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The Computing Skills expected of Business Graduates: a New Zealand study

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ABSTRACT

A survey of employers in New Zealand was undertaken to test the expectation that new graduate employees will possess a good level of computing skills given they have completed a university qualification. We are now in a time where a series of generic skills are required of any graduate entering the workforce. These generic type skills include good communication skills, problem solving abilities and the often not asked for but assumed computer literacy. There is evidence from the literature to suggest that these assumptions are not exclusive to New Zealand. Results indicate that employers are finding they have to lower their expectations to fit with the computing skills university graduates are bringing to the workforce. This gap in skills is seen by some as handicapping the ability for employers to recruit suitable graduates.

KEYWORDS

Computer Literacy, workplace skills, business graduates, self assessment, computer self efficacy, end user computing

INTRODUCTION

As we move through the 21st century much is made of the computing ability of the current generation of university graduates entering the workforce. The majority are a generation who come from education and home environments where computers are commonplace. It is expected that familiarity with computers is accompanied by computing knowledge. They are expected to be quality end users who can use the available applications to operate in a professional environment (Yoon and Lee, 2007; Stone, Madigan, Hoffman and Vance, 2006). However, we contend that growing up in this digital generation does not mean having advanced computing skills but is more likely to mean having a superficial knowledge and familiarity with a variety of applications (Stone et al 2006).

In 2003 Hodges and Burchell surveyed New Zealand employers about a wide range of competencies expected from Business graduates. It is interesting to note that in their study computer literacy ranked only the 17th most important skill desired of graduates while the most important was the more generic "ability and willingness to learn." Employers in this study did question the type of technical knowledge that graduates were arriving in the workforce with, but seemed to place more emphasis on soft skills rather than the more specific 'hard' skills such as experience with computer applications. This lack of expectance of more specific skills could be attributed to the fact that employers have assumptions about what a graduate will leave university knowing. In a US study Murray, Sherburn and Perez, (2007) found that the employer participants all expected graduates entering the work force should be proficient in the standard Office™ suite of applications. This was also found by Zhao (2002) in his survey of Fortune 500 employers. Employers in the Zhao study also deemed experience in mobile technologies as being a major requirement for employees to succeed in a business environment.

A number of studies have focused on the employment of IT graduates. These studies agree the skills needed by graduates have evolved. There is now a need for graduates to present with broad IT and IS knowledge and equally importantly to have a range of more generic skills in order to prosper in the work place (Davis and Woodward, 2006; Chao and Shih, 2005; Trauth, Farwell and Lee, 1993).

A factor which may be contributing to the mistaken belief that graduates leaving university have the necessary computing skills is that some employers are not sure what it is they want their staff to be able to do with computer applications. Employers, we suspect, seem more than happy to take the word of the candidate when assessing ability. While self assessment has long been used to measure the computer abilities of students, it has been found elsewhere that people often rate themselves at levels higher than they are actually at. It should also be noted that confidence should not be confused with competence. Competence in this case can be defined as being able to use the range of suitable computer applications to operate on and produce data and information in a professional manner (Yoon and Lee, 2007; Gupta,

2006). One of the factors which can and does have an effect on how a person perceives their ability in something is their self-efficacy toward that task (Bandura, 1977). This is no less important in computing and is seen by some as being a better predictor of performance than actual capability (Smith, 2001). Computer Self Efficacy (CSE) comes from the theory of self efficacy (SET) (the basis of social cognitive theory¹). Essentially it says that a person makes judgments about their ability to perform tasks based on their own experience (Bandura, 1977).

This study, similar in part to that conducted by Murray et al (2007), uses a survey to explore the relationship between employers' expectations of new graduates' computing skills and the reality they are finding once a graduate has been employed. Specifically this study addresses the following:

1. What level of computing skill is expected of new graduates?
2. How is this expected level communicated to graduates seeking a position?

THE SURVEY

Data were collected using semi-structured interviews. A questionnaire using open-ended questions designed to prompt free-flowing responses was administered to all participants. Open-ended questions provide a way to identify themes when the limit of possible answers is unclear. The questions were formulated in an attempt to identify the computing skills employers thought a graduate should have and to compare these with the reality of skills actually held by business graduates.

The participants were all employers who had previously hired Lincoln University Commerce Graduates. All of the prospective participants contacted agreed to take part in the study.

Nine employers with business backgrounds in accountancy, marketing, property, hospitality, rural banking, local government, infrastructural contracting and employment consultancy were interviewed. The interviews were conducted either in person or over the telephone. All interviews were recorded, transcribed verbatim and then analyzed using the qualitative method of thematic analysis. Thematic analysis is a means of recognising, analysing and reporting themes within data (Braun and Clark, 2006).

Results were collated according to the question or questions they answered.

RESULTS AND DISCUSSION

In each of the interviews employers were asked to describe the type of software that graduates would be expected to know and the level of computing skill expected from new graduates. Several themes were identified that were common to all of the employers. Results are discussed in terms of the themes revealed.

DEFINITION OF SKILL LEVEL

The participants articulated their expectations of skill by using a variety of general terms. These terms included: basic, competent, intermediate and advanced. On enquiry it became evident that these 'general' terms had different meanings to different participants. Some participants articulated their skill expectations in general terms whereas others related their answers to specific application functions. The 'general term' meanings are explained in Table 1 which shows a summary of the terms used to describe the desired skill level and the definitions given by the participants to explain them.

¹ Social cognitive theory provides a framework for understanding, predicting, and changing human behaviour. The theory identifies human behaviour as an interaction of personal factors, behaviour, and the environment (Bandura, 1977)

Level of expected skill	Definitions of skill level
Basic	<ul style="list-style-type: none"> • The ability to use tools in a meaningful way. • A user can open files, copy, paste and sort data and check for valid data entry. • Can open files and add to existing documents but couldn't create new documents
Competent	<ul style="list-style-type: none"> • Be comfortable enough to explore applications and know when and where to ask for help. • Have the 'nous' to be able to hook into in-house systems pretty quickly.
Intermediate	<ul style="list-style-type: none"> • Knowing the basics and knowing how to use the software in order to manipulate data and to get the job done. • Outlook: can send and receive emails and email attachments. Can use the schedule features of Outlook • Excel: can design a spreadsheet to manipulate data, sort data. • Word: prepare documents to a professional enough level that they are acceptable to use as memos, flyers, and out going letters. • Can use mathematical functions in spreadsheets, sort data and make graphs. • An Intermediate spreadsheet user should be proficient with using spreadsheet but would not be expected to use statistical functions or to create graphs but be able to use basic functions and search within cells. Adding" and deleting cells. • Word: formatting, page numbering, headers and footers. • Excel: use basic formulas, Sum range of data.
Advanced	<ul style="list-style-type: none"> • An advanced spreadsheet user should be able to "do spread sheeting" – create graphs, use formulas • Word: complete mail merge operation. • Excel: data analysis including graphs , pivot tables etc

Table 1 - Definitions of skill expectations

This lack of consistency of definitions may indicate that the employers themselves are not sure of the computing skills required for roles they are filling. It may also be an indication of their lack of computing knowledge and their self-efficacy toward computing tasks (Bandura, 1977). Some employers indicated that they expected graduates 'nowadays' to have more knowledge of computing than when they themselves left university and had to learn these things on their own.

"I take for granted that they will pretty much know a lot more than I did when I graduated. For me the standard things today in a commerical sense would be Excel, PowerPoint, Word, for me thats pretty standard....you know my kids at kindergarten can use those." [Marketing Employer]

We expect all graduates to certainly have an awareness of computing and be able to use Word and Excel – certainly at least a basic level. [Accounting Employer]

The current business environment is one where an individual will take responsibility for many of their IT tasks. This is a time when employers are looking to employ 'knowledge workers' who can combine many different skill sets and operate efficiently in a technologically changing time (Yoon and Lee, 2007; Torkzadeh and Lee, 2003). A candidate may not see it the same way. While a candidate may rate his or her computer knowledge based on the time spent in social networking or game playing, the employer will want more specific knowledge and experience (Bartholomew, 2004). Assumptions about skill level are often made due to the pervasive computing in today's society where the use of computing technology for social networking and game playing can be mistaken for a skill base in the use of computer applications. (van Braak, 2004). While most current graduates have had a great deal of experience with computers and using the Internet there is still a gap between the practical and analytical use of these technologies (Murray et al , 2007) .

The software graduates were expected to have knowledge of included the MS Office suite of applications, with Word, Outlook and Excel being the most requested. This didn't vary much between employers. However, one employer expressed the desire to be able to employ graduates with knowledge of database design and the use of Access to create databases. The expectation was for graduates to be able to query simple databases and to add data but not to have the skills to carry out design of other than very simple relational database applications.

"Ideally we would love someone to be able to develop relatively minor databases but realistically that seems to be a bit high of an expectation at the moment. They are familiar with databases and can input data and use them but not too many seem to be able to do much beyond that." [Property Employer]

This employer may have been disappointed in the database skills graduates had because students often have trouble understanding the concepts behind databases and resist developing their skills beyond being able to carry out simple queries.

Even though databases were pervasive in the student's everyday life, formal exposure to database software functionality is clearly lacking in the student's own experience". (Baugh, 2004, p8)

Baugh's study (2004) showed that students of a third-level computer concepts course found it difficult to master database tasks. In a test of Access tasks, Baugh found that they had difficulty with the majority of the tasks including creating a basic form and query. When a person is confident about doing a task their self-efficacy toward that task is high. Often this confidence can manifest itself (in the view of the individual) as being competency. So while graduates may confuse confidence with competency it is not uncommon for a low achiever to represent their actual achievements as higher than they are. This phenomenon is described by Ehrlinger et al, p119, 2008 as:

"Part of why the dramatic overestimation demonstrated by poor performers is so fascinating is precisely because they show dramatic overconfidence on tasks about which they have likely received substantial feedback in the past."

Murray et al (2007) surveyed a series of employers on the need to have an information technology literate workforce. Overwhelmingly the employers surveyed, from a variety of workplace disciplines, agreed that IT literacy is relevant to any industry and agreed that college graduates should be proficient in a standard office suite of programs. Murray et al (2007) said that part of the problem that employers have in trying to identify a 'concrete' set of skills was that technology and computing changes frequently and rapidly.

ADVERTISING OF EXPECTATIONS

The employers all said that they would not necessary include any computing requirements in job advertisements for Business Graduates as they assumed any graduate would have these. They saw no need to waste valuable advertising space asking for something they assumed all graduates would have. It is interesting to note that employers do this even though they have experienced business graduates with skills that do not match their expectations.

These assumptions were evidenced with comments such as:

"We expect that graduates these days will have a natural awareness of computers." [Infrastructural Contracting employer]

"We figure that they have gone through university so they are not completely stupid. If you have got through varsity you know how to use Word to a certain extent and Excel and Outlook...not like my

Mum she would need to be trained on how to open files. Everyone who is 25 or below knows how to use a computer inside out” [Marketing employer]

Placing such faith in the self appraisal of a candidate’s knowledge combined with a belief that the younger generation know how to use computers can and often does lead to disappointment for employers. We heard from participants how they had had to lower their expectations of what skills a graduate would bring with them in order to make appointments. One employer went so far as to make a distinction between what she called her level of desire and what she was getting. Another employer said that while graduates can create spreadsheets there seemed to be no concern about accuracy. This is discussed in more detail in the section “Quality of Skills” Wallace and Clariana (2005) noted that while it is often assumed that incoming business graduates will have the necessary computing skills to get them through their degrees and out in to the business world this is often not the case. They also believed that while some skills are picked up or learnt informally, these new skills are often lacking or learnt “imperfectly” and certainly not to the level employers require.

QUALITY OF SKILLS

Participants said they would like to see a greater level of not only competence in graduates but also the ability to check their work for accuracy. While the graduates were arriving with some computing skills, in most cases employers would prefer these to be at a higher level, with an emphasis placed on producing accurate work to a professional standard. This is something that has also been noted in other studies (Bell, 2007; Johnson et al, 2006).

These thoughts were articulated through statements such as:

“Expectations or desires? These are quite different. Our desires are that they will have the computing skills that will allow them to function in a supervisory or management role. Often this is not the case. The reality is that they have the basic level – you know they can work with things they can open files they can add to existing documents” [Hospitality Industry employer]

“Graduates seem to have no problem in creating spreadsheets...they seem comfortable with this but what we would really like is for them to be able to step back and check their work for accuracy.It is almost like if I have done a calculation on a spreadsheet – then it must be correct.” [Accounting employer]

“We bring in youngsters and they struggle to use a spreadsheet. By that I mean they think they can use a spreadsheet but they can’t necessarily. ... Quality and accuracy are absolutely paramount.” [Infrastructural Contracting employer]

“Ideally we would love someone to be able to develop relatively minor databases but realistically that seems to be a bit high of an expectation at the moment. They are familiar with databases and can input data and use them but not too many seem to be able to do much beyond that.” [Property Industry employer]

“I think lot of them [graduates]do rate themselves up there [computing ability], incorrectly....I think that what we have to do is to make them realise that it [computing] is not as sexy as they think it is.” [Infrastructural Contracting employer]

One participant said that when it came to computing skills she would like to be able to hire graduates with a higher level of computer skills than is currently demonstrated. She noted that while she was able to state requirements graduates needed with regard to general management skills she felt unable to do the same for computing skills. She put this down to her own lack of knowledge of what it is they required in the area of computing skills. This demonstrates this employer's own computer self-efficacy toward her computing knowledge. In this instance the employer regarded her own computing experience as very basic and although she would like to see higher skills in graduates she employed she was unsure how to ask and test for these.

TESTING OF EXPECTATIONS

Just as each participant had expectations of levels of skill only two of them actually tested their expectations before hiring staff and even then, this was not done for every applicant. Both said that testing depended on the position being filled as it was time-consuming and expensive.

“It often depends on how we are hiring people. We may run tests to sort of check the competencies in various specific software.” [Property Employer]

Other participants said that they did not test, but rather made the assumption that graduates would have the required skills.

“We just assume them to have the skills.” [Hospitality Employer]

“Actually I had never thought about testing computing but we certainly do all those other tests for all applicants whether they be at graduate level or higher. - but never computing skills.” [Accounting Employer]

Importance is placed on the information a candidate gives on their CV about the computer applications they are familiar with. Participants were willing to accept the candidate's own estimation of their abilities. Other studies have found this to be an unreliable measure (Ballantine et al, 2007).

“People also have a difficult time separating their strengths from their shortcomings, in that the perceptions they hold of their talents and performances often correlate modestly, and sometimes not at all, with the truth.” (Caputo and Dunning 2005, p488):

This method of computer self-efficacy (CSE) is common Stone and Madigan (2007) noted that “University students do not generally perform at the level they themselves believe they perform at.” It has been found that often the people with the lower level of knowledge have a greater confidence in their ability than perhaps someone else who has greater knowledge. This makes it difficult for CSE to stand alone as a reliable method to use to evaluate a person's computing ability, especially in industries that rely on accuracy of data and professional output (Ballantine et al, 2007; Yoon and Lee, 2007).

ACQUISITION OF SKILLS

When asked where they expected the candidates to have gained the skills necessary the most common answer was at university. Employers made comments such as:

“I assume that anyone who has had a tertiary education particularly in the sciences or commerce perhaps not so much law but certainly commerce and the sciences – it would be part of their training.”

“We expect that anyone coming from university would have had to use computers for their course work.” [Marketing Employer]

It is interesting to note that while employers assume that IT skills necessary for a graduate to operate in a professional and useful manner are taught in university there is also a call for students not to have to study any specific IT courses, instead using the time for more study specifically related to business (Turner, 2003; Ballantine et al, 2007; Stone et al, 2006; Gupta, 2006; Wallace and Clariana, 2005). Students who do not have high levels of IT training and have ‘got by’ throughout their study on what they have taught themselves or picked up from peers, do not necessarily have the necessary knowledge to operate in a professional environment (Torkzadeh and Lee, 2003; Wallace and Clariana, 2005; Yoon and Lee, 2007).

“I can say that I have been disappointed in the level that some show when it comes to formatting things to a high enough professional standard. It is not uncommon for work to be produced at a sloppy level.” [Infrastructural Contracting Employer]

CONCLUSION

This study revealed three key points.

1. Employers expect all university graduates to have 'good' computing skills.
2. Employers feel the need to lower their expectations of graduates computing skills to avoid disappointment.
3. Employers do not always know how to request a particular level of computing skill.

The level of computer skills that employers desire from business graduates nearly always exceeds the computing skills graduates possess. Some of these differences can be explained by the employer's lack of knowledge of what they actually require and the general expectation that workers should possess a number of generic skills (Dickerson and Green, 2004). This was demonstrated when participants were asked their expectations. Some gave one word answers relating to a perceived level of computing, others were more descriptive. What is interesting about these responses is the range of meanings given for the same term. What some perceived as intermediate skills others saw as basic or even advanced.

It is not surprising that employers' expectations are not always met. There is evidence to suggest that employers, specifically those composing job descriptions, do not always know how to express the level of computing skill required and, indeed, struggle at times with knowing what specific computing skill level is required for a role. Some place too much faith in a candidate's own assessment of their skill level. It is widely reported that people often over estimate their own ability (especially those with a lower ability) (Ballantine et al, 2007; Caputo and Dunning, 2005).

A point made by several of the participants was that often their expectations of a graduate's ability to use computer applications accurately were not met. This failure could not be attributed to the graduate's lack of confidence as the participants did note that the graduates always seemed confident, but was, in part, due to their failure to check for accuracy.

Participants expressed the belief that a person having completed a university qualification would have the necessary levels of computing skills to enter the workforce. The reality for some of these employers is while they have graduates who may have the confidence to create spreadsheets, these people do not have the judgment and ability to stand back and cast a critical eye over their work.

While the results of this study point towards a gap between an employer's expectations and the reality of the skills graduates present with, the literature shows us that this is not a problem exclusive to New Zealand. So while the study compiled by Hodges and Burchell (2003) showed us that employers concentrated more on soft skills they certainly do lament the lack of skill in the 'hard' skill areas.

Although students may be entering tertiary study with a greater confidence in using technology, this confidence does not always translate into their having the knowledge, competence and experiences that they should have when leaving university. It is expected that future more in-depth study will enable us to understand these issues better.

"Employers prefer workers who are computer literate because they are more productive and efficient at work than those who are not." (Gupta, p1, 2006)

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APPENDIX: INDICATIVE INTERVIEW QUESTIONS.

- 1) As a potential employer of university graduates
 - a) What are your expectations of a new employee's computing skills?
 - b) When are these expectations measured?
 - c) How are these expectations measured?
- 2) When a graduate position is advertised are computing skills specifically requested?
 - a) If so how is this request made?
 - i) Are specific applications mentioned along with level of use (e.g. Expert with Outlook). Do you narrow down specific tasks or application usage
 - ii) Is the request more general in nature, e.g. would the advertisement be likely to use a term such as “..Computer literacy.....”
 - If so can you answer the following?
 - b) There are many different definitions that are used to explain 'computer literacy'. Can you explain what it means in terms of gaining employment with your organisation?
- 3) If Computing /IT skills are not specifically mentioned in job advertisements, is this because:
 - a) The use of computers in this position is either non existent or irrelevant to the position
 - b) It is assumed that all applicants have the relevant Computing/ IT skills.
- 4) What are some examples of the types of software applications that an employee would be expected to use?
- 5) For all the relevant SW applications can you give me some examples of specific tasks that an employee would use this software for.
- 6) Where would you expect that employee would have learned to use this
- 7) If an employee requires training how would they get this?
- 8) In general have you been pleased with the computing /IT problem solving skills of graduates?