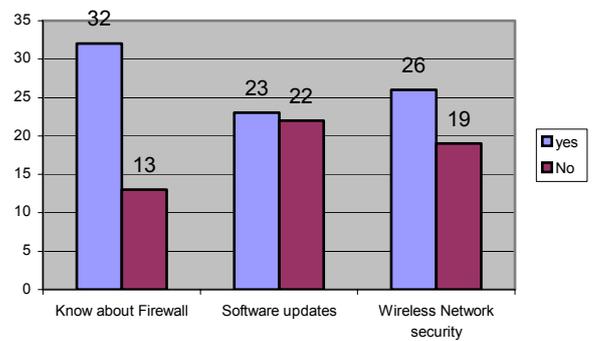
**Figure1: Ability to setup Network / Internet**

Although thirty five participants (out of forty five participants) were able to setup their home computer network only twenty-four participants were confident of fixing their computer network problems as and when they arose. Details are given in Fig. 2 below.



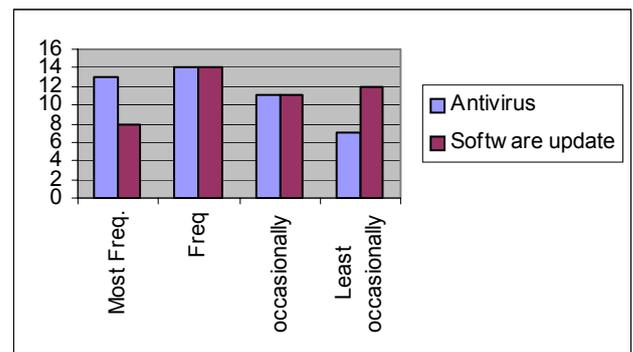
**Figure2: Fixing Network Problems**

In response to computer security awareness, thirty five participants responded yes and ten did not understand the security issue while surfing the Internet. Although thirty participants were aware of computer security, they did not comprehend fraud and identity theft etc. Quite a few participants (thirty-five) knew about firewall but only twenty-three participants knew about software updates and twenty-six participants realized that wireless network is less secure. Fig. 3 shows this statistic.



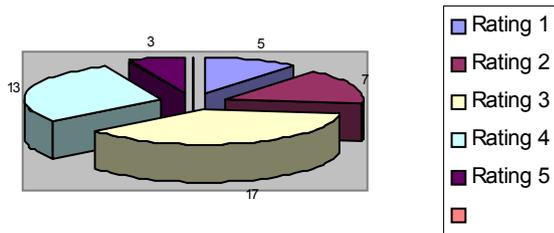
**Figure3: Awareness of Firewall, Software updates, Wireless Security**

The next question related to, how frequently participants updated their software (apply patches) and upgraded their antivirus software? Only eight participants said that they did their Software updates on regular basis and thirteen kept their Antivirus software current. This is depicted in Figure 4



**Figure 4: Anitvirus and Software updates**

The participants were asked to rate themselves on a scale of 1 to 5 about their understanding of computer fraud. *Rating of 5 indicated sound understanding and Rating of 1 indicated very little knowledge of fraud.* The results are shown in the figure 5. Out of total of forty five participants, five rated themselves as 1, seven rated themselves as 2 and a large number (seventeen), rated themselves as 3, thirteen participants rated themselves as 4 and only three participant rated themselves as 5.



**Figure 5: Awareness of Computer Fraud**

## DISCUSSION AND ANALYSIS

From the above results it is clear that majority of the students have computer(s) in their home and high speed connectivity too. Only about 60% have the ability to setup and troubleshoot their *home computer network*. The students do have the information about computer security but do not understand their vulnerability while surfing the Internet where appropriate measures are not taken by them before surfing the net. Figure 4 indicates that participants do not do software upgrades, (if they are Microsoft users they can easily download from Microsoft site [Microsoft]). Antivirus software is also not kept current. These lapses may be due to their (students) lack of comprehension of consequences.

The above study included students attending computing courses in the school of computing and IT. It may be safe to assume; if the students were from non computing related courses, the results would have shown greater unawareness in students of network computing and its security. Therefore there exists a need to understand the following aspects of technology for smart, safe usage of technology. To investigate that whether this gap in understanding of technology is wide spread across New Zealand, authors plan to conduct another survey across several tertiary institutes in New Zealand.

## CONTEXT OF STUDY

The current status of cyber era is enough evidence to support e-Learning. E-Learning has greatly helped in the enhancement /prospect of life-long learning. Duffy and Cunningham [1] have very appropriately stated that, education is not preparation for life but it is life itself. In Young's opinion, education providers need to adopt online delivery mode right now for future generations [7].

It is evident from the above discussion that e-Learning is going to stay. Therefore from authors' perspective it is

appropriate that we assess the students understanding of technology (for effective usage) and if there are gaps in their understanding then as an organization steps need to be taken to address the situation.

In the previous phase of research, authors had limited the scope of research to their school in their tertiary institute. In this phase of research authors would be conducting their survey to cover several tertiary institutes within New Zealand to investigate and identify gaps in technology New Zealand wide.

## Survey format

Survey format has been modified to web format to address larger sample of population. The web format will also help in participants filling the web form as and when the time permits and they could also fill it partially and go back and complete it or clear the previous entry and modify it. Only when a participant presses the submit button, it would be available to the authors.

Besides the questionnaire change to web format, some of the old questions also have been modified and some new ones added. New questions are there to evaluate the participants understanding of configuring web application software for secure environment. Knowledge of Window's defender, secure file sharing, multiple users on a desktop etc. are some of the new questions.

## RESULT ANALYSIS

Authors intend to use web tools to analyze the survey. Survey tool provided by Surveygizmo [20] will be used for this purpose. The tool can provide charts, analysis, filters.

The discussion and analysis of the results will be carried out from many different perspectives; choosing appropriate Internet access/connection plan, setting up HAN, fixing networking problems, security, applying software patches, upgrading anti-virus software etc

## RECOMMENDATIONS

Authors will provide statistical data to the participating tertiary institutions about their participants. They will also be given the consolidated results with out giving any specific information about other participating institutes to maintain privacy.

## FUTURE PLANS

Authors will conduct this web survey New Zealand wide. The survey results will be analyzed and participating institutes will be provided with the appropriate statistical

data. Authors also intend to create an intranet site with the relevant information. The supporting information needs to be presented in a way so that everyone is able to understand and make use of it. The knowledge base for the network and security is kept updated. Knowledge base will consist of criteria for selection of components for computer network; client, modem/AP (Access Point), media. It will also describe how to configure a client computer. A list of dos and don'ts for home area networks, computer security etc. will also be included. A follow up survey will be carried out after the students have used the web based help for some time.

## CONCLUSION

In this paper authors have discussed and analyzed the result of their pilot survey about technology awareness among their students. It is clear from the results that everyone using the computer technology is serious about its usage for learning, since a majority of them subscribe to broadband (Fig. 1) connectivity. Although the usage of technology is on the high side, they are not adequately aware of keeping the networks / computers up-to-date and secure. Concept of computer security seems too abstract, as no physical asset is being lost. Therefore, in authors' opinion it may be a good idea that educational organizations take steps that would help this at the course level, organizational level as well as at the community level. Authors have suggested some key areas which if addressed could help in keeping our student community safe while they are surfing the cyber space.

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