Graduate Profiling: Aligning course content with industry

Paul R Kearney
School of Computing and Information Technology
Unitec New Zealand
Auckland, New Zealand
pkearney@unitec.ac.nz

Linda Fraser
School of Business and Computing
Waiariki Institute of Technology
Rotorua, New Zealand

ABSTRACT

Multimedia development and web design companies throughout New Zealand, were asked to comment on the expected skill set of a computing graduate employed within their industry. This paper documents their answers, comparing them with the current curriculum, and concludes with a recommendation of further industry input into course content.

Keywords

Graduates, industry, computing, skill sets, design, multimedia, web development.

1. INTRODUCTION

Many students do not get the jobs they want when graduating from their chosen qualification. This appears to be especially true for graduates of computing courses. Study nursing and you get a job as a nurse, study boat building and you get a job building boats, but study programming or web design and you possibly will end up on a help desk answering the phone. The first question that needs to be asked is what skills are needed for a computing graduate to be employed doing what they have a passion for. Courses must then be modified or created to encompass these skills, and a pathway or specific courses through a degree must be clearly conveyed to the student, to allow them to conclude their study with the appropriate skill set. It has long been known that many employers advertise positions wanting staff that, not only have previous experience, but also the experience wanted is tailored towards their particular computing environment. Hence, the perfect applicant very rarely arrives for an interview. However, the next best thing may be a graduate with the skills to be productive in their new career, within the shortest possible time frame.

For this to occur, tertiary institutions offering computing degrees need to be aware of the current technology employed by local, and to a lesser extent, international businesses. Whereas traditional universities teach computer science with many of their graduates embarking on programming careers, students from institutes of technology often become developers, designers, analysts, or project managers. Emigh (2001) suggested that enrolments would drop if curriculums did not reflect what industry needed from graduates – and enrolments have dropped significantly.

2. METHODOLOGY

Many institutions employ an industry advisory committee to comment on the relevance of current and future syllabuses. These committees need to comprise of both industry leaders and academic personnel. However, if the mix is wrong, the committee will be ineffective; too many academics and the syllabus will be top heavy with social engineering, too many industry people and courses become product training tutorials. Sorkin, Tupper, Beiderman, Harmeyer, and Mento (2003) successfully developed a new Internet and multimedia degree, using a equal mix of business, industry, and academic members on their advisory panel.

For this paper, we concentrated only on multimedia development and web design companies within New Zealand. 50 companies were contacted, with a personalised email, and comments on the current graduate skill set were sought.

Thistlethwaite, Luker and Ransdell (2002) found email surveys to be a valuable and cost effective method of conducting research, with the speed of obtaining replies from participants being paramount. The written replies were collated and analysed to ascertain themes and patterns within the comments. The themes were then compared with current course content and conclusions were documented. Of the 50 companies contacted, only 18 replies were received and these were spread across both provincial and metropolitan areas.

3. RESULTS

Although the initial email to respondents listed the skill sets and requested comments for Web based and Multimedia developers, many of the replies divided employment opportunities into four categories. These being:

- Web Designer
- Web Developer
- Multimedia Designer
- Multimedia Developer

Each of these four areas was identified as having different roles and therefore required skill sets. Admittedly in some of the smaller companies, one employee would fill more than one of these roles and would possess multiple skill sets. These skill sets were:

Web Designer:

An in-depth knowledge of HTML & CSS coding (not via a package such as Dreamweaver).

A thorough understanding of image editing using a variety of software tools, with in-depth experience in at least one image package (Adobe or Corel).

A basic knowledge of the Internet and associated issues such as browsers, platforms, bandwidth, security, and emerging technologies.

In-depth experience in Macromedia Flash, with XML and FLV integration a bonus.

Solid cross-media design skills including User interface design and HCI knowledge.

Web Developer:

An in-depth knowledge of HTML & Javascript coding to a de-bug level (and not via a package such as Dreamweaver).

A thorough understanding of server side fundamentals and experience with PHP, ASP, and SQL programming on both Windows and Linux.

A thorough understanding of client side fundamentals and experience with action-script programming for Macromedia Flash with XML.

A basic knowledge of Internet protocols, Domain name servers, browser compatibility, and security issues, with consideration for new technologies such as mobile Internet platforms.

Multimedia Designer:

A thorough understanding of image editing using a variety of software tools, with in-depth experience in at least one image package (Adobe or Corel).

An in-depth knowledge of 3d modeling using a variety of software tools, with in-depth experience in at least one image package (3DMax, Maya, Strata).

In-depth experience in Macromedia Flash, with XML and FLV integration a bonus.

Video and sound editing skills with experience using commercial products such as Adobe Premiere and After Affects.

Solid cross-media design skills including User interface design and HCI knowledge for current and emerging platforms.

Multimedia Developer:

An in-depth knowledge of 3d modeling using a variety of software tools, with in-depth experience in at least one image package (3DMax, Maya, Strata).

In-depth experience in Macromedia Flash and Director using action-script and Lingo programming.

Video and sound manipulation skills including experience with integration into various platforms.

DVD editing and authoring skills using commercial software.

Consideration for emerging technologies including mobiles, palmtops, tablets, kiosks, and gaming.

In addition to these specific skills, all graduates are expected to possess problem solving skills and be able to think beyond the square's boundaries.

4. DISCUSSION

More than half of the respondents stated that, in their experience, computing graduates skills fell well short of their requirements. While they conceded that keeping abreast of new technologies is often difficult with the long academic lead times for approving new courses, they suggested that the issue was allowing students to pick and choose courses with no clear guidelines of what skill sets were needed for different professions. A student having knowledge of HTML, network protocols, e-commerce theory, and GUI programming with a smattering of Photoshop, would not fit into any of the above roles and would probably find difficulty when applying for positions in the technology industry. All students need introductory programming and a basic knowledge of hardware, however these can be tailored towards the students needs; for example JavaScript programming for a web developer or action-script programming for a multimedia developer. Introductory programming should not be limited to C++ or Java based languages. Likewise, knowledge of various hardware platforms is paramount for those wanting to work in the multimedia industry. Taffe (2002) suggested that computing courses must keep pace with technology and the programme itself must track technology changes within industry. Many of our respondents use the MAC platform for developing, and some suggested that much of their future work will involve mobile and handheld platforms.

Comparing course content from the Bachelor of Computing Systems at both Waiariki and Unitec, most current students would only be able to attain the designer skill set for both Web and Multimedia disciplines. Action-script programming is not yet taught, neither is XML integration into Flash. 3D modeling tends to be covered in the Unitec design degree with only some computing students having knowledge of this area. Design techniques have tradition-ally included only what is needed for Windows programming and basic web site creation. The degrees at both institutions culminate in a capstone project. Clear, Young, Goldweber, Leidig and Scott (2001) state that a capstone project should not only prepare students for industry, but also reflect the curriculum. This suggests that the curriculum must reflect industry, making liaison with potential employers paramount.

During the data gathering phase for this paper, Adobe Systems announced a buy out of Macromedia. Consolidation of their product base will surely follow. Course content that focuses on software such as Dreamweaver or Fireworks, will have to be revised before next year as Adobe already have competing products. Flash will undoubtedly stay as it is unique in its function and has a monopoly in market share. This makes it extremely difficult to create course content, but does suggest that students should be presented with problems to solve using a variety of software tools from various suppliers.

Three of the respondents made the comment that they would employ design graduates before computing graduates. These companies were not in the graphics design business but Web and Multimedia developers. Although the skill set they require involves programming and design, it was clearly stated that design graduates possess a more professional work ethic than computing graduates. Both degrees at Wairiki and Unitec include a compulsory course on professional skills, yet the respondents suggested that computing graduates did not realize that although you can hand in a program containing errors for an assignment, doing this in industry is not acceptable. It was suggested that design graduates have a higher standard for their work and it is easier to teach them programming skills than teach ethics to computing graduates.

Many of the respondents to this research suggested portfolio based assessment. Exams grades only provide the prospective employer with an impression if the majority of the marks are A's. With most computing now involving Multimedia (Windows XP is a Multimedia operating system), visual design, animation techniques, and the ability to integrate with functional programming on varied platforms, a prospective employee must

be able to demonstrate their abilities with sample work.

5. CONCLUSION

Computing education must keep pace with the industry that it supports. Many educationalists continue to believe that education at tertiary level should concentrate on creating critical thinking generalists and not product specialists, and that computer science is more applicable than applied learning. The industry disagrees and suggests that they need graduates with usable skills and the work ethic to produce professional output. With enrolments in computing dropping, institutions offering qualifications in technology must keep abreast of the industry that they support, to attract new students. Virtually all computing applications today are web-enabled and involve multimedia in some form. Mobile applications and game technology will be paramount in the near future and although this is recognised by prospective employers, educationalist appear slow to implement change.

REFERENCES

Clear, T., Goldweber, M., Young, F.H., Leidig, P.M., & Scott, K. (2001). Resources for Instructors of Capstone Courses in Computing, ACM SIGCSE Bulletin, Vol 33, Issue 4.

Emigh, K L. (2001). The Impact of New Programming Languages on University Curriculum. In The Proceedings of ISECON 2001, v 18 (Cincinnati)

Sorkin, S. Tupper, D. Beiderman, A. Harmeyer, K. & Mento, B. (2003). Creating an Internet and Multimedia Technology Program in a Computer Science Department. Journal of Computing Sciences in Colleges, v18 (3), 32-44.

Taffe, W. (2002). Information technology: A degree in computing. Journal of Computing in Small Colleges Vol. 17, No. 3.

Thistlethwaite, P. Luker, K. & Ransdell, T. (2002). The usage of the email message/internet surveys compared with other methods of collecting data. Retrieved 15 May, 2005, from http://www.sbaer.uca.edu/research/mma/2003/papers/31.pdf

GLOSSARY

HTML: HyperText Markup Language
The authoring language used to create documents on the World Wide Web.
CSS: Cascading Style Sheets
Methods with a defined order of precedence used to attach styles such as specific fonts, colors, and spacing to HTML documents.
HCI: Human Computer Interaction
The study of how people interact with computers and to what extent computers are or are not developed for successful interaction with human beings.
XML: Extensible Markup Language
A simple, very flexible text format derived from SGML (ISO 8879). Originally designed to meet the challenges of large-scale electronic publishing, XML is also playing an increasingly important role in the exchange of a wide variety of data on the Web and elsewhere.
FLV: Flash Video
The Macromedia Flash video file format.

GUI: Graphical User Interface (usually pronounced GOO-ee)
A graphical (rather than purely textual) user interface to a computer.
Javascript
An interpreted programming or script language from Netscape. It is somewhat similar in capability to Microsoft's Visual Basic, Sun's Tcl, the UNIX-derived Perl, and IBM's Rexx. In general, script languages are easier and faster to code in than the more structured and compiled languages such as C and C++
Dreamweaver:
Macromedia's Dreamweaver is an application used to create web pages. It supports Cascading Style Sheets.
Flash:
Macromedia's Flash is an application used to create animations. The use of vector graphics makes files sizes very small.
Director:
Macomedia's Director is an industry standard presentation tool. A published Director file is executable on any platform without plugins.
Lingo:
Macromedia Director's programming language.
Action-Script:
Macromedia Flash's object-oriented programming language that is designed specifically for Web site animation.