Invited paper

Developing and Introducing Courses on Testing and Quality Assurance

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Abstract

This paper reviews the processes involved in developing level 6 and 7 courses on testing and quality assurance. These processes include having the initial idea, conducting market research, deciding to proceed, forming a development team, gathering data, deciding levels and prerequisites, identifying resources, obtaining approvals, and marketing to students. The paper also reflects on the learnings gained from the experience of delivering the level 6 course for the first time.

Keywords: course, testing, quality assurance.

1 Introduction

During 2007, academic staff in the School of Computing and Information Technology at Unitec began developing a Level 6 Diploma in Information Technology Support (DipITS) and reviewing course offerings in two level 7 qualifications: the Bachelor of Computing Systems (BCS) and the Graduate Diploma in Computing (GradDipComp). Two things quickly became obvious: there was considerable industry demand for graduates with knowledge and experience of testing and quality assurance, and there did not appear to be any suitable courses on offer in public sector tertiary education institutions.

Accordingly a development team was set up with a brief to consult widely and determine the desirable content and level of a course (or courses) on testing and quality assurance. The team included the head of school (who was also leading the DipITS development team), the BCS and GradDipComp programme directors, the leader of the Information Management and Software Development academic teams and a representative of the Technical Infrastructure academic team. The first outcomes from the work of the team were an 18 credit, level 6 course called "Testing and Quality Assurance in ICT" (Elliott, 2008; Koh, 2008; Young, 2008), that was offered for the first time in semester 1, 2008 and an 18 credit, level 6 course called "Testing and Quality Assurance Management", that will be offered for the first time in semester 2, 2008 (Elliott, 2008; Koh, 2008).

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In the first part of this paper, members of the development team answer the following questions:

1. who first suggested that we might need a course on testing and quality assurance?
2. what "market research" was conducted and by whom?
3. what factors influenced the decision to go ahead?
4. how was the membership of the development team decided?
5. what data was gathered when writing the course descriptor?
6. how were the levels and prerequisites decided?
7. were there many suitable texts and other learning resources available?
8. what approvals and documentation were required?
9. how was the course marketed to students?

In the second part of this paper, the lecturer who delivered the level 6 course for the first time answers the following questions:

10. are the content, level and prerequisites appropriate?
11. were there many suitable texts and other learning resources available?
12. how are the students responding so far?
13. what are the challenges faced in delivering the course for the first time?

In the final part of this paper, conclusions are drawn and possible future developments are discussed.

2 Methodology

The methodology involved in writing this paper consisted of two stages: electronic data gathering and manual data analysis. The members of the development team to answer (independently) the first nine questions listed above. Their responses were checked for consistency and then summarised. The lecturer who was delivering the level 6 course was asked to answer the last four questions listed above. His responses are presented verbatim.

3 Development Process

The summaries of responses from the members of the development team are presented below under the appropriate headings. The leader of the Information Management and Software Development academic teams is identified as A, the BCS programme director as B, the GradDipComp programme director as G, the head of school as H, and the representative of the Technical Infrastructure academic team as T.

3.1 Who first suggested that we might need a course on testing and quality assurance?

It came out of discussions with the advisory board (one of the members was a tester and told of the absolute lack of testers in Auckland), discussions H had with industry people when surveying them about the proposed Business Analysis stream in the BCS, and also discussions among three of development team about what jobs are available and what types of jobs graduates can get. Also two academic teams (Information Management and Software Development) had considerable discussions about the need for courses that covered the theoretical and practical outcomes of the wide area of testing and quality assurance in computing systems. G had students from overseas asking for courses such as these and discussed it with A. At that point the Business Analysis stream idea grew stronger, a team was formed to discuss the format of that stream, and having at least one testing and quality assurance course was deemed to be a requirement.

3.2 What "market research" was conducted (including consulting the advisory board) and by whom?

When H visited the industry people in regard to the Business Analysis stream, typical bodies of knowledge, content and then appropriate courses were discussed with them. A, as a working professional, often deals with test teams and it was clear from discussion with test teams at a number of organisations that New Zealand was short of testers. This was validated by reviewing job advertisements and by the advisory board when the draft prescriptions were introduced to them (very strong positive feedback was received). There was also a wider meeting to discuss various new courses and their content, which was attended by past students who had graduated and were working in the IT industry. Finally the development team was required to get letters of support from industry before the prescriptions could be approved.

3.3 What factors (strategic for the school and your programme) influenced the decision to go ahead?

The school philosophy of continuous improvement and update drives an ongoing effort to look at what is taught and ensure that it is real and required by industry. The testing and quality assurance courses are part of that continuous improvement drive. Student requests were the initial driving factor then seeing that jobs that include this area were available and growing in number. It was a strategic move because no tertiary educational institutions in the Auckland region were offering such courses and there was a need to meet the demand. Other factors included the 100% positive feedback from industry, the enthusiasm of G, and the confirmation and expertise of A.

3.4 How was the membership of the development team decided?

Because of their positions, B, G and H were “ex-officio” members. When H asked for volunteers from each academic team, A and T stepped forward. A is the school expert in the Business Analysis field, and it was felt a representative of the networks area was required, as previous discussions had led to the conclusion that the course should reflect implementation testing.

3.5 What data did you gather when writing the course descriptor?

This task was assigned a member of the development team. Research was conducted by looking at industry-based training courses and other testing and quality assurance papers taught at university level, some data was collected in terms of the content and level of those papers. The job market was studied, also the hardware and software used for testing.

3.6 How did you decide level and prerequisites?

The team examined the overall BCS and the Business Analysis stream and looked at what would be a good fit, when the students had enough background and understanding to enrol in this type of course. Then the team looked at what content should be covered and decided on two courses: one at level 6 and one at level 7. This enabled good progression, a solid grounding in the theory and practice of testing and quality assurance, and a sound body of knowledge in order to have a valid, solid Business Analysis stream, with the opportunity for students in the other areas to be able to take this course in order to add valuable knowledge to enhance their own areas, for example, software development and networking. The criteria for determining prerequisites were what students need to know first and how this course could be made available to as many people as possible. Students who took the level 6 course would have completed the compulsory introductory courses in the three discipline areas and would be able to appreciate the need for testing and quality assurance, so no other prerequisite was needed. The level 6 course was made the prerequisite for the level 7 course.

3.7 Were there many suitable texts and other learning resources available?

The choice of textbooks was left to A, the person assigned to writing the prescriptions, who found that there were “literally 100's of books and other learning resources available”; indeed there were “too many options”. Finally two texts were chosen: Gao, Tsao, and Wu (2003) and Muller (2002). The team also found that appropriate software and equipment for testing were available.

3.8 What approvals and documentation were required?

The initial prescriptions were drafted and circulated to the academic teams and then to the whole school for comment and approval. They were also presented to the advisory board for their endorsement. Further approvals were required from the program committee governing the level 7 programmes and the undergraduate board of studies. Letters of support had to be obtained from industry, from an external academic and the BCS

monitor. An official form requesting board of studies approval, and a memo outlining the rationale were also required. As one team member commented "basically it goes off into bureaucratic never-never land and comes back approved if you have done your homework".

3.9 How was the course marketed to students?

This was done at programme level. The programme directors counsel students into courses which provide them with the opportunities they are looking for. New and continuing GradDipComp students were informed about the new course when planning their course of study. Those enquiring about the GradDipComp had it explained (along with the others) before they applied. No direct marketing has been done, but it is intended to advertise the Business Analysis stream on the Unitec website.

4 Delivery Experience

The lecturer who delivered the level 6 course had not been a member of the development team, so his views (presented verbatim below) provide feedback to the development team about their decisions and processes.

4.1 Are the content, level and prerequisites appropriate?

It is difficult to comment on the content of the material at this stage of the course, as the course material is being developed on a week-by-week basis. The learning outcomes as specified in the prescription are appropriate to level 6. As for the prerequisites I think that they are not appropriate. I think the networking side needs to reconsidered, as level 6 network testing requires some knowledge of networks that some of the students do not have. The same goes for the software side of the course. Also it would help if systems analysis and design was a prerequisite.

4.2 Were there many suitable texts and other learning resources available?

Yes, although when it comes to networks it is difficult (if not impossible) to see where network testing ends and network management begins. There are certainly a lot of books available on "books 24/7" on software testing. Also, the internet is a good resource both for definitions and for white papers on specific topics (e.g. decision tables, test data, test theory etc).

4.3 How are the students responding so far?

The response of the students is difficult to measure at this stage of the course. However attendance is generally high: the average attendance so far is 21 (26 students are enrolled). The highest for any single class is 25 and the lowest is 16. The students have just submitted their first assignment and 24 out of 26 submitted work (I have not marked the assignments yet). I think quite a lot of the students are taking this course just to get the credits and are not particularly interested in testing – it is often hard to get them to do any exercises that require abstract thought. Also I have noticed that several students will not do the exercises unless I stand over them! I have begun to address this by getting the students to do the exercises in groups and report back.

4.4 What are the challenges you have faced in delivering the course for the first time?

The biggest challenge is in finding the right level at which to pitch the exercises. For example, I gave the students some logic (depicted in structured pseudo-code) on which to perform a structured walkthrough – very few students proved capable of reading the logic and I ended up having to teach them how to do so. Also, although the course is clearly about software testing and network testing, it has attracted a lot of students who appear to be interested in neither. On a show of hands, only six students are interested in software development and four are interested in networks. Teaching the networking side has also been a challenge since I have no background on the subject and the person who wrote the course prescription was unavailable at the time.

5 Conclusions

The development and approval processes were lengthy, time-consuming and rigorous. The positive outcomes include a good enrolment in the first course, a strong basis for degree and diploma students wishing to focus on the testing and quality assurance area, and an excellent marketing opportunity at a time when enrolments in tertiary computing programmes are in a "trough". Future plans include offering the level 7 course in semester 2, 2008, and further marketing (of the courses, the Business Analysis stream and the DipITS).

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7 References

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