THE UTILISATION OF COMPUTER TECHNOLOGY IN ENVIRONMENTAL STUDIES AT MIDLANDS STATE UNIVERSITY, ZIMBABWE: A FOCUS ON THE DEPARTMENTS OF GEOGRAPHY AND ENVIRONMENTAL   STUDIES AND SURVEYING AND GEOMATICS

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ABSTRACT

This study assesses the utilization of computer technology at a recently established institution of higher learning, the Midlands State University in Zimbabwe. The study focuses on how computer technology is used in environmental studies in the related academic departments of geography and environmental studies and surveying and geomatics. Data collection methods included questionnaire surveys directed at students and lecturers, interviews with key informants such chairpersons of the two departments, lecturers of computer related modules such as geographical information systems, laboratory technicians and the information technology officer. Secondary data sources included the Midlands State University website, the university yearbook and transcripts of departmental modules. Data collection aimed at revealing the current state of computer utilization in the departments, problems encountered by students and lecturers in the utilization of computer technology and the measures being put in place to overcome the problems. The results revealed that there were inadequate computers in use in the departments and hence inadequate access to computers by staff and students. There is limited use of relevant GIS software such as Arc View, and ILWIS and this tends to be outdated. Computer security is also an area of concern due to viruses, as the computers are not fully protected by anti-viruses. There is need to continue equipping the computer laboratories with new computers and GIS software and the necessary anti-virus licenses as well as continuous servicing of the computers.

Keywords: Computer Technology; Environmental Studies; Surveying; Geomatics; Geographical Information systems

INTRODUCTION

There are variations in the use of computer technology in university education around the world (Anissimov, 2009; Bless & Smith, 2009; Bellis, 2009). At the global level, developed countries are more advanced than developing countries in terms of computer assisted learning. In a developed country such as America, universities like Maine, Akrom Community and Technical College and Alfred State College, offer their students courses such as computer applications in surveying, land information systems, surveying, drafting, construction surveying, fundamentals of cartography and photogrammetry. The students are more exposed to different Geographical Information System software and Geographical Positioning Systems (British Columbia Institute of Technology, 2006; Fothergill, 1998).

Africa has also been able to adopt computer assisted learning in different institutions though the use of computers is not widely spread to different individual people for example, in rural areas of Africa, access is rare compared to western countries, which are more developed. In universities the limited use of computers is due to the lack of adequate finance to

purchase and maintain computers and software. According to Kisaramba (2009), innovation and use of computer technology is still limited in universities in east Africa since on average 20 students scramble to use one computer. The same scenario pertains in Southern Africa with countries such as Botswana, Zimbabwe and Mozambique among others lagging behind in computer-assisted learning in universities and other educational institutions. South Africa is more recognized to be advancing more in computer technology in learning institutions in the region. Different organizations have assisted in an attempt to resolve the gap between African countries and western countries computer usage. Examples of these organizations include Collect and Recycle Ecologically (CARE), Computer Aid and Virgin Group in United Kingdom. The CARE organization collects computers and computer equipment from a variety of businesses, schools and individuals in western countries so as to help countries in the developing world (CARE, 2010). According to CARE (2010) Ghana is one of the countries in Africa with inadequate computer technology. Most of the Ghanaian children graduate from formal education without any computer skills. The vision of the organization is to bridge the gap of computer knowledge between a student in a developing country and that in the developed country in terms of computer technology.

In Zimbabwe, most universities do not have adequate computers to cater for the large numbers of students that are enrolled. Midlands State University is an example of a university with students lacking adequate access to computers to help them in their studies. Amongst the departments at the institution, the departments of geography and environmental studies and surveying and geomatics greatly need computer technology since they are an important tool in environmental studies and in surveying and geomatics.

Since geomatics, surveying and environmental studies integrate into geography, computers are widely used in this area and this is mainly through the use of geographical information systems (GIS) which is described by Mandayam (2006), Carver, Cornelius, and Heyhood (2000) and Dempsey (2008) as a computer-based technology that combines geographic data and other types of information (for example names and addresses of streets) to generate visual maps and reports. According to the British Columbia Institute of Technology (2006), geomatics professionals use an integrated approach to measure, analyze and manage spatial data by employing GIS, the global positioning system (GPS), digital photogrammetry, digital total station, satellite and terrestrial remote sensing to create a detailed but understandable picture of the earth's natural and man-made features. Environmental modeling has become critical to the understanding and resolution of environmental problems and issues of sustainable and natural resource management (Jessup, 2009; Mackey, 2009). GIS computer technology therefore is used in assessing environmental problems in various projects.

Utilization of computer technology in the field of environmental studies at Midlands State University is thus not clearly visible. Departments of Geography and Environmental Studies and Surveying and Geomatics at the institution need computers to help them in environmental research. According to Jessup (2009), Oak (2008) and Pillai (2008) computers play an important role in assisting students to access learning related material through the access of Internet which they may use in their research and also to have skills in computing. Students in the departments of Geography and Environmental Studies and Surveying and Geomatics, lack strong background skills in GIS software which is necessary in assisting students to study and understand geographical and environmental issues. Currently, access of students to computers provided by the departments of geography and environmental studies and surveying has been difficult and sometimes rare. The reasons for such a situation remain largely unattended. Students also do not get enough practice in

GIS and other modeling issues and the reason for such a situation is not clearly known. Relevant software used for environmental research needed by the departments of geography and environmental studies and the students and some of the lecturers do not use surveying and this tends to affect the learning process. Looking also at previous research done on computer technology in education, the research mainly focused on the utilization of computer technology at global level for example a research done by Bravo and Ortega published in 2000 about Computers and Education in the 21st century was based at a global scale. Other researchers tended to focus on educational institutions in the western countries like America and Britain where computer technology is at an advanced stage paying less or no attention to educational institutions in the southern African countries for example Zimbabwe. This paper explores the utilization of computer technology at a local level that is at institutional level such as the Midlands State University in Zimbabwe with a special focus on the departments of geography and environmental studies and surveying and geomatics since they have common grounding in GIS. The specific objectives include identifying the available computer technology in use, analyzing the importance of computer technology in the fields of geography, environmental studies, surveying and geomatics and to come up with recommendations of improving the utilization of computer technology in the university departments.

STUDY AREA

Midlands State University is situated south east of the Midlands provincial capital city, Gweru. Gweru is situated 275km south west of Harare and is located at an elevation of about 1,425 meters above sea level and is found between latitude 19 degrees south of the equator and longitude 29 degrees east of the Greenwich meridian. Midlands State University is located in natural agro ecological region three where the mean rainfall is between 600 and 750 mm and the mean temperature is around 20-25 degrees Celsius. The climate in the region is characterized by a dry season that extends from May to October and a wet season that extends from November to April. Geologically, dominant soils in the area are formed from Gneissic granite. Soils are generally weak as they are sandy making them infertile. Vegetation around the district is scattered acacia, which are mainly young, small bushes. There is also widespread Savannah grassland. Semi intensive farming is practiced around MSU. Figure 1 shows the location of Midlands State University in Senga suburb of Gweru, Zimbabwe.

Figure 1. Location of Midlands State University   scale: 2cm represent 2km

Source: GIS Mapping

METHODOLODY

Two types of questionnaires were designed as the first directed at the students and the other the staff members of the departments of geography and environmental studies and surveying. One hundred questionnaires were distributed to students and staff members. Interviews were carried out with key respondents that were known to have adequate knowledge about the computer technology needed and used by the departments in environmental studies. The key respondents included two chairpersons of the departments of geography and environmental studies, and surveying, a computer laboratory technician from the department of geography and environmental studies, the information technology officer, computer lecturers from the departments of geography and environmental studies and surveying (Table 1). The laboratory technician of the department of surveying and geomatics was not interviewed because at the time of the survey the department had no computers in their laboratory.

Table 1. Target respondents and the rationale for their choice

Interviewee	Purpose of the interview
Laboratory technician of geography and environmental studies	To acquire technical information regarding computer technology used in environmental studies and the available and needed technology
Chairperson of surveying	To learn about the visions of the department pertaining to the use of computer technology in the department
Lecturer of surveying	To obtain information on how computer technology is used in the fields of surveying and geomatics and what is the current state of computer utilization in the department
Chairperson of geography and environmental studies	To gather information on the visions of the department pertaining to the use of computer technology in the department
Lecturer of geography and environmental studies	Gather information on how computer technology is applied in environmental studies and whether the needed equipment is available for use
Information technology officer	To acquire technical information regarding computer security and servicing in the departments of geography and surveying

Data was collected from already existing sources and these included the Midlands State University website, Midlands State University year book (2007-2010) and departmental module transcripts

The website was used to acquire information about the degree programs in the departments of geography and environmental studies and surveying and geomatics, the requirements for students to be enrolled in the departments of geography and environmental studies and surveying and geomatics. Module transcripts were used to identify modules offered by these departments so as to select modules that are mainly computer related. The yearbook was used to obtain information about the aims and objectives of the departments. The yearbook also provided with detailed information on each module offered by the departments and this helped the researcher to quickly identify modules that were computer related.

RESULTS AND DISCUSSION

Computer technology supporting environmental studies and surveying

The departments of geography and environmental studies and surveying have a limited range of computer hardware and software and lack the prerequisite types of GIS software used in environmental studies such as Ilwis, DIVA, GRASS and BASINS (Tables 2 and 3). Students lack experience in various types of GIS software since Arc view is only used in both departments. Knowledge of the various GIS software is essential since the most appropriate technology can be applied to a research problem. These two departments each have one black and white printer currently working which cannot be used to print out GIS color images. The department of geography and environmental studies does not have Global Positioning System (GPS) receivers needed to work out the exact location of the user or other entities on the earth's

surface in terms of x and y coordinates. GIS usage is also supported by the use of total stations, digitizers and scanners but these are not available in the geography and environmental studies department.

Table 2 Computers available in the Surveying and Geography and Environmental Studies departments

Department	Number of computers	Distributed in staff members' offices	Available in computer laboratory
GES	20	5	15
SVG	5	3	2

Table 3 Computer software and hardware in SVG and GES departments

Department	Software	Hardware
GES	Microsoft office 2007, Arc view	Black and white printer, 20 computers
SVG	Arc view	GPS receiver, 1 total station, 3 theodolites and black and white printer

Digitizers, multispectral scanners, color printers, total stations, GPS receivers and the internet are important in supporting GIS use in mapping environmental issues. Scanners are important in obtaining digital information through scanning of aerial photographs or hard copy maps. In the surveying department there is only one scanner for the whole department and there is none in the department of geography and environmental studies. Color printers are essential in producing GIS maps presented in color images for example vegetation is displayed with a green color and water as blue. Only black and white printers are available in geography and environmental studies and surveying departments making distinction of images difficult. Total stations are used for distance measurement and leveling when set to the horizontal plane to make measurement of geographical locations easier. Distance measurements are undertaken in cartography and geomatics modules that are concerned with map making and map projections. Only one total station is available in surveying for approximately 64 students and in the department of geography and environmental studies there is none. Digitizers are used in the creation of digital maps, which are computer readable, or simply to convert analogue data to digital format. Digitizers, scanners GPS receivers and the Internet help to make environmental analysis easier as they support GIS software such as Ilwis or Arc View operations. In supporting GIS operations, a processer with sufficient power to run the GIS software is needed together with sufficient memory for the storage of large volumes of data and a good quality, high-resolution color graphics screen. These computer hardware facilities are not available in the departments, making environmental analysis difficult.

Access to departmental computers

Table 4 shows that students and staff members in the departments have less time of access to departmental computers per day. A larger percentage that is (48%) in the surveying and geomatics department lack access to departmental computers whereas a smaller proportion of 31% have 1 hour of access and 21% 1-3 hours of access. In the geography and

environmental studies department there is inadequate access to computers with 24% having no access to computers and 57% having 1-hour access to computers. Neither students nor staff members have more than 4 hours of access to departmental computers. The main cause of this inadequate access is shortage of computers in both departments when compared to the number of students and lecturers in the departments. Besides in the department of geography and environmental studies there is limited access because the computer laboratory is also used as a lecture room for most of the day.

Table 4: Respondents' hour access to departmental computers per day

Department	No access	Less than 1hour	1-3 hours	4-7 hours	8-11 hours	<11 hours
GES	13	31	10	0	0	0
SVG	14	9	6	0	0	0
TOTAL	27	40	16	0	0	0

Access to other university computers

Besides access to departmental computers only, students and staff members in geography and environmental studies and surveying can access other university computers in the Midlands State University Library and Hellenic Hall in the city center.

Table 5: Hourly access to other university computers

Department	no access	Less than 1hour	1-3 hours	4-7 hours	8-11 hours	>11 hours
GES	0	1	47	6	0	0
SVG	0	1	25	3	0	0
TOTAL	0	2	75	9	0	0

Students and staff members have more access to other university computers such as in the Library or Hellenic. This is shown in Figure 2 with 86% in surveying and geomatics department having 1-3 hour access and 10% having 4-7 hour access. In the geography and environmental studies department 87% has 1-3 hours access and 11% have 4-7 hours access. Students and staff members can use the library or Hellenic computers for Internet access for research in environmental studies but they cannot use the computers for GIS operations since the computers cannot be installed with GIS software since students from other departments that use different software use them also.
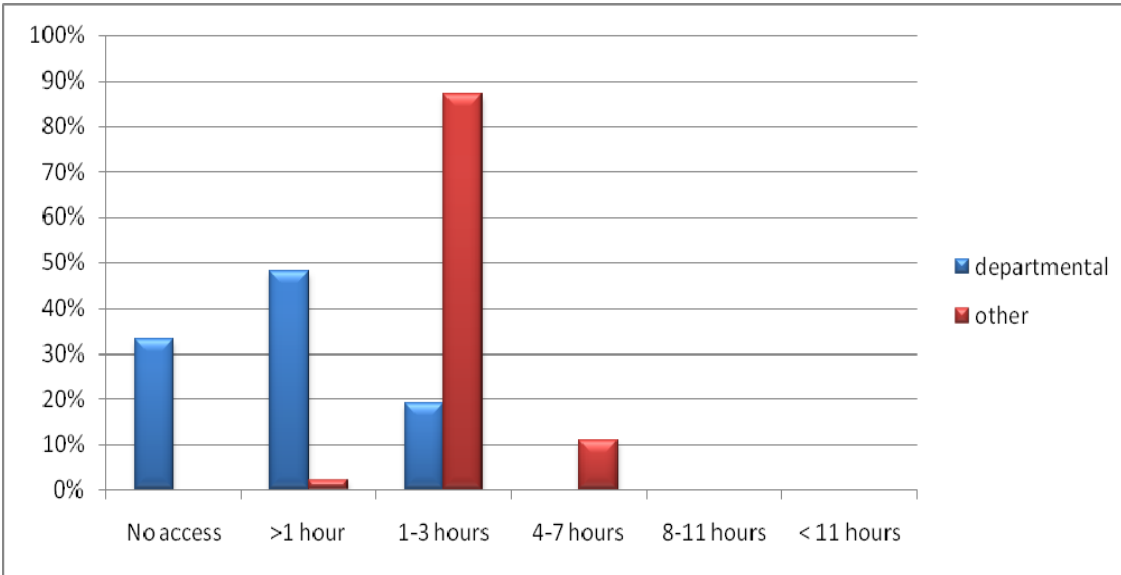
Figure 2 Comparative analysis of access to departmental computers versus access to other university computers

Figure 2 show that students and staff members in geography and environmental studies and surveying departments have more access to other university computers than departmental computers. An example is that 11% of the students and staff members have 4-7 hour access to library or Hellenic computers whilst 0% of the students or staff members have 4-7 hour access to departmental computers.

Access to departmental computers by gender

Female students tend to have more hours of access to departmental computers than male students (Table 6). Thirty-three percent of the female students in the departments have 1-3 hour access to computers whereas 21% of the male students have 1-3 hour access. Male students tend to dominate on less than 1-hour access with a 48%. The main reason found in the research for such a situation is that fewer females are enrolled in the departments of geography and environmental studies and surveying therefore they get more chances of using departmental computers especially in the surveying department where female enrolment is approximately 2 per semester resulting in females favored first. Female students are also more cautious in handling computers than male students who are believed to temper with computers and remove computer cables therefore are allowed less access.

Table 6: Access by students to departmental computers by gender

Gender	No access	>1 hour	1-3 hours	4-7 hours	8-11 hours	<11 hours
male	33%	48%	21%	0	0	0
female	32%	35%	33%	0	0	0

Students' practical experience in GIS software

Ninety percent of the students lacked practical experience in GIS software used in environmental studies as shown in Table 7. Only 8 students out of the 83 respondents acknowledged that they had some experience in GIS software as shown in Table 7 and most of these students were from surveying department. This shows that in both departments,

essential software required in environmental monitoring is not utilized in GES and SVG departments either because the necessary software needed is not available or the available GIS software is outdated.

Table 7 Students' practical experience in GIS software

Department	Experience	No experience
Geography and environmental studies	2	52
Surveying	6	23
TOTAL	8 (10%)	75 (90%)

Computer software developed to be used in environmental studies, geomatics, and surveying

Environmental studies, geomatics and surveying are all linked as they all view the aspects of geography. Technological revolution in the last decade according to Mandayam (2006) has created changes in data analysis and information management impacting research techniques for assessment of environmental issues. This has seen the development of computer software such as Geographic Information System (GIS) which is described by Mandayam (2006) as referring to a computer-based technology that combines geographic data (locations of manmade and natural features on the earth's surface) and other types of information (for example names and addresses of streets) to generate visual maps and reports. GIS software performs a variety of functions including data input, database management, data analysis, graphic presentations, data query and transformation. Dempsey (2008) states that GIS software is capable of using spatial and statistical methods to analyze attribute and geographic data. According to Goodchild (2006), environmental management has been a prime motivator of developments in GIS and a major area of application in its history. The first GIS, the Canada Geographic Information System was developed in the mid 1960s according in order to handle data of the government of Canada on Canada's land resource utilization and management. In the early years of GIS development, access to GIS software was restricted to large corporations and government agencies, but now, due to the steady fall in computer hardware and software costs, universal access to GIS is now frequent. Educational institutions can now use GIS in research in surveying, geomatics and environmental management. GIS is also used in automated digital landscape analysis, digital photogrammetry and in cartography to produce automated maps.

Use of computer technology in environmental problem solving and research

Geographic Information System (GIS) technology can be used for scientific investigation, resource management and development planning. GIS may allow emergency planners to easily calculate emergency response times in the event of a natural disaster or can be used to find wetlands that need protection from pollution. GIS is therefore applied in modules concerned with natural resource management or in natural hazards mapping. Currently these modules are not taught using GIS such that students do not know how GIS is applied. GIS is important, as it is capable of capturing, storing, analyzing, and displaying geographically referenced information that is identified according to location. GIS is therefore important in performing overlay operations such as combinations of several maps. As an example, to select a landfill site, digital maps such as soil, drainage and settlement are overlaid to find out the exact suitable landfill site. Modules such as cartography, which deal with mapmaking in the surveying department, do not apply computer cartography because few

computers that are compatible are available for use. GIS can be used in water resource management courses such as deformation and hydro graphic surveying and one can use remotely sensed data obtained by GPS receivers to find out areas with illegal dams or to analyze land cover changes in catchment areas so as to monitor siltation rates. At present the two departments are not applying GIS in modules of water resource management, as they do not have software such TOPAZ used in the analysis. Lack of various GIS software in the two departments results in restricted environmental analysis of data since GIS can infer meaningful data through visualization, measurements, and computations.

GIS technology continues to play a vital role in environmental systems management. GIS is becoming more suitable for emergency operations and is integrating tools that allow real time display of information (Mohammed, Sharma and Uppuluri 2003). Rapid access to information, safety, efficiency and better resource management decisions can be made with the use of GIS. GIS is an available spatial analysis tool, which is to give insights into the natural and man-made environments due to its strength to link the generic information with its location. It is a powerful tool, which not only analyses the present environmental scenario, but also helps in projecting the future that is, GIS can be used for past, present and future studies on the environment, its protection for generations to come in future. GIS is used to store spatial data in a digital mapping environment. A digital base map can be overlaid with data or other layers of information onto a map in order to view spatial information and relationships. It thus allows for viewing and understanding physical features and the relationships that influence a given critical environmental condition. Factors such as steepness of slopes, aspect and vegetation can be viewed and overlaid to determine various environmental parameters and impact analysis. GIS is also important in environmental planning, groundwater contamination analysis, water quality monitoring, solid waste and wastewater management, air and water pollution and natural hazards and their mitigation.

Apart from data analysis in the laboratory, GIS has the power to analyze attribute data and geographic information, and can also help the analyst in the field by giving the exact location of devastation and amount of devastation and hence an environmental inspector can rapidly map waste storage sites, describe the volume, content and state of waste containers, retrieve previous inspection records to compare with the existing environmental conditions, view environmental data in relation to adjacent geographic features such as waterways, neighborhoods or other sensitive areas such as high risk zones for landslides water pollution (Mohammed et.al, 2003).

Mandayam (2006) acknowledged GIS software as an important tool in hazard management. An example were GIS is often used is in earthquake mapping. GIS is used in mapping tectonic activity in earthquake prone regions for the purpose of both public safety and commercial interests. Commercially, tectonic activity would be of great interest for the decision making process of insurance companies in setting earthquake insurance premiums. Premiums would be much high in tectonically active areas such as the west coast of the United States of America than in relatively stable regions such as the mid west. Tectonic mapping through GIS is also used as a public safety measure by the United States Geological Survey (USGS). GIS maps are useful for the purpose of studying past earthquake events in order to improve and perfect prediction techniques with a view of creating early warning systems which would predict earthquake and allow emergency response teams and organizations to react more quickly to natural disasters. The United States department for Geological Survey (2007) also contribute to the fact that GIS allow emergency planners to easily calculate emergency response time in the event of a natural disaster as indicated above.

Application of computer technology in surveying and geomatics

Computer technology has also been applied in surveying and geomatics as these help in environmental analysis. Physical, economic or social aspects of the environment are usually surveyed using different surveying techniques. Computer technology therefore has been seen also to be greatly influencing the advancement of the field of surveying and geomatics. According to Jones (1998), geomatics is the science and technology of acquiring and managing information about our world and its environment. The name geomatics emerged several years ago in Canada and represents the rapidly changing and expanding world of land information management which consists of measuring, mapping, geodesy, satellite positioning, photogrammetry, computer systems, remote sensing, information systems, environmental visualization and computer graphics. One cannot completely separate, geomatics and surveying as the two almost mean the same. Jones (1998) defines surveying as the art and science of determining the position of natural and artificial features on, above or below the earth surface and representing the information on paper plans as figures in report tables or on computer based maps. Today, computer technology has been widely used in surveying and geomatics. Together with environmentalists, surveyors according to Wolf (2003) use satellites to image the earth's environment, use different satellites for navigation and precise position fixing, use computer visualization techniques for mapping, microcomputer controlled equipment for measuring the earth's surface and information systems to present and analyze data about land and land usage. Due to advances in computer technology and space technologies, surveying and mapping have been totally revolutionized (Adewale, 2002). Conventional methods and instruments in surveying and mapping have been transformed to analytical and full digital. The surveyor can now use geo- information technology tools to perform his or her professional duties in more efficient and effective ways.

Technological trends in surveying and geomatics

According to Adewale (2002), technological advances that are transforming the traditional surveying activities include global position system (GPS) receivers and computers. The GPS receiver is currently one of the preferred equipment for surveying activities involving large areas. The technology is used according to Derby (2000) in;

- Control surveys of mapping extensive areas
- Hydro graphic surveys
- Airborne GPS to provide photo controls for photogrammetric mapping

Computer dependent technologies are also expanding the career opportunities and training of surveyors. These involve GIS, softcopy or digital photogrammetry and remote sensing systems applications, image processing and analysis according to Adewale (2002). With advancement in digital photogrammetry and remote sensing, multiple layers of images in digital format are extracted and processed and the required information is generated and transmitted in the appropriate format for dissemination. Digital photogrammetry has also enabled aerial triangulation, orthophotos, digital terrain modeling (DTM) and also enabled easy interaction with GIS database with digital images, especially color photographs from softcopy photogrammetry as input data for GIS displays and related presentations.

Importance of GIS in surveying and geomatics

Madani (2001) has considered GIS to be an important tool in the development of photogrammetry and also cartography. The most important thing about GIS is that, it is used to emphasize the spatial relationships among the objects being mapped. A computer aided mapping system according to the United States Department of Geological Survey (2007) may

represent a road simply as a line but with GIS it may also recognize that road as the boundary between wetland and urban development between two census statistical areas. GIS is also important in data integration as it makes it possible to link or integrate information that is difficult to associate through any other means, thus GIS software can use combinations of mapped variables to build and analyze new variables popularly known as overlaying. An example is the use of maps of wetlands, slopes, streams, land use and soils to produce a new map layer or overlay that ranks the wetlands according to their relative sensitivity to damage from nutrient runoff. A critical component of a GIS is its ability to produce graphics on the screen or on paper to convey the results of analysis to the people who make decisions about resources. According to United States Department of Geological Survey (2007), wall maps, Internet ready maps, interactive maps and other graphics can be generated, allowing the decision makers to visualize and thereby understand the results of analysis or simulations of potential events. GIS is also used popularly for mapmaking (cartographic design) but also through visualization, can be used to produce images not just maps, but drawings, animations and other cartographic products. These images allow researchers to view their subjects in ways that they never could before. However, surveying and geomatics engineering technologists collect data in the field and use the data to calculate mapmaking information for use in performing computation and computer aided drafting.

Compatibility of computer software available in departments of geography and environmental studies and surveying

Both students and staff members from the departments of geography and environmental studies and surveying had different views on the compatibility of the computer software currently used. Sixty nine percent of the respondents acknowledged that, the computer software currently used is user friendly since the departments have Microsoft office 2007, which almost every student and staff member is familiar with. Microsoft office can be used to analyse data obtain in form of numbers in environmental surveys. Thirty one percent acknowledged that some of the computer software is not user friendly for example the Ubuntu computer software currently installed which some students and staff members are finding difficulties using. This results in students spending most of their time on computers when they have the time to access the computers.

Computer security

The Midlands State University as an institution does not have valid computer antivirus software for all departments and computer laboratory technicians install free downloads of different antivirus from the Internet. Free downloads do not ensure maximum protection of computers used by many people in departments such as those of geography and environmental studies and surveying and geomatics. Some of the computers have had their hard drive crushed due to different types of computer viruses the computers are exposed to. The result is less access to computers by students for their research or data analysis in environmental problems.

The geography and environmental studies computer laboratory is currently used as a lecture room depriving students and staff member's adequate access to departmental computers. Computer accessories such as cables are prone to theft by students. Internet cables have been removed from the computer laboratory resulting in reduced access to computer connection since the alternative wireless network is not reliable. Most of the computers in departments are also not continuously serviced. Once computers are purchased for the departments, it is left all to the computer laboratory technicians to insure that the computers are functioning well. This is a problem in both departments because some of

these laboratory technicians are not computer specialists qualified to repair computers in case they discontinue functioning. As a result, a number of computers are not functioning causing non-utilization of these computers.

Internet usage

Internet use is important in enhancing environmental research. Students and staff members acquire vast knowledge from the World Wide Web (www) in the field of environmental studies as they can access different scholarly articles written by environmentalists, ecologists or any expert in the field. Internet is also of importance in supporting GIS usage. An example is that the Internet supports GIS to locate certain geographical areas being mapped and usually location is fast if Internet transmission is fast. It is important for students and staff members to have access to the Internet as they can acquire up to date geographical and environmental information. However, Internet access is not reliable because most of the times the Internet network is not available or is very slow. Due to the limited number of computers, access to the Internet is also limited, affecting research in environmental studies and as a result students and staff members rely on outdated environmental textbooks available in the library for their research.

 Presentation of research data

Students face difficulties when it comes to presenting research data for marking. Computers can be used to present information in form of graphs using Microsoft Excel and for assignment typing using Microsoft Word, but due to limited access to departmental computers students present their assignments in hand written form. Hand written assignments are difficult to read as some of the handwriting is illegible and spelling mistakes are common. Unlike when one uses a computer, assignments are written in legible font size and the computer automatically correct spellings and grammar. Most of the times the geography and environmental studies computer laboratory is used for lectures making access difficult.

CONCLUSION

There is inadequate use of computer technology in the departments of geography and environmental studies and surveying and geomatics at Midlands State University. Students and lecturers do not have adequate access to departmental computers and hence resort to the use of other computers provided by the university for example the pool computers in Hellenic Hall located in city center and the library computers. Although students and lecturers in the two departments have more access to other university computers, the problem is that the computers in the library and Hellenic cannot be installed with GIS software used in environmental studies as these computers are used also by students from other departments who use different types software altogether. Use of GIS software such as Arc View, Ilwis, SPSS, and SURPAC is limited in these two departments. The surveying department uses Arc View but this software is outdated and in the department of geography and environmental studies, only Arc view software is available yet software such as ILWIS, SPSS, and SURPAC is of importance in environmental analysis.

Computer related hardware used in environmental studies is also inadequate. The essential GIS software used in environmental studies requires hardware facilities such as digitizers, total stations, theodolites, GPS receivers, scanners and color printers, but most of these are not available in the departments. Black and white printers are available in the departments of yet color printers are needed to print GIS images produced in different colors. Most of the computers are prone to computer viruses because the computers are not fully protected by antivirus software. Since there is no

continuous updating of computer antivirus in the departments, some of the computers in the laboratories do not work either because the hard drive has crushed or the computer is failing to start up. This results in more pressure being placed on the few computers left working causing less people to have access to computers. Proper qualified computer specialists as required to maintain the efficiency of computers are not also doing computer servicing and as a result, most of the computers end up not functioning properly within a few months of purchase. There is no computer back up parts for replacement in case one computer part fails to function in both departments. As a result, there has been a decrease in the number of computers available for utilization. In the geography and environmental studies department, the computer laboratory is used as a lecture room such that computers are continuously moved and students steal cables such as Internet cables. This has reduces computer efficiency and security such that the computer lifespan is short lived. Access to departmental computers by students is also limited.

Some of the respondents acknowledged that the currently installed UBUNTU software is not user friendly due to the fact that the students and some of the lecturers are well versed with GOOGLE, which they had been trained to use. When UBUNTU was installed, no proper training was done for the students resulting in some students spending time using the software, but coming out with no results.

RECOMMENDATIONS

More computers should be purchased by the university for the departments together with the essential computer hardware and software especially GIS software used in environmental studies or source from donors. There is need for continuous updating of GIS software to suit the changing computer technology used in environmental studies. The geography an environmental studies computer laboratory should not be used as a lecture room to enhance more access to students and lecturers at all times per day. Fewer students need to be enrolled to suit the available computer resources. The university needs to acquire a valid antivirus license to maximize computer virus protection in all departments and spare computer hardware parts should be in stock in each department to be used when the need arises. Continuous servicing or calibration of computer and related hardware facilities is needed to enhance efficiency and lifespan of the products and specialists in computer repairing should be acquired to avoid trial and error by laboratory technicians who might not have the required knowledge for computer repairing. Above all there is need for training should be done for both students and lecturers if there is any switch from old software to new software for example from GOOGLE to UBUNTU.

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