A Tracer Study of ICT Graduate Students at Mzuzu University, Malawi

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Abstract

Governments the world over are increasingly challenging universities to produce human resources with the right skill sets and knowledge required to drive their economies in the twenty-first century. It therefore becomes important for universities to produce graduates that bring tangible and meaningful contributions to the economies. Graduate tracer studies are hailed to be one of the ways in which universities can respond and reposition themselves to the actual needs of the industry. It is against this background that this study was conducted to establish the relevance of the Department of Information and Communication Technology at Mzuzu University to the Malawian economy by systematically investigating occupations of its former students after graduating from the University. The study adopted a quantitative design by distributing an online-based questionnaire with predominantly closed-ended questions. The study focused on three key objectives: to identify key employing sectors of ICT graduates, to gauge the relevance of the ICT programme to its former students' jobs and businesses, and to establish the level of satisfaction of the ICT curriculum from the perspectives of former ICT graduates. The key findings from the study are that the ICT programme is relevant to the industry. However, some respondents were of the view that the curriculum should be strengthened by revising it through an addition of courses such as Mobile Application Development, Machine Learning, Natural Language Processing, Data Mining, and LINUX Administration to keep abreast with the ever-changing ICT trends and job requirements. The study strongly recommends the need for regular

reviews of the curriculum so that it continually responds to and matches the needs of the industry.

Introduction

Governments across the world are increasingly depending on universities' ability to produce graduates with adequate competences and knowledge necessary to drive their economies in the twenty-first century. These governments are challenging universities to transform their slow economies into knowledge economies by conducting innovative research that informs governments to withstand a highly competitive and rough global market (Tan and French-Arnold 2012). In response to governments' calls, universities are determined to prepare individuals with the right skills and knowledge to easily take up challenges in the competitive labour market. However, establishing relevant programmes and curricula that prepare the graduates for easy absorption in the industry poses a recurrent challenge to universities especially considering that recent statistics have revealed that there is an increase in both university enrolments and youth unemployment globally (Tan and French-Arnold 2012). In Africa, the Africa-America Institute (AAI 2015) reports that many African countries are experiencing a surge in their higher education enrolment. As a result, studies have proven that on average, professors in most African universities are inadequate to handle the higher number of students as compared to the global average (AAI 2015).

Noteworthy is the global financial economic crisis that occurred in 2008 and that continues to affect various sectors of the global economy; one of the effects has been the steady increase in global unemployment (International Labour Organisation 2012). For example, the International Labour Organisation (2012) reports that the unemployment rate for youths aged between 15 and 24 jumped from three million in 2007 to 74.4 million in 2011. Reports show further that many economies are not generating sufficient employment opportunities for fresh graduates, and as a result, graduates are uncertain and feel hopeless of their future unless drastic interventions are taken to avert the current trend. One way of averting the trend is by producing highly competent and knowledgeable graduates. According to Tan and French-Arnold (2012), to maximise opportunities for graduates to land decent jobs that align with their skills and knowledge, universities are under pressure to align their programme offerings with the needs of the job market, that is, to equip students with the specific competencies that will enable them to excel in various workplaces.

Universities worldwide conduct graduate tracer studies to solicit adequate feedback from the industry that in turn helps them improve their programmes (Castro-Gonzales and Gonzales 2016). By definition, graduate tracer studies are an activity that involves systematically follow-ups by higher education institutions (HEIs) on their graduates

with the aim to develop an understanding about how the knowledge and competencies these graduates gained from college are helping them assimilate, transit and excel in the industry (Badiru and Wahome 2016). Baking et al. (2015) emphasise that employability and productivity are key issues that influence the HEIs' strategic direction and should therefore respond to these issues by making sure that they offer education and training that adequately respond to and deal with the complex demands and requirements of the various subsets of the economy. Tracer studies are important tools for appropriately providing feedback to universities about the appropriateness of their programme outputs. Tracer studies provide information such as employability status of the graduates, the link between university programme offerings and the job market or required work skills (Schomburg and Teichler 2011).

These tracer studies also provide universities with information about the noticeable deficits in educational programmes thereby allowing universities to revise their training contents and strategies so that they can closely align with the needs of the economy (Tertiary Education Commission 2009). According to the Project for Rehabilitation through Education and Training Opportunities for Needed Skills (PRET-Options 2012), tracer studies help universities to measure the relevance of programme offerings by a university and document the number of graduates finding employment in their trained occupations. According to Schomburg and Teichler (2011), in Europe, universities have used tracer studies for various reasons as follows:

- to assess and accredit their academic programmes;

- to establish the relevance between their programmes offered with the job market;

- to prove their uniqueness in relation to others;

- to reposition themselves in line with the demands of the job market; and

- to make strategic directions based on evidence which aimed at delivering quality education in institutions.

The absence of tracer studies in Africa have created uncertainty about universities' relevancy to the industry (Ocholla and Shongwe 2013) because there is no feedback from their graduates and the industry about the relevance of the study programmes they offer. Having noted the importance of tracer studies as espoused by various authors, the researchers were inspired to carry out this study with the aim of making a follow-up on graduates of the Department of Information and Communication Technology (ICT) at Mzuzu University (Mzuni). The aim was to inform university stakeholders about interventions that were appropriate in aligning the ICT programme with the needs of the industry.

An Overview of the Department of ICT at Mzuni

Following a high demand for university education, the Malawi Government established Mzuni in 1999 as a second public university. The university started with a single Faculty of Education in 2009 but as of 2017, the university had five faculties, namely the Faculty of Education, the Faculty of Environmental Sciences, the Faculty of Tourism and Hospitality Management, the Faculty of Information Science and Communications, and the Faculty of Health Sciences (Mzuzu University 2017). The University also offers its programmes through the Centre for Open and Distance eLearning (Mzuzu University 2015). During the time the researchers were writing this paper, the university was undergoing restructuring; the University Council had just approved a new university structure with six faculties as follows: the Faculty of Education, the Faculty of Health Sciences, the Faculty of Humanities and Social Sciences, the Faculty of Tourism, Hospitality and Management, the Faculty of Science, Technology and Innovation, and the Faculty of Environmental Science. Currently, the Department of ICT belongs to the Faculty of Science, Technology and Innovation. The Department was established in 2005 to train ICT professionals in Malawi, and offers bachelor's degrees, diplomas, postgraduate diplomas and demand-driven short courses. The Department is currently in the process of introducing postgraduate studies in various ICT specialities.

Statement of the Problem

Since the Department of ICT graduated its first-degree cohort in 2010, it has continued to produce many students every year. The Department receives an overwhelming number of applicants for this programme every year; a development that makes the Department believe that the degree programme is marketable and appealing to various employers in the industry. However, such a belief cannot be revealing enough especially considering that it is not scientifically proven since no systematic study has been conducted to investigate what former students from the Department are currently doing in terms of employment status and their employing sectors, and the challenges they face. To avoid relying on speculations about the marketability and relevance of the ICT degree programme, the researchers were motivated to carry out this study, which aims to investigate the relevance and employability of former students in the ICT Department at Mzuni. To achieve the objective of this study, the study answered three specific questions as follows:

- What are the key employing sectors of graduates from the ICT Department at Mzuzu University?

- To what extent are the skills and knowledge that graduates acquired from the University relevant to their jobs and businesses?

- How satisfied are ICT graduates with the ICT curriculum?

Review of Related Studies

The industry or employers dictate and define the characteristics and skills requirements of future employees or workforce produced by HEIs (Nugroho et al. 2012). However, the gap between universities and the industry means that HEIs may fail to equip graduates with skills that are imperative for these graduates to fit in the industry (Nugroho et al. 2012). To assess marketability of their programmes, universities need to conduct tracer studies that provide them with a feedback loop for responding to the needs of the industry (The Uganda National Council for Higher Education 2013). Literature therefore suggests that for universities to position and compete favourably in the global economy, which is characterised by high unemployment rates (Tan and French-Arnold 2012), it is imperative for universities to extend their self-evaluation exercises to their graduates through tracer studies. These studies provide quantitative and structural data on employment, careers, and related competencies in the workplace (Millington 2003). In that regard, researchers like De Guzman and De Costa (2008) have advocated for the use of graduate tracer studies as appropriate strategies for determining universities' capability in preparing graduates to meet the demands of the workplace. It has to be mentioned upfront that very limited related literature has been found regarding tracer studies, particularly in information and communication technology and related fields. As a result, a few and mostly old studies will be reviewed in this section.

The University of Dar es Salaam in Tanzania conducted a tracer study in 2003 in pursuit of academic improvement. The study recommends the need to establish a balance between theory and practical skills in all undergraduate and diploma programmes in the country. In that regard, there is a need for universities to revisit and reflect on their curricula, their teaching and assessment styles, and their teaching staff to make sure that they produce graduates that are ready to face the demands of the complex job market (The Uganda National Council for Higher Education 2013).

A rather old but important study was conducted by Zembere and Chinyama (1996) that targeted the University of Malawi alumni who had graduated between 1987 and 1995. The study revealed three key findings worth sharing. First, the study found that 76 per cent graduates started looking for jobs when nearing completion of their studies, that is, when they were in their final year. Only 13 per cent of the graduates did not search for work while in college, and this group comprised nursing and education students. Previously, the Malawi Government could employ all nursing and education graduates upon completion of their studies without requiring them to apply and this explains why they were not involved in job searches. Second, the study found that in terms of employability, apart from nursing and education graduates, on average, graduates from various fields of study and specialisation took at least four months to secure a job after graduating. Although, the duration to find a job after graduating increased every year, the period became longer between 1988 and 1995 as compared to the period of 1987 and 1988 when job opportunities were plenty. Third, the study showed that the key

factors that determined employability of graduates included the field of study with a score of 80 per cent, area of specialisation with a score of 64 per cent, personality of the graduates with a score of 46 per cent and overall performance of graduates in college with a score of 27 per cent.

Another tracer study in Malawi was conducted by Manda and Matidza (2016) at Mzuni and targeted graduates of the Land Management Programme. The study found that 19 (49%) graduates were employed by the government. Still at Mzuni, a tracer study by Chipeta and Chawinga (2018) of Library and Information Science graduates revealed that 19 (30.2%) graduates were employed in the parastatal sector.

Griesel and Parker (2009) conducted a tracer study in some institutions of higher learning in South Africa which revealed that there was a gap between universities and the industry. The study recommended the need for employers and higher education to enter into a working relationship to close this gap. The study further revealed the lack of English proficiency and ICT competency and skills among some graduates. Generally, Griesel and Parker (2009) noted that most employing sectors considered two key factors when recruiting graduates, namely graduates' conceptual foundation, and the knowledge and skill sets graduates amassed from universities. Similarly, a tracer study by Chipeta and Chawinga (2018) on Library and Information Science graduates at Mzuni in Malawi, found that communication, critical thinking, problem-solving, and information literacy skills were critical for information professionals.

In Rwanda, a study by the Higher Education Council (2015) showed that the majority of undergraduate alumni with a score of 80.2 per cent were employed by the public sector and the majority were holding administrative positions. The study also revealed that universities had produced more graduates from some fields such as Economics and Business, Education and Arts and Social Sciences compared to other fields such as Medicine, Engineering and ICT. The most used job search mechanisms according to the study were through the Internet and newspaper advertisements. According to the Higher Education Council (2015), the key contributor to unemployment was the lack of experience with a score of 60.3 per cent. Poor remuneration forced 41.8 per cent of graduates to change their jobs (Higher Education Council 2015).

A study conducted by Laguador and Dotong (2013) in the United States of America on Computer Engineering graduates revealed some interesting findings worth sharing. Unsurprisingly, the study revealed that the majority of the graduates held computer science related positions. The subjects, which were more important and necessary to the industry, included Mathematics, Microsoft Office Applications, Computer Troubleshooting and Maintenance, and Computer Programming. A similar study by Fowles (2012) at the University of the South Pacific in Oceania revealed that graduates of both the Tonga Institute of Education and the Tonga Institute of Higher Education had a very high employability status of 98.5 per cent and 72.9 per cent respectively.

A systematic search of the literature in major online databases revealed limited information on tracer studies across the globe. As a result, the literature reviewed in this paper was limited to study reports that were accessible. Specifically, a literature review was conducted based on related studies (Chipeta and Chawinga 2018; Fowles 2012; Griesel and Parker 2009; De Guzman and De Costa 2008; Higher Education Council 2015; Laguador and Dotong 2013; Manda and Matidza 2016; Millington 2003; Pathirage, Dilrukshi, and Hettiarachchi 2003; Tezera et al. 2014; Zembere and Chinyama 1996). In reviewing the literature, the focus was on identifying the research methods, key findings and recommendations. Based on the reviewed literature, a conclusion can be made that tracer studies are reliable mechanisms for receiving feedback from the graduates and the industry about the suitability and impact of programmes offered at universities. These studies offer important data on which universities can base their decisions when reviewing and improving their curricula.

Methodology

The study collected data from former students who graduated from the ICT Department at Mzuni in Malawi. Being a national and public university, the University enrols students from the three geographical regions of the country, namely the Northern Region, Central Region and Southern Region. Selection into the University is based on the Equitable Access to Higher Education Government Policy whereby each region is allocated a certain number of students to be admitted into the University with the aim of ensuring that all individuals from each region have equal access to higher education.

After its establishment in 2005, the Department graduated its first cohort in 2010 and has graduated students every year since 2010. Between 2010 and 2016, the Department had graduated 176 students. Details of the graduates are presented in Table 1.

Table 1: Statistics of ICT students between 2010 and 2016

Year	Diploma	Bachelor's degree	Total
2010		18	18
2011		14	14
2012		19	19
2013		3	3
2014	6	25	31
2015	5	29	34
2016	8	49	57
Grand total			**176**

Source: Mzuni (2016).

A quantitative research approach was adopted in this study. The researchers were inspired to adopt this approach because of one key reason: As already stated, the

Department's former students are scattered in various parts of the country and the best option was to adopt a questionnaire which is commonly used in collecting quantitative data. A web-based questionnaire was adopted which is defined by (Denscombe 2006) as a type of questionnaire which is deployed online and requires the participants to answer the questions by means of inputting their answers while connected to the Internet. The questionnaire was designed and deployed on Google Drive and it was distributed by sharing using online technologies including the Mzuni Alumni Facebook, Twitter and WhatsApp group forums and emails.

In addition, snowballing which as previously used in similar studies by Chipeta and Chawinga (2018), Manda and Matidza (2016), and Ocholla and Shongwe (2011) was adopted to contacts. Relatives, friends and employers were used to get contact details of other respondents. A web-based questionnaire was used as ICT students are conversant in using various forms of online technologies because they are trained as ICT specialists by the Department. More importantly, it is reported by Chawinga (2016) and Chawinga and Zinn (2016) that the Internet is accessible by most Malawians courtesy of network service providers that offer competitive and customised Internet data bundles. A web-based survey has also been successfully used in similar studies by Combes et al. (2011) to collect data from LIS graduates in Australia.

The convenient sampling and snowballing technique was used because of a lack of contact information of the graduates; the Department had not kept such information. Chipeta and Chawinga (2018), and Manda and Matidza (2016) in their respective studies used a combination of convenient sampling and snowballing. As already stated, snowballing was used in identifying and locating respondents whose whereabouts were unknown and the study relied on the generosity of their friends, relatives and employers to help researchers reach those respondents. Pertaining to the convenient sampling, the researchers decided that any participant who could be reachable and available to answer the questionnaire could participate in the study. Considering that it could not be possible to reach all respondents and that not all the participants could respond within the study's time frame, the researchers decided that a sample size of 60 was appropriate. Onwuegbuzie and Collins (2007) argue that the dichotomy that suggests that random sampling tends to be associated with quantitative research and non-random sampling typically being linked to qualitative research is increasingly being challenged. Onwuegbuzie and Collins (2007) argue further that qualitative research can involve random sampling, and that similarly non-random sampling can be used in quantitative studies, hence the use of the snowball sampling technique in this study. Since the study collected predominantly quantitative data, the Statistical Package for Social Sciences (SPSS) software was used to analyse the data. The SPSS produced percentages and frequencies that were depicted in tables and graphs. Also, data were analysed thematically.

To ensure that the researchers adhered to research ethics, they sought clearance from the Directorate of Research at Mzuni which vetted the proposal of the study. The

researchers also ensured that participation was voluntary and that the respondents remained anonymous by using numbers to identify questionnaires, meaning the respondents were not asked to write their names on the questionnaires. More importantly, for the respondents who left some footprints through their responses such trails were removed in the process of analysing and preparing this article. Worth mentioning is that the questionnaire had an introductory section which informed the participants that they were participating in the study on a voluntary basis.

Results and Discussion

This section presents and discusses the findings of the study. Apart from personal information of the respondents, the findings have been presented and discussed according to the themes of the study as follows: key employing sectors of graduates, relevance of skills and knowledge of graduates, and satisfaction of ICT graduates with the Department's curriculum.

Demographics of Respondents

The study intended to reach out to 60 respondents. However, 41 (68.3%) responded to the questionnaire of whom 33 (80.5%) were males and three (7.3%) were females. Five (12.1%) respondents did not indicate their gender. The response rate of this study is regarded as adequate considering that other related studies experienced low response rates. For example, Vong (2015) realised a response rate of 60.6 per cent, the Tertiary Education Commission (2009) realised 46 per cent and the College of Computer Studies (2016) achieved 41 per cent. Table 2 shows the respondents of this study. In terms of category of qualifications obtained, it is clear as it can be seen in Table 2 that the Department has produced more degree students than diploma ones.

From the demographic data, there are two key findings worth mentioning. First, it is clear that there are more males than females admitted into the programme. Prior studies at Mzuni have attempted to explain the reasons why more males are enrolled in the university than females. For example, Chawinga and Zinn (2016) and Chawinga and Zozie (2016) noted that most university science-based programmes are dominated by males because most females do not perform well in science subjects during the Malawi Secondary School Certificate which is a determinant for one to be admitted into a science-based programme such as ICT. Second, the information presented in Table 2 reveals that since 2010 there has been a steady rise in the number of students who have graduated from the Department. The key reason for the rise is that the Department has recently introduced weekend classes to complement a full-time face-to-face mode of delivery thereby according students more opportunities to enrol into this programme.

Table 2: Distribution of respondents by qualification obtained (n = 41)

Year	Diploma	Degree
2010	1	2
2011	1	0
2012	1	4
2013	1	3
2014	0	5
2015	1	16
2016	1	11
Total	6	41

Employing Sectors of Mzuni ICT Graduates

This section set out to determine the employability status of the respondents and their employing sectors. Out of 41 respondents, 34 (82.9%) indicated their employment status. All 34 (82.9%) respondents indicated that they were employed and none indicated to be unemployed or self-employed. An employment rate of 82.9 per cent is considered significant. This can be ascribed to the fact that there is a severe shortage of skilled ICT personnel in Malawi (Isaacs 2007). The employment rates in this study are well higher compared to similar studies such as that of the College of Business Education (2016) which recorded a 30.1 per cent and 43.3 per cent employment and unemployment rates respectively of its business studies students. Unlike this study which found that all respondents were on full-time employment, Macatangays's (2013) study at the Philippines University reported that 62.5 per cent of the employed respondents were on regular or permanent employment status, 11.5 per cent were casual workers, 11 per cent were temporary and contractual workers, while 4 per cent were self-employed.

Pertaining to the sectors in which ICT graduates work, 34 (82.9%) responses were received. The respondents were provided with a list of sectors from which they were asked to select the option that best represented their employing sector as follows: public, private, parastatal, non-governmental organisations (NGOs), and "other" to cater for those categories which were outside the listed options. The results are presented in Table 3. As it can be seen in Table 3, the private sector is the highest employer with a score of 23 (56%) followed by the public sector with a score of eight (19.5%). It is not surprising that most respondents are employed in the private sector because in Malawi, the private sector offers attractive working conditions including more competitive remuneration than the public sector. Graduates are therefore attracted more to the private sector than the public sector whose working conditions are poor and unattractive. The other reason could be that the Malawi Government has not extensively invested in ICTs as most work operations are performed manually, meaning there are limited opportunities for these graduates to find jobs in government.

Another item in this section required the respondents to indicate their job titles, and various titles were mentioned as presented in Table 3. The titles were as follows: Information Technology (IT) Officer, Data Officer, Monitoring and Evaluation Assistant, IT Coordinator, Software Engineer, IT Consultant, IT Support Officer, Systems Support Officer, Clerk, Co-location Specialist, Computer Hardware and Network Technician, Product/Scrum Product Owner, IT Infrastructure Analyst, ICT Administrator, Assistant Lecturer and Lecturer. The findings suggest that most respondents are occupying positions which are directly related to the course offerings by the Department of ICT at Mzuni. The higher employment rates and the nature of job titles imply that the ICT degree programme at Mzuni directly matches the needs of the industry. It is, however, surprising that despite the Department equipping students with knowledge to set up their own enterprises through courses such as entrepreneurship, none of them was self-employed.

Table 3: Distribution of respondents by employment sector and job titles

Sector	Name of Organisation	Positions occupied
Private (23)	Airtel Malawi	IT Support Officer
	Baobab Health Trust	Product/Scrum Product Owner
	Britam Insurance Malawi	IT Officer
	Centre for Youth Development	Computer Hardware and Network Technician
	Christian Health Association of Malawi	IT Officer
	Nation Publication Limited	ICT Administrator, Systems Support Officer
	National Bank of Malawi	Clerk
	Mechro Systems	IT Specialist
	NITEL	Software Engineer
	Opportunity Bank of Malawi	IT Infrastructure Analyst
	RAIPLY Malawi	Assistant Systems Administrator
	RTI	Monitoring and Evaluation Database and GIS Specialist
	World Relief Malawi	Monitoring and Evaluation Assistant
	World Vision Malawi	IT Coordinator, IT Officer
	UNC Project	Data Officer
	Rise and Shine Building Contractors	IT Specialist
	Bumas International	Consultant
	Malawi Assemblies of God University	Associate Lecturer
	Wits College	Lecturer
	Riverton University	Associate Lecturer

Sector	Name of Organisation	Positions occupied
	Trinity Secondary School	IT Teacher
Public (8)	National Commission for Science and Technology	Assistant IT Officer
	Malawi Electoral Commission	Network Administrator
	Malawi Judiciary	Systems Analyst
	Malawi Telecommunication Limited	Co-location Specialist
	Ministry of Home Affairs,	Telecommunication Officer
	Malawi Government	IT Officer
	Mzuzu University	Staff Associate, Senior Account Assistant

Another item in this section required the respondents to indicate their work experience. Figure 1 presents the work experience of the ICT graduates. It is worth noting that of 41 respondents, 34 (82.9%) responded to this item while seven (17%) did not respond. The findings presented in Figure 1 show that six (17.6%) ICT graduates had working experience of more than five years, six (17.6%) had more than a year's working experience, three (8.8%) had more than two years' working experience, and 19 (55.8%) had less than a year of working experience. Differences in working experience are attributed to the fact that admission into the ICT programme targets two categories of candidates. The first category covers students that are admitted into the programme straight from secondary school and they seek employment after graduation. The second category includes upgrading students who are admitted while already employed. It is therefore plausible to conclude that the majority of students who indicated a working experience of more than five years are those who were admitted as upgrading students. In fact, upgrading students pursue their studies through the weekend mode of delivery.
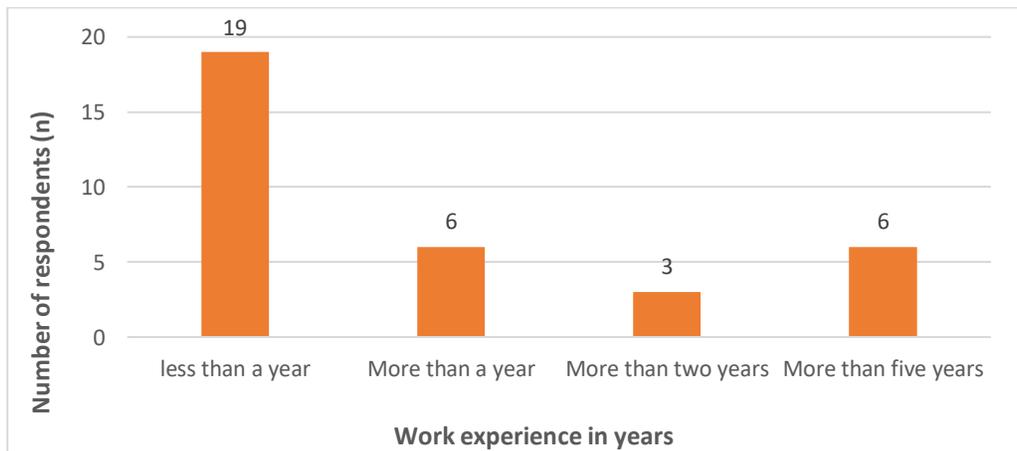
Figure 1: Distribution of respondents by work experience in years (n = 34)

Relevance of ICT Skills and Knowledge to the Job Market and Business

The respondents were asked an open-ended question to express their views about the relevance of the ICT programmes to their jobs and businesses. In terms of skills and knowledge required, 40 (97.5%) responded to this item. The question was asked with the understanding that to perform their job-related tasks effectively, ICT graduates needed to possess certain skills and knowledge. A thematic analysis of the findings revealed various skills and general knowledge which has been summarised as follows: good communication skills (including writing and interpersonal skills), organisational skills, analytical skills, logical skills, marketing skills, and computer literacy skills. For discipline-specific knowledge, the study summarised the responses into the following: computer programming, networking and network administration, database administration, software engineering, hardware and software maintenance, artificial intelligence and systems analysis and design. The courses were further ranked according to the level of relevance as follows: Systems Project, Artificial Intelligence, Web Programming, Distributed Systems, Object Oriented Programming, Object Oriented Analysis and Design, Software Engineering, Databases, Systems Analysis and Design, Data Structures and Algorithms and Network Administration, and Information Security.

All the respondents indicated that most of the skills acquired as students at Mzuni are relevant to their work. For instance, one of the respondents commented that:

> I strongly believe that the skills that I acquired during my study at Mzuni have really helped me a lot as I am regarded as a star performer at my workplace.

Another respondent commented that:

> The knowledge that I acquired at Mzuni is directly very relevant to my work. I am an ICT Officer at my workplace and one of my responsibilities is to ensure that the system is up and running daily, for me to achieve that I needed to have enough knowledge in ICT of which I acquired at Mzuni.

The findings in this study are not unique to Mzuni because Macatangay's (2013) study also showed that respondents rated discipline specific general education subjects like Mathematics, Languages and Natural Sciences as relevant while all professional subjects were rated as very relevant. However, the respondents in the current study expressed concern over the scope and breadth of some courses. For example, some were of the view that the content of programming courses is shallow and inadequate to match the nature of programming required in the industry. The respondents suggested that there is need to make Rapid Application Development practical considering that time is an important factor in the industry.

Satisfaction with the ICT Curriculum

The respondents were asked to express their level of satisfaction with the ICT curriculum in general. The question drew diverse responses which were both similar and contradictory. For example, while the respondents indicated the need to remove some courses from the curriculum altogether, some suggested that such courses should be substantially reviewed. Some respondents suggested that there is a need to introduce new courses into the curriculum. Other respondents made a good point worth noting: they suggested that there is need for the Department to introduce majors so that students can major in various areas of specialisation such as programming or networking. A comment that follows represents many other similar comments made by other respondents:

> All courses offered by the Department of ICT are relevant to our current job market. Additionally, Machine Learning, Data Mining, Natural Language Processing and Linux administration should be added to the curriculum.

Another respondent said:

> The Department of ICT should add Mobile Application Development, Web Services and other upcoming technologies to suit the industry during this digital era.

On the need to introduce majors, one respondent commented that:

> Of course I understand it is good to have wider knowledge in all those [ICT] fields, but I believe that all of us cannot be programmers [for example] … So, majoring will help students to master that particular field they are good at.

Some respondents observed that the Department did not have enough computer laboratories in which they could practice what they had learnt in class. For example, one respondent commented that:

> The Department should have proper labs [laboratories] with the required infrastructure in place and let them [students] build their applications, websites and upload them on a real server and have their friends critique and interact with other student's works.

Some respondents were of the view that the Department should set up a business centre through which students can sell the software they develop while studying with the Department. To give credence to this proposal, one student commented that:

> The department can as well be writing proposals to some companies which need various products which are in line with ICT curriculum at Mzuni and let the students in collaboration with lecturers brainstorm and come up with a saleable product.

Another respondent similarly commented that:

> The best approach is to create courses to major from level three for example, software development, networking or system administration so that the University should be producing students who are good at their job.

Generally, the findings of this study show that much as respondents are satisfied with the curriculum, they want the Department to revise its curriculum. Many respondents were of the view that the Department should allocate more practical hours so that students are well prepared to work in the industry other than being appointed as interns in the first place. This means there is a need for more exposure to the industry during the time they are attached to various organisations to do their practicals.

The respondents were asked to state if they had undertaken other professional qualifications after graduating with Mzuni as part of enriching their skills and knowledge. The results revealed that the majority of the respondents with a score of 29 (70.7%) had not attained any additional training. Only one (2.4%) respondent had attained a Master's degree in Informatics. The other 10 (24.3%) had attained short training sessions in networking, project monitoring and evaluation, Linux administration, project management, programming and server management. These results are not surprising considering that most respondents work in the private sector where the working conditions are generally good as already discussed, and it is not easy to go for further studies because doing so would require resigning.

Limitations of the Study

The key limitation of the study was that it was difficult to trace respondents because the Department had lost contact with most of its former graduates. Future tracer studies may consider carrying out a rigorous publicity using more formal ways such as the radio, TV and newspapers so that more participants can participate in the study.

Conclusion and Recommendations

This tracer study has exposed the strong points and weaknesses of the ICT programme at Mzuni. The study has revealed that overall, the courses that the ICT Department at Mzuni is offering are regarded as relevant and applicable to the daily tasks of graduates in their respective workplaces. The study has confirmed that graduates acquire relevant skills and knowledge from the Department. The study identified writing and interpersonal skills, organisational skills, analytical skills, logical skills, marketing skills, and computer literacy skills as some of the notable ones that are inevitable for graduates to succeed in their workplaces. In terms of discipline-specific knowledge, the study identified computer programming, networking and network administration, database administration, software engineering, hardware and software maintenance, artificial intelligence and systems analysis and design as the most important skills.

The study also revealed the most important courses of the curriculum such as Systems Projects, Artificial Intelligence, Web Programming, Distributed Systems, Object Oriented Programming, just to mention some. The study established further that some courses should be reviewed to meet the changing needs of the industry and that the Department should consider introducing new courses such as Machine Learning, Natural Language Processing, Data Mining, and Mobile Application Development, which will meet the demands of the current and future technology. The study revealed further that the Department does not adequately expose its students to practical work. It was also noted that failure by the Department to offer majors in its degree produced students with general knowledge in ICT instead of producing graduates with specialised knowledge and skills in certain ICT specialities such as Programming and Networking.

In view of the findings of the study, the researchers make the following recommendations, which, if implemented by the ICT Department at Mzuni, may help enrich the relevance of the programme:

- The Department should regularly review its curriculum in consultation with ICT alumni and other stakeholders in the ICT field in the various sectors of the economy to induce and align the relevance of its courses with the current needs of the industry.

- The Department needs to set up a modern computer laboratory equipped with super computers and related infrastructure where students can practice and showcase their creativity in the various areas of ICTs.

- The Department should seriously consider introducing majors in the various areas of ICT so that it produces graduates with various expertise in ICT.

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