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A STUDY ON COMPETENCIES OF ICT GRADUATES IN NEPAL

Naresh Prasad Shrestha,
PhD Scholar, MBA.
Email - naresh.prime@gmail.com

Abstract: *This paper intends to explore issues associated with knowledge, skills and attitudes of ICT Bachelors' level graduates of Tribhuvan University (TU) of Nepal. The study aims to identify employable skills desired by employers in Nepal. The researcher intends to highlight the issues in ICT industry and academia collaboration. The study primarily benefit all the stakeholders specifically, ICT students, industry and the academia. Secondary beneficiaries are the policy makers, industry associations and other researchers in this field. The focused group discussion of the ICT industry representatives provided the preference of the desired skills required in this sector. Survey of fresh graduates from Bachelor of Information Management (BIM) program indicated the major skills among them. The analysis presents evidence of existence of a gap between ICT industry expectation and possessed set of skills of ICT graduates. The study urges for an immediate need for close collaboration between industry and academia for mutual benefit. Moreover, the alignment of set of employable skills would foster environment for effective human resource development and ultimately economic growth of the nation.*

Key Words: *ICT education, technical and soft skills, ICT industry*

1. INTRODUCTION:

Technical education, particularly ICT education is popular in Nepal due to its wide usage in various sector as it is cross cutting in nature. It has been observed that the number of educational institutions providing ICT education is growing. University Grants Commission (UGC) Annual Report 2011/12 & 2012/13 clearly indicate the number of enrollments and passing graduates are also increasing every year. Nonetheless, there is not any significant research done to find whether these graduates are employable upon graduation.

The vision of collaboration between state, academia and industry would be one of the greatest opportunities for stakeholders(s) to bring to a table talent, resources and vivid perspectives that, together, create a robust whole in addressing problems and projects. For example, state government often has resources that, along with academic creativity, can be applied to real problems identified in the industry contexts. Linkages between state, academia and industry to enable collaboration are easily envisioned and sometimes do exist in one form or another. Government grant programs, university technology transfer offices and industry associations are but a few examples (Vogel, 2005).

As a matter of fact all promising opportunities do not always turn into reality. Collaboration successes between state, academia and industry are, in fact, few and far between. In addition to noted strengths and distinctions, each stakeholder also brings to the table residual weaknesses that can scuttle the best of collaborative intentions. Laxity in state bureaucracy, lack of academic focus and vigor and the inability of industry to appreciate alternative ways of working are a few examples. Required attention can effortlessly be left unaddressed and projects can easily derails as reality drives out vision.

Employers often report that they cannot find qualified workers to fill their vacancies, especially when they are trying to hire system designers, system engineers, computer scientists, system analysts, and programmers to design and build ICT systems and applications. (Committee on Workforce Needs in Information Technology, National Research Council, 2001).

Employers report significant gaps in both technical and soft skills (Aring M. , 2015). The overwhelming majority of reports on skill gaps suggest that the lack of soft skills, such as time management, problem solving, creative thinking and interpersonal communication, is a critical void in the skills of the region's workforce (Economic, 2016). A lack of English language proficiency and computer-related or other technical skills also present challenges to employers, many of whom report difficulty finding suitable candidates (Aring M. , 2015).

At the same time, some job seekers find it difficult to obtain jobs in information technology, despite having credentials that they think should qualify them for employment. Some who are older (over 40) observe that the majority of IT workers are younger, and some assert the existence of widespread and rampant age discrimination in the IT industry. (Committee on Workforce Needs in Information Technology, National Research Council, 2001).

As ICT sector is poised for continuous and dynamic growth, the complexities and challenges associated with it will also grow further and stakeholders could also suffer a great deal. A solution or model to bridge the industry – academia gap should be continuously explored and developed. It is observed that there exist a significant gap between the kind of human resources universities produce and what ICT industry really needs. The problem of skill gap between the entry level ICT graduates and the industry needs is universal in nature and Nepal is no exception to this.

Taking Kathmandu valley under such a sample survey, this study attempts to find out competencies in terms of knowledge, skills, attitude and abilities of ICT graduates in Nepal and identify the employability skills required by ICT industry from these graduates.

2. LITERATURE REVIEW:

This is era of information communication technology (ICT) and it has shown tremendous impact on every sphere of business and social life. Information and Communications Technology (ICT) has changed our society remarkably in the last few years (Piccirillo, 2015), (Pikas, 2006). ICT has become an integral and accepted part of everyday life for many people. It is evident that ICT use has made enormous impacts on different sectors of the community including industries and commerce.

One key feature is its great and continuously increasing size. BCC Research state, the ICT global market was worth $38.4 billion in 2010; the forecast is a growth to $58.4 billion by the year 2015. Worldwide IT spending is forecast to grow from $ 2.46 trillion in 2015 to more than 2.8 trillion in 2019, according to new Worldwide Semiannual IT spending guide: Industry and Company Size from International Data Corporation (IDC) (Press Release: IDC, 2017). In plain words, this means that many people all over the world use ICT products, and that in the future, even more people will use ICT devices (Piccirillo, 2015). As the economy comes to depend on ICT, its importance has been a matter of concern for both the nation and its communities for the overall development. However, its successful impact on the societies demands lots of skills in the ICT human resources.

The contribution of universities towards the economic fabric of a region, nation or supranational entity is manifold, and is recognized as vital to the creation of wealth (Romero, 2008). Universities, in general, develop needed human resources including ICT workforce for the industry. Universities assume that upon completion their graduates have knowledge, skills, attitudes and abilities to be employed. On the other hand, industry provides employment opportunities to those graduates having required knowledge, skills and attitudes to perform their job responsibilities. In a few cases a small number of graduates take initiatives to become entrepreneurs in this field.

Students entering university have an exposure to wide variety of digital tools and learning opportunities. They have indistinct ideas about how they will learn at the university and what constitutes legitimate learning practice – especially digital practice – in a university context (Beetham, 2013). Every student entering into the portals of an ICT college comes with dreams and hopes for a bright future through an immediate job subsequent to the graduation. The hopes of approximately two thirds of the entire entry level graduates stand denied for lacking in employability skills (Jose, 2011).

Numerous fresh graduates including university toppers find it difficult to acclimatize in the ICT industry. Many innovative ideas of the new generation go unnoticed due to lack of proper platform. The Association of American Colleges and Universities (AACU) report suggest that when it comes to the types of skills and knowledge that employers feel are most important to workplace success, large majorities of employers do not feel that recent college graduates are well prepared (Jaschik, 2017). This is particularly the case for applying knowledge and skills in real-world settings, critical thinking skills, and written and oral communication skills areas in which fewer than three in 10 employers think that recent college graduates are well prepared. Yet even in the areas of ethical decision-making and working with others in teams, many employers do not give graduates high marks (Associates, 2015).

At the same time, the industry is facing shortage of capable human resources and creative ideas. There is a greater demand (Beetham, 2013) that universities need to be pro-active in managing students' ideas and expectations about their university experience, including expectations of the digital environment for study. So there is a question commonly asked (Trauth, Farwell, & Lee, 1993) are colleges and universities responding fast enough to the business and technology changes that have redefined the role of ICT in today's organizations? (Rabayah & Sartawi, 2008)

Academia and industry are interdependent enterprises with a critical need to form research alliances. (Burrington, 1993). Graduate employability is a set of achievements skills, understandings and personal attributes that makes graduates more likely to gain employment and be successful in their chosen occupations, which benefits themselves, the workforce, the community and the economy (Yorke, 2008). They are generally skills that cut horizontally across all industries and vertically across all jobs from entry level to chief executive officer (Sherer, 1987). From the employers’ perspective ‘employability’ seems to refer to ‘work readiness’, that is, possession of the skills, knowledge, attitudes and commercial understanding that will enable graduates to make productive contributions to organizational objectives soon after commencing employment (Mason, 2006).

It is widely thought that industry could do more to promote the ICT profession and that government could address the issue at all levels. In general, the relationship between industry and universities needs to be improved particularly with respect to the development of industry-integrated curricula. (Koppi, 2008).

The objective of this study is to explore issues of the ICT industry requirements for and competence of Bachelor of Information Management (BIM) graduates of Tribhuvan University (TU) of Nepal. The researcher intend to highlight the issues in ICT industry - academia collaboration.

3. METHODOLOGY:

Focus group discussion and key informant interview were taken as tools to collect information from intended respondents which include ICT industry executives, government officials and academia representatives. Video recording of entire session complement the information collection. After the session, the participants were asked to rank the skills they feel most important in their own organizational context. University of Kent Employability Skills Set (Woodcock, 2015) was applied for this purpose.

Similarly to obtain information from ITC graduates a rapid survey questionnaire was monitored among 57 students after explaining the objective of the survey. The survey questionnaire was designed on the base of tested set of tools of University of Kent Employability Skill. The research has adapted descriptive approach applying both qualitative and quantitative data.

4. FINDINGS AND DISCUSSIONS:

After the focused group discussion, the ICT industry leaders and the representatives from the government and academia were asked to rank the skills they will be looking for in the ICT graduates, following is the 10 skills identified and ranked in order of importance:

Table 1 Preference of Employers

Skills	Brief explanation	Rank
Verbal & written communication	Able to express ideas clearly and confidently in speech & able to express clearly in writing	1
Teamwork	Work confidently within a group	2
Commercial awareness	Understand the commercial realities affecting the organization.	3
Analyzing & investigation	Gather information systematically to establish facts & principles. Problem solving.	4
Initiative/self-motivation	Able to act on initiative, identify opportunities & proactive in putting forward ideas & solutions	5
Computing skills	Word-processing, using databases, spreadsheets, the Internet & email, designing web pages, programming skills etc.	6
Drive	Determination to get things done. Make things happen & constantly looking for better ways of doing things.	7
Planning & organizing	Able to plan activities & carry them through effectively	8
Flexibility	Adapt successfully to changing situations & environments	9
Numeracy	Able to carry out arithmetic operations/understand data	10

When it comes to hiring the right persons for right position, there seems to be consensus among the industry leaders as well as representatives of academia and the government. In some skills they have a little degree of differences, but above ranking is derived after moderation from the facilitator upon consensus of the participants. Although few members of the panel also mentioned about other skills such as action planning, creativity, time management, negotiating and networking skills etc., but they agreed on above mentioned skills as most important skills they are looking for from the fresh graduates.

They all agreed that communication skill i.e. verbal and written is the most desired as well as is significant from the perspective of workplace success. According to University of Kent, careers and employability service, verbal skill is ability to express ideas clearly and confidently in speech **whereas written skill is ability to express clearly in writing** (Woodcock, 2015)**. A significant number of** participants expressed that communication skill is important because it helps an individual to become quick learner and they need quick learners in the profession. Moreover all participants were unanimous that documentation is crucial in ICT business and they wanted to have employees with good written skills.

It is interesting to observe that for ICT graduates the employers ranked computing skills to the sixth position. They opined that if the graduates have other skills as they have ranked, the new hire would turn out to be a right candidate doing the right job.

On the side of the students, followings are the key findings based on the responses from them given in the table no. 2:

i. **Computing Skills:**

It is one of the core skills for the ICT graduates which is about having proficiency on using word-processing, databases, spreadsheets, the Internet & email, designing web pages, programming skills, computer architecture and system, computer networking etc. In this skill the ICT graduates seems confident, the majority of 75.44% felt they have this skill. There are still 24.56% graduates who expressed lack of this important skill.

ii. **Teamwork:**

Team work is about working confidently within a group and the ICT employers valued it as 2nd major skill, desired in fresh ICT graduates. It includes: working cooperatively towards a common goal; contributing own and original ideas effectively in a group; listening to others' opinions; taking a share of the responsibility; being assertive – rather than passive or aggressive; accepting and learning from constructive criticism and giving positive, constructive feedback. All these dimensions of teamwork is important from achieving the organizational goals. In this skill the graduates displayed sign of confidence, 74 percent felt they possess have this skill, and remaining 26% responded they would like to improve upon. It is a positive sign that the majority of graduates could work in a team as desired by the industry.

iii. Numeracy:

This skill is related to ability to carry out arithmetic calculations and understand data. Few components of this skill contain, : ability to multiply and division accurately; calculate percentages; using a calculator; ability to read and interpret graphs and tables; using basic statistics; ability to plan and organize personal finances effectively; manage within limited budget, etc. 61% graduates expressed displayed their confidence and rest 39% felt they lack numeracy.

iv. Initiative and self-motivation:

Able to act on initiative, identify opportunities & proactive in putting forward ideas & solutions are the key skills universally required for transforming an organization from a good to great one. 54% graduates felt they have the skill if self-initiative and self-motivation, whereas 46% still reported they have to improve this skill.

v. Flexibility:

Another skill desired by the employers is flexibility, which includes adapting successfully to changing situations and environments. It also includes followings: keeping calm in the face of difficulties; planning ahead but having alternative options in case things go wrong; thinking quickly to respond to sudden changes in circumstances and persisting in the face of unexpected difficulties. 51% respondents expressed they are flexible to adjust any situation. Still 49% are uncertain about this skill.

vi. Investigating, analyzing and problem solving:

Yet another important skill employers prefer on their new hires is research, analysis and problem solving. Most ICT employers felt this skill is required for the success of the organization. This skill include few of the following aspects: clarifying the nature of a problem before deciding action; collecting, collating, classifying and summarizing data systematically; analyzing the factors involved in a problem & being able to identify the key ones; recognizing inconsistencies in reasoning; using creativity/initiative in the generation of alternative solutions to a problem; and differentiating between practical and impractical solutions. About half of the respondents seem to lack this skill as only 49% responded said they have this skill whereas 51% felt need for developing this skill.

vii. Written and Verbal Communication:

Written communication skill includes: thinking through in advance what he or she wants to say, gathering, analyzing and arranging information in a logical sequence, developing argument in a logical way, being able to condense information/produce concise summary notes, adapting writing style for different audiences and avoiding jargon. **Verbal** skills generally includes: listening carefully to what others are saying, being able to clarify and summarize what others are communicating, being sensitive to **body language** as well as verbal information, making the right impression by making effective use of dress, conduct and speech and successfully building a rapport with audience when **speaking to groups.**

Only 47% students were confident that they have all these skills, remaining 53% graduates felt that somehow they lack this skill and want to improve on it. Thus there is a gap between what industry wants and what graduates have.

viii. Planning and organizing:

Another skill, planning and organizing is the ability to plan activities and carry them through effectively. Few elements of planning and organizing include: setting objectives which are achievable; managing time effectively/ using action planning skills; setting priorities – most important/most urgent; identifying the steps needed to achieve goals; being able to work effectively when under pressure; completing work to a deadline. Here also 47.37% respondents show confidence and still 52.63% felt they need to improve this skill.

Table 2: Response from the graduates

Skills	I have this	Percentage	Like to improve	Percentage
Computing skills: Word-processing, using databases, spreadsheets, the Internet & email, designing web pages, programming skills etc.	43	75.44%	14	24.56%
Teamwork: working confidently within a group	42	73.68%	15	26.32%

NUMERACY: able to carry out arithmetic operations/understand data	35	61.40%	22	38.60%
INITIATIVE / SELF MOTIVATION: Able to act on initiative, identify opportunities & proactive in putting forward ideas & solutions	31	54.39%	26	45.61%
FLEXIBILITY: adapting successfully to changing situations and environments	29	50.88%	28	49.12%
INVESTIGATING, ANALYSING AND PROBLEM SOLVING: gathering information systematically to establish facts and principles	28	49.12%	29	50.88%
WRITTEN & VERBAL COMMUNICATION: able to express yourself clearly in writing and expressing your ideas clearly and confidently in speech	27	47.37%	30	52.63%
PLANNING AND ORGANISING: able to plan activities & carry them through effectively	27	47.37%	30	52.63%
DRIVE/ PERSUADING: Determination to get things done. Make things happen & constantly looking for better ways of doing things. Able to convince others, to discuss and reach agreement.	26	45.61%	31	54.39%
COMMERCIAL AWARENESS: Understand the commercial realities affecting the organization	24	42.11%	33	57.89%

ix. Drive/ Persuading:

This is also another skill preferred by the employers but most of the students are not aware about. Drive could be considered as determination to get things done, make things happen and constantly looking for better ways of doing things. Here also the majority of BIM graduates (54%) show need for improvement. Only 46% reported they have needed drive.

x. Commercial Awareness:

Commercial awareness could be summed up as an interest in business and an understanding of the wider environment in which an organization operates: its customers, competitors and suppliers. It might also encompass understanding of the economics of the business and understanding the business benefits and commercial realities from both the organization's and the customer's perspectives. Generally it includes awareness of the need for efficiency, cost-effectiveness, customer care and a knowledge of the market place in which the company operates (current economic climate and major competitors, for example). A survey by the CBI and UUK in 2009 found that 35% of employers were dissatisfied with the business and customer awareness of graduates (Woodcock, 2015). Only 42% graduates responded they have idea about the commercial awareness whereas majority 48% expressed the need to improve this skill.

So above findings clearly state that the recent BIM graduates lack many skills required to survive in the job market. In other words, there exists a gap between industry requirements for and competence of ICT graduates. Although the graduates have completed their study, except for few skills such as computing, teamwork, numeracy, and initiative - the majority of graduates lack other skills. This could affect their employability and further development.

5. GAP ANALYSIS:

When we compare employer requirements and student perception regarding skills, we can clearly observe the mismatch or gap between them. Table 3 below illustrate this gap clearly.

Table 3: Comparison of employer requirements and graduate skills

Skills	Employer's Requirement	Student's Perception
Verbal & written communication	1	7
Teamwork	2	2
Commercial awareness	3	10
Investigating, analyzing and problem solving	4	6
Initiative/self-motivation	5	4
Computing skills	6	1
Drive / persuading	7	9
Planning & organizing	8	8
Flexibility	9	5
Numeracy	10	3

From above comparison it is now clear that what ICT employers want from their new hires and what skills fresh ICT graduates have. The employers are clear that the first skill they look forward in new employees is sound verbal and written communication skill, whereas the most of the graduates ranked this skill at 7th position only. It points out that academia (including universities, colleges and students) must make relevant efforts in developing communication skills of the students to bridge the gap between industry and academia.

Regarding 2nd most important skill Teamwork, there is no gap. Students exhibit confidence on it as they are used to group works, team presentation and team project work during their studies.

About the third important skill from employer's perspective; Commercial Awareness, again there exist a wide gap. Employers want this skill in new employees whereas students seem not aware about this crucial skill and have ranked the least, i.e. 10th position. It is partially because students lack exposure about real world, although there is provision of internship for eight weeks. It calls for modification on curriculum, extended and effective internships, more realistic project work in collaboration with ICT industry and real time exposure to faculty members as well.

Investigating, analyzing and problem solving is considered as fourth important skill by the employers, whereas only 49.12% of graduates feel they have this skill, ranking 6th in the table. Likewise, the employers look for initiatives and self-motivation as another important skill in new employees giving 5th rank. For this skill, 54.39% students reported they have it, meaning 4th rank.

The graduates felt they are good in computing skills. 75.44% reported they have this necessary skill ranking it as number one skill they have. But the irony is employers consider this skill as 6th important and stated that if the new employees have stronger previous skills, then computing and other skills will follow the order. This calls for sensitivity on the part of the employers and effective lobbying about the graduate capacity on the part of academia

6. CONCLUSION AND SCOPE FOR FURTHER RESEARCH:

This study is an attempt to observe the competencies of BIM graduates in relation to their employability. Similarly, this study also endeavored to explore the views of employers from ICT industry in Nepal regarding skills they are looking for in their new hires. There seems a huge gap between industry expectations and realities of fresh graduates in terms of skills. There is a difference between what current ICT curricula of the universities provide and what industry requires. Colleges and universities are producing graduates with subject knowledge but it seems not adequate. Academia side must seriously analyze the situation and there is a need for further research and studies regarding it. Initiatives are needed to create industry ready professionals as there is a severe shortage of right candidates for right jobs.

On the other hand, employers also not satisfied with the skill level available in the market. Employment opportunities are there in the ICT area, but the employers are having difficulty to find the ‘right’ employees. This mismatch helps in explaining why employers are skeptical about fresh graduates. From the FGD, it is observed that the ICT industry, to some extent is insensitive to, and/or lack awareness of the resource potential of the Academia.

Industry – Academia relation should be strengthened with understanding from both sides. A productive interface between academia and industry, in the present times of knowledge economy, is a critical requirement. (Menezes & Pinto, 2016)

A well-established and innovatively nurtured industry-academia partnership can be a win/win proposition in many dimensions and help both parties retain their leadership positions (Ramkumar, 2017). Exposing ICT students to newest industry practices and latest research and theories allows them to acquire and maintain the technical skills necessary to continually adjust to the rapid changes that occur in technology. In a marketplace where new technologies quickly become old technologies and new knowledge become s old knowledge, the best professional will be those who continually update their skills. Close interaction with industry members help the universities and colleges identify real-world problems and their solutions and incorporate them into the curriculum. This also necessitates further research and study to suggest the long term solutions.

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