

# An Exploratory Study on the Usage of Internet Technologies and Tools in Educational Working Environment of Developing Countries: A Case of Pokhara University in Nepal<sup>☆</sup>

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## ABSTRACT

21<sup>st</sup> century has seen a tremendous advancement in the field of Information and Communication Technology. The commercial utilization of Internet tools and technologies has brought change in the traditional working environment. The functioning in an electronic environment is far more complicated than working in traditional environment and this brings many challenges, threats and potential problems. In this paper we analyze the challenges, threats and potential problems in the working environment of Pokhara University due to application of Internet tools and technology. We have chosen four basic areas on the basis of use that include web resources, electronic mails, social sites and P2P technologies. The main focus is to analyze the impact on work place productivity, social interaction, use and abuse of technology and legal issues associated with them. We, finally summarize the findings and offer solutions and recommendations from the observed data based on direct survey conducted in Pokhara University, Nepal.

☞ keyword : Internet technologies, social sites, web resources, social & ethical issue, work productivity

## 1. Introduction

21<sup>st</sup> Century is the age of Information and Communication Technology. It has changed the way we access and consumed information. The rapid growth of high speed Internet, web enabled application and the mobile technology produces enormous information in just no time. Access to enormous information is a click away from us. This massive flux of information is further growing at a speed undefined. The production of information due to varied technologies like social media, streaming media, blogs, P2P technology, etc., and the interconnection of almost every computing device has forced us to redefine our pattern of consumption, production and reproduction of information. Technology is not only making

production, access and distribution of information easily but is also raising concerns about the application of this information in social, professional and legal spheres.

Today's, Information and Communication Technology (ICT) is a vital component of an organization and its impact on the working environment of these organizations becomes a part of curiosity. Different organizations have different information and technological needs and the impact created due to these information and technological needs depend totally on the structure, function and business operation of these organizations. For example an airline reservation system may totally rely on computing and Internet technology for smooth functioning, whereas a Departmental store may not require Internet technology so importantly. Therefore the need and the impact will depend totally on the functions and nature of an organization.

The advancements in ICT has modified the working environment of every organization. Each business house, governmental offices, research centers, academic institutions, hospitals, etc. around the world rely heavily on networked computers, Internet, Internet tools and its related technologies

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to communicate [15], operate and manage their business functions. Universities are no doubt other big organizations that find the massive application of these technologies in their academic and administrative functioning. The use of emails, web portals, websites, blogs, social and streaming media, online discussions, groups and forums including university's own web based management systems are all relied on ICT technologies. Many researches have been conducted that find the application and impact of Internet tools and technologies on organizations and most of articles and papers talk only about the advantages of these technologies. This represents only one side of the process but there is another side of the process connected with it which is far more complicated and brings many concerns in light. These concerns are so vital that if they are not studied and addressed properly, it may lead to lowering of work productivity, efficiency and also raise concerns related to legal and ethical matters. Many organization spend a lot of time, invest a lot of money and heir consultants to maximize benefits of ICT technologies in their working environment.

Working in an electronic environment with Internet connections facilitates the possibility of massive data and information availability [15] at the click of a mouse. Information on varied subjects from knowledge base, entertainment, latest news updates, streaming media, pornographic content to sharing of information through social media and streaming media is so easy with Internet tools and technologies. This has raised serious concern and alarmed organizations to find right use of information inside their organizations and also ensure that no legal or ethical matters arise due to use of these technologies. This issue has become more sensitive for under developed countries like Nepal and growing university like Pokhara University, which has just a few years of history in the use of Internet tools and technologies.

This study is a case study which was based on direct survey conducted in Pokhara University, Nepal. The study found the impact of Internet tools and technologies on working environment of Pokhara University. The study was conducted on 150 employees (census method) of Pokhara University to understand the contemporary issues associated with the use

of computer technology and Internet in the universities' work environment.

The study constitutes of three parts that investigate the implication of Internet tools and technologies in the internal working environment of the university. The first part brings out the statistical analysis scenario of computer technology and Internet use. The second part forms the core of this paper which focuses on the study of use and abuse of Internet tools and technologies inside Pokhara University. The third part analyzes and identifies the most significant impacts occurring due to Internet tools and technologies. It then provides suggestions, conclusion and recommendations regarding impact of these technologies on university. In all cases attention is concentrated not on the advantages of the mentioned tools and technology utilization, which are quite well discussed in length in many research papers, but on the negative impact that include social and ethical consequences, threats and problems and legal issues in the university's work environment.

## **2. Utilizing Computer Technology and Internet in Internal Work Environment**

Pokhara University started its operating from 1997 [11] and is considered one of the modern universities in Nepal. It started the use of computer system from the time of its operation and the demand for computer technology, Internet usage and information management system has multiplied with every passing year. Today university has a well-designed computer network architecture, an Information Access Center [11] constructed by Government of Korea and a dedicated lease of 8 Mbps and 4 Mbps provided through fiber optics. University allocates thousands of rupee every year in ICT sector to maintain, operate and upgrade its IT infrastructure and resources. Today almost every person and university divisions find computer and Internet as a vital technology to accomplish their functions. The academicians, administrative people and students massively use emails, web resources, social network sites, P2P applications and streaming media in their daily activity. The internal relationship between different entities is as depicted in figure 1 below.

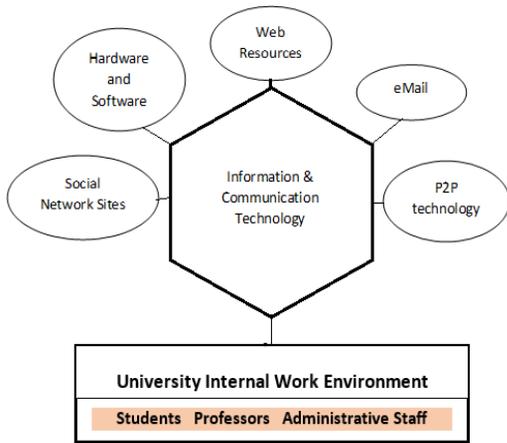


Figure 1. The Internal Association Diagram

The study conducted on 150 employees of Pokhara University brought some interesting facts into light which are discussed in the sections below.

### 2.1 Challenges Connected with Computer Usage

Computer use is a common daily practice of employee of the university. Many are aware of the system they use, the types of software that are installed in it and surf Internet as a novice /average user but still they are not aware of many issues that are attached to unsafe browsing. This section of study was done to find out the possible challenges and threats that may occur due to less awareness about computer system and the type of software installed in them. A four set of questions were asked to the university employees that included

- What type of software is installed in your computer system?
- Do you use a licensed Antivirus program?
- What problems do you face in your computers systems? (multiple choice)
- Do you take your data backups?

The data revealed that about 69.9% of the respondents use pirated and pre-installed software provided by the computer seller, 21.2% used both licensed and pirated software, and 9.9% of the respondents had no idea.

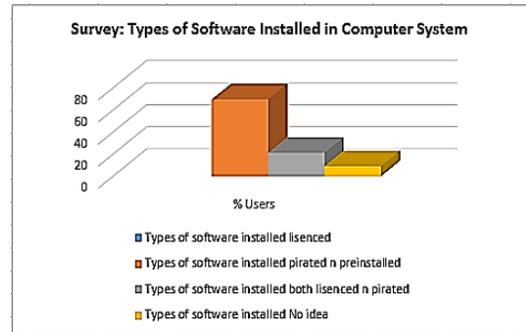


Figure 2. Field Survey representing licensed / pirated software scenario

The second survey showed that around 81.81% of the users use licensed antivirus program while 18.19% of the user did not use any licensed antivirus program in their computer system.

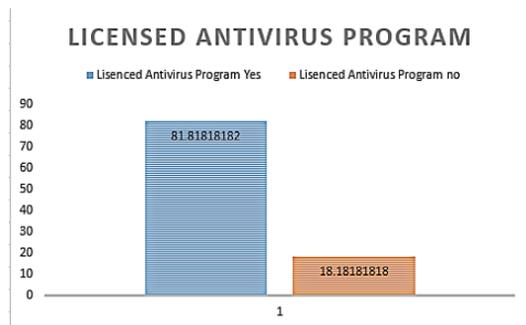


Figure 3. Field Survey representing Anti-Virus software scenario

In an answer to the third question that talked about problems occurring in a computer system, respondents reported that 78.8% had virus related problems, 21.2% reported about data loss, and 45.45% reported slow performance and system hang up. In response to the third question 60.61% people used secondary storage devices to take backups, while 18.18% took no backups, 12.12% use windows utility program and 9.09% of the respondents had no idea of the backup.

The survey concluded some interesting facts that showed people had less awareness towards pirated and licensed software. The use of licensed antivirus program offered no great help to the problems related to virus, data loss, slow

performance and system hang ups. A report on pirated software by IDC stated that 62% of consumers reported a problem with some software they had installed in the past two years. Problems ranged from software that slowed the consumer's computer so much it had to be uninstalled (36%) and software that wouldn't run (34%) to software that infected the computer with a virus (16%) or overran the computer with pop-up ads (15%).[1]

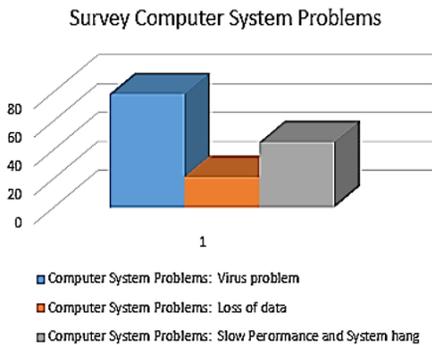


Figure 4. Field Survey representing Computer System problem

Another fact that was observed was in case of data backups. It showed a good majority of employees took backup in secondary storage while some were not aware of it. Respondents reported that they lost very important data in the past and had to reach to a technician to retrieve data.

This section gave an impression about the awareness quotient of Pokhara University manpower and its management regarding the use of ICT. It was interesting to note that government of Nepal has well defined cyber law [12] that talks about copyright, license, trademarks and patents, a reputed institution like Pokhara University is still using illegal and pirated software.

## 2.2 Challenges Connected with Access to WWW Resources

Access to WWW resources is the need of time and seems to be something that is quite obvious and natural. Internet and WWW can bring numerous benefits in a university environment such as: faster searching of required information, easier access to professional and academic

knowledge, more effective communication, possibility of cooperation within different stakeholders of university and execute services necessary for organization. Besides these range of benefits many studies on the use of Internet at offices has proved that an alarming percentage of web use in organization is for personal purpose and is an open invitation for worms and viruses. The Hindu, an online news media stated results of a survey conducted in Singapore, which showed that 53% of respondents said that they use Internet for personal works during office hours. In the Middle East 37% respondents said they use Internet for non-work related activities during work hours. [2] The fact is not only related to the use of Internet by business professionals but majority of the users having access to Internet and www use it for their own personal needs, entertainment and other such activities. According to a research of Dr. S. Young, 47% of employees send up to 5 personal emails per day, and 32% send up to 10 personal emails daily, and 28% receive up to 20 personal emails per day. [17]

Table 1. Source, Symantec cloud Internet security threat report 2014:: Vol10 [13]

### Malicious Web Activity: Categories that Delivered Malicious Code, 2013

Source: Symantec cloud

Rank	Top-Ten Most Frequently Exploited Categories of Websites	Percentage of Total Number of Infected Websites	2012	Change
1	Technology	9.9%	24.1%	14.9%
2	Business	6.7%	31.8%	-7.4%
3	Hosting	5.3%	9.0%	-3.8%
4	Blogging	5.0%	4.0%	0.5%
5	Illegal	3.8%	2.8%	0.9%
6	Shopping	3.3%	4.7%	-1.8%
7	Entertainment	2.9%	1.7%	1.1%
8	Automotive	1.8%	3.3%	-0.6%
9	Educational	1.7%	1.9%	0.7%
10	Virtual Community	1.7%	1.7%	-0.4%

The same attributed facts regarding the use of web in Pokhara University were also studied. The research tried to study how employees in university use web. The primary objective was to study the use and abuse of web in workplace, the average time spent on Internet in office, primary types of websites visited during office hours and downloading of programs and applications during office hours.

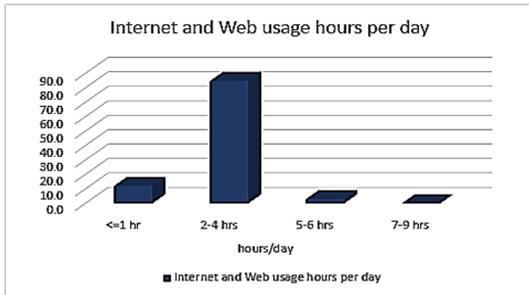


Figure 5. Field Survey representing Internet / Web Use

The survey results depicted that around 60% of the employees used web for official use whereas 40% used it for personal purpose as well. Further the types of surfing done during official hours concluded that email was mostly used by 99% of the employees, whereas 75% used social networking, 57% used it for streaming media and 54% were engaged in searching different types of content.

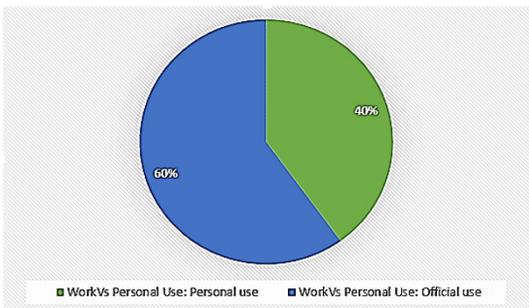


Figure 6. Field Survey representing Internet Use Scenario

The survey results clearly indicated that employees commonly used Web resources to access materials for completely personal purpose and the scope of this phenomenon was not marginal.

The scope of potential problems and challenges connected with such utilization of the Web was very broad. The basic risk was seen in case of productivity loss that resulted from devoting part of work time on activities completely unrelated with their university business activities. Other significant issues included threats of virus infection connected with downloading various files (music, movies, games etc.), legal risks related to downloading unsavory or copyright material, “absorption”

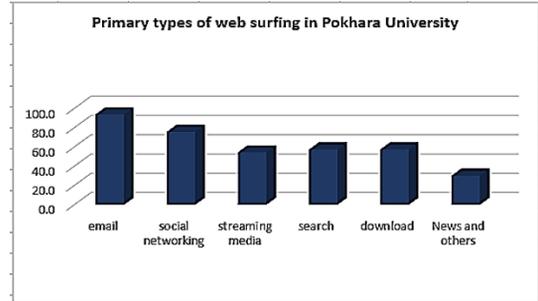


Figure 7. Field Survey representing Web Surfing Scenario

of the part of computers’ disk space, consumption of network bandwidth as well as risk of downloading and installation of various types of malware (spyware or adware) in their systems. Study of Dr. Young in this regard also had a similar output where the data showed that 224 firms that utilized monitoring software, 60 percent of the managers said they had disciplined employees for online misuse, and 30 percent had fired people for such behavior, which included downloading pornography and shopping and gambling online. [17] Generally summarizing four basic groups of threats were concluded which included:

- Loss of employee’s productivity.
- Risk of companies sensitive information due to spyware and malicious programs
- Legal risks associated with copyright infringement.
- Improper use of IT infrastructure.

Webroot Inc. published a report that stated that in 2012, 79% of companies reported that they experienced one or more types of Web-borne attacks and nine in ten Web security administrators agree that Web browsing is a serious malware risk to their companies. [3]

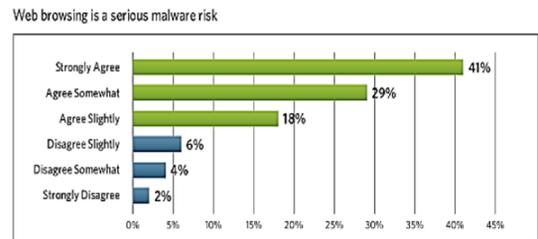


Figure 8. Survey representing Web browsing / Malware risk Scenario, Source: Webroot Inc.

### 2.3 Challenges Connected with Utilization of P2P

Access to the resources of P2P (Peer-to-Peer) networks and P2P program utilization like torrents is nowadays the next common area of Internet technology use in an organization. Torrents are a big challenge to the consumption of Internet bandwidth and intellectual property rights. According to study of Martin and Westall Torrent applications contribute to the demand for high speed broadband access, they also contribute to the undesirable 80/20 effect wherein 80% of the bandwidth is consumed by 20% of the users. [19]

Results of the research conducted in Pokhara University, proves that utilization of P2P/torrents is common among employees. It shows that almost 24% of people use torrent to download programs, music and videos while 15% of them conduct file sharing in the workplace.

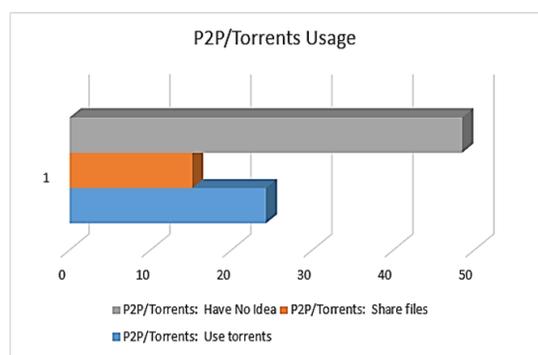


Figure 9. Field Survey representing P2P / Torrent use scenario

The P2P programs offer four most important groups of threats which include high bandwidth consumption (improper use of IT infrastructure), security issues, legal risks and loss of employees' productivity. When talking about the security issues two basic types of threats of virus and third party malware (like adware, spyware etc.) are taken. A research paper by Wielki in IFIP conference proceedings stated that in case of usage P2P networks virus risk is really significant and heighten by the fact that there exists viruses not present elsewhere, targeted especially at file-sharing applications [5]. Further, beyond the much discussed copyright infringement issues, P2P networks threaten both corporate and individual

security. Our research shows that confidential and potentially damaging documents have made their way onto these networks and continue to do so. [6]

The use of P2P applications pose a significant threat for the improper use of universities IT infrastructure. Because of the fact that the size of downloaded files is usually quite big (in the case of movies it can range from 500MB to > 1GB). The downloading of such files can significantly decrease bandwidth availability of the university. White paper of Exinda stated that on average, 37% of network capacity has been occupied by traffic that is not business-critical. [4] The legal risks (risk of universities employees actions), connected with downloading and storing of data on universities computers, the downloading of copyrighted material (especially music and films) is also a severe offense. In the case of productivity loss, the time spent on search of such materials and download of such files directly contribute loss of working time. Saroiu et al. [18] on the University of Washington campus network found that file-sharing accounted for more than treble the volume of web traffic. Further P2P file sharing causes a number of problems for businesses, including: unpredictable network usage, increased security threats and the risk of legal action. [18]

### 2.4 Challenges Connected with Utilization of Electronic Mail

E-mails form an important part of communication in organizations today. The improper use of email at workplace can raise many questions regarding the professional ethics of employees. Young in his study found that 47% of employees send up to 5 personal emails per day, and 32% send up to 10 personal emails daily, and 28% receive up to 20 personal emails per day, which accounts that employees use emails for personal use at work place.

The study also tried to identify such patters in University. It was noted that 99% of the employees in Pokhara University who used emails at office gave a considerable amount of time almost 57% for checking their personal emails whereas 48% had email as an enormously popular way to communicate with people across the Internet [16] and was undoubtedly the most common utilization of Internet technologies in a universities' work environment. The most important aspect connected with electronic mail utilization included better and faster

communication with students, professors and stake holders, easier access to co-workers and improved quality of team work.

The other most frequent use included sending of jokes, creating chain e-mails received from others, discussing personal matters and gossiping on official matters. The emails did not carry only text but they also include attachments such as pictures, shorts movies or Power Point presentations and such other stuffs. This kind of behavior contributes to productivity loss which result from devoting part of work time on reading and answering personal e-mails.

Research conducted by the Pew Internet & American Life Project indicates that in extreme situation according to their results in the group of “power e-mailers”, which make up about a fifth of employees using the Internet, 68% of the people surveyed spend over 2 hours of a workday on handling e-mails, including 16% who spend more than 4 hours on such activities [7].

Additionally commonly received and forwarded e-mails containing jokes, pictures or multimedia presentations are the sources of few kinds of challenges. On one hand they contribute to an increasing amount of spam circulating in cyberspace, which has rapid growth in recent years and has become a serious problem, diminishing people’s confidence in e-mail as a business tool. On the other hand such employee behavior affects bandwidth of Internet connection. Further attachments, commonly accompanying personal correspondence, pose a serious threat to security and it relates to leak of sensitive information. Thus in extreme situations the utilization of electronic mail as a business tool can lead to opposite effects leading to loss of productivity through message overload and increased amounts of issues not handled on time.

### 2.5 Challenges Connected with Utilization of Social Sites

Social networking sites are the new form of tools used among people to communicate today. The growing popularity of Social networking sites is a kind of new threat to organizations productivity and security. Today 1.5 billion people across the world have their profiles on social network site. [8] This is an alarming increase in recent years and needs an introspection. Social media are helping people to follow breaking news, keep up with friends or colleagues, contribute

to online debates or learn from them. [9] These features of social sites keep users attracted towards them but at the same time contribute towards loss of time in office. It is not only with the social updates, Social Networking sites are common area of attack by malicious programs as depicted in table 2 [13] and raises a serious concern on the security issue of an organization.

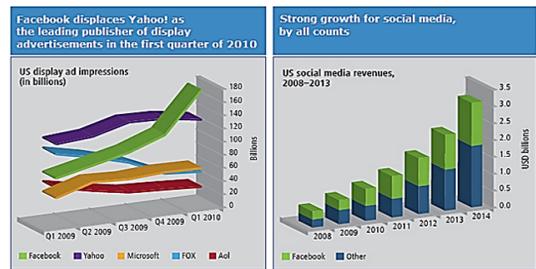


Figure 10. US ad impression and US social media revenue. Source: ITU News 2014

A survey conducted in Pokhara University reported that 75.8% of the employees are using Facebook at office. The survey also concluded that around 44.1% employees use Facebook daily for one hour, 27% use for around 1- 2hrs, 9% use around 3-4hrs, while 9% use it once a month and 4% do not have account till date. The daily use percentage of social sites in university was quiet high. As social sites purely address personal needs, productivity loss is major concern. A study conducted by Nucleus Research with 237 corporate employees shows 77 percent of them use Facebook during work hours. And it results in 1.5% drop in employee productivity for those companies allowing full access to Facebook. [8]

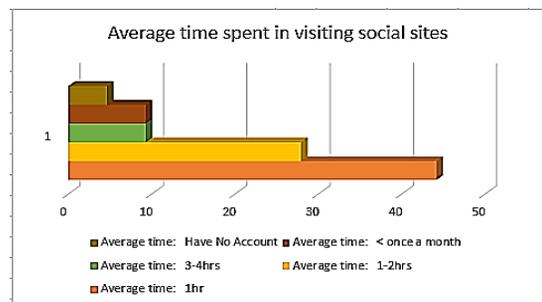


Figure 11. Field Survey representing average time spent in visiting social sites

Table 2. Source, Symantec cloud Internet security threat report 2014:: Vol19 (13)

Malicious Web Activity: Social Networking Attacks by Category, 2013

Source: Symantec.cloud

Rank	Top-Ten Potentially Most Harmful Categories of Websites - Social Networking	Percentage Used To Deliver Social Networking Attacks
1	Blogging	17%
2	Hosting	4%
3	Illegal	3%
4	Technology	2%
5	News	1%

On surveying about the advantages and benefits of social networking sites almost 95% considered it as a tool for sharing information, while 34% took it as a tool for maintaining and making relationship, 32% thought it as a tool for representing facts and around 41% took it as tool for participatory approach.

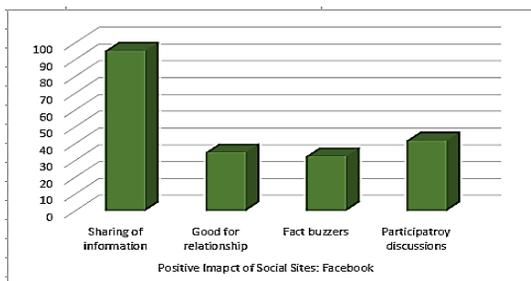


Figure 12. Field Survey representing positive impact of Social sites

On surveying about the negative impacts 62% took it as a tool for wasting time, 51% as a tool for creating tension due to postings and comments, while 27% took it as a fake tool of representation as people never put their original thoughts in it and around 39.5% took it as a tool to leak sensitive and confidential information.

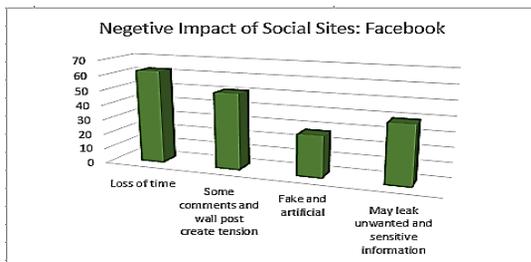


Figure 13. Field Survey representing negative impact of Social sites

Though this tool highlights both positive and negative impacts it still has quite serious challenges and the most important ones include uncontrolled leaking of internal information. Employees have their personal profiles in these sites that may contain comments concerning organizations internal issues and functions [14] which may further spread instantly hence becoming sensitive on part of organization. Another potential challenge connected with it is productivity loss resulting from employees devoting part of their work day on reading and writing on their and others profiles, wall post and tagged information.

### 3. Conclusions and Recommendations

#### 3.1 Conclusions

The survey conducted in Pokhara University and literature from other papers conclude that Internet tools and technologies have a strong influence in internal work environment of universities and this is growing with time. The kind of data searched retrieved and visited online during office hours have serious concerns in terms of loss of productivity, risk of viruses, malwares, improper use of IT infrastructure and loss of bandwidth. Pokhara University is still more sensitive to these problems as it exercises very less awareness in terms of ICT system use. As indicated in the section above, almost 90% of the computer systems use illegal and pirated software programs, which is illegal in Nepal itself and these programs are frequent to all the problems related to Internet and web browsing. The growing popularity of social sites like Facebook can lead to Facebook Addiction Disorder [8] and may result in heavy loss of productivity in times to come. According to a survey conducted by America Online and Salary.com, employers spend \$759 billion per year on salaries for which real work is expected, but not actually performed. Web surfing for recreational use was cited as the #1 time waster at work by 44.7 percent of more than 10,000 people polled. [4] Further, the challenges are not only of pure a technical nature but also have social, legal and ethical implications associated.

A whole new set of re-thinking, re-designing and re-structuring is needed for the new electronic environment

keeping the base of organization functioning intact. Policy relating to computer systems, Internet and WWW usage must be brought into practice. This situation necessitates the introduction of comprehensive solutions including both organizational and technical issues, leading to defining the limitations and rights of employees' functioning in electronic environment. The growing popularity of social sites, streaming media, P2P technology and other applications of the Internet must be brought under web usage policy of an organization. Security measures like firewalls, Internet and email usage, Implementation of Internet usage policy [10], best practices, security programs, web filters and constant monitoring of the Internet and web technologies must be brought into practice.

### 3.2 Recommendations:

This study only revealed about the use of Internet tools and technologies in work place and its associated impacts. There are some more vital issues that need a detailed study which include and understanding of the types of links that are visited during office hours, the type and frequency of attacks on university systems. An elaborate study on the performance hurdles of internet tools and technologies can give a better understanding of management and technical lapses in the current system. A study can be performed on how internet tools and technologies can be used to boost up productivity in a university. The two important aspect of university, the students and faculty members should be taken as next domain for analysis to have a deeper understanding of the impacts due internet tools and technologies. A complete set of above study will help the academic institutes to find the right use of technology in their premises, which will further help them to devise policy and take necessary steps in design, management and implementation of Internet tools and technologies.

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