



## **Exploring students' perceptions of the value of the MInfoTech programme in preparing them for their internship**

**Dr Elaine Khoo, Dr Alvin Yeo, &  
Prof Bronwen Cowie**

**June 2017**

This project is a collaboration between the Wilf Malcolm Institute of Educational Research (WMIER), Faculty of Education and the Faculty of Computing and Mathematical Sciences, University of Waikato

# EXECUTIVE SUMMARY

This report describes the findings from a developmental evaluation of the first cohort of students' learning in the Masters in Information Technology (MInfoTech) programme, specifically their preparation for and participation in the 10-week internship. Two research questions guided the inquiry:

1. In the students' view, what is the impact of the current coursework in the MInfoTech in developing the competencies they need for a successful internship?
2. How and to what extent do students' views of the value of the course and what they need to be successful change over the duration of their internship?

Three focus group interviews were conducted with the eleven students enrolled in 2016 in the programme from the University of Waikato and University of Auckland. Students' (changing) perspectives regarding the impact of the coursework in developing the core competencies and knowledge needed to be successful in the internship were tracked through interviews held prior to, during and after their internship experience. The focus of data analyses was on the value of the coursework to students' development of the competencies and knowledge needed for a successful internship, the nature of courses useful to their learning and issues/challenges faced in preparing for and during their internship experiences. Thematic analyses of the transcribed interviews revealed seven themes which are organised into issues related to prior to and during the internship:

## ***Prior to the internship students:***

1. Saw the internship as a pathway to better professional prospects.
2. Would have liked greater clarity about what the internship would involve.
3. Experienced that their courses had differential value for their internship.
4. Commented that there was some variation in the opportunities internship appeared to offer.

## ***During and after the internship students reported:***

1. Very positive experiences of learning on-the-job and developing transferable competencies.
2. Variation in their experiences of interaction with and support from their university supervisor.
3. Concerns about the extent the internship assessment supported reflection on and documentation of their learning and experiences.

Students offered four suggestions for improving the programme so that it better supported their learning and development. These were:

1. Provide a roadmap to guide course selection in support of their internship.
2. Customise courses to students' learning needs now and into the internship.
3. Review internship assessments so that they more effectively support student learning and provide evidence of student learning on-the-job.
4. Clarify university supervisor roles and responsibilities.

Three overall recommendations are made for purposes of informing future programme refinement based on the findings. These mirror those of the students' suggestions with regard to programme structure and university-based course design and the nature and conduct of the internship, including revision of university supervisor roles and the internship assessment (weighting, who grades, nature of tasks).

# TABLE OF CONTENTS

Executive summary.....	1
Table of contents.....	1
Introduction.....	1
Research questions.....	1
Participants.....	1
Research design.....	1
Findings.....	2
Prior to the internship.....	2
During and after the internship.....	5
Student suggestions for change.....	7
1. Provide a roadmap to guide course selection.....	7
2. Customise courses to students' learning needs now and into the internship.....	7
3. Review internship assessments so that they more effectively support student learning and provide evidence of student learning on-the-job.....	8
4. Review the role of the university supervisor.....	8
Developmental evaluation recommendations and Auckland ICT Graduate School Responses.....	<b>Error!</b>
<b>Bookmark not defined.</b>	
Acknowledgements.....	11
References.....	11
Appendix 1: Focus group questions for MInfoTech students.....	12

# INTRODUCTION

The study described in this report aimed to evaluate the first cohort of students' learning in the Masters of Information Technology (MInfoTech) programme as part of preparing them for their internship experiences. The MInfoTech is offered by the Auckland ICT Graduate School (AGS) as a partnership between the University of Auckland and the University of Waikato. The programme is funded by the Ministry of Business, Innovation and Employment and Tertiary Education Commission to produce industry ready graduates and to build stronger collaboration between tertiary education providers and industry. The study was undertaken by the Wilf Malcolm Institute of Educational Research (WMIER) in collaboration with the Faculty of Computing and Mathematical Sciences (FCMS) at the University of Waikato.

## Research questions

Two research questions framed the study:

1. In the students' view, what is the impact of the current coursework in the MInfoTech in developing the competencies they need for a successful internship?
2. How and to what extent do students' views of the value of the programme and what they need to be successful, change over the duration of their internship?

This study is timely in providing feedback on the original design of the MInfoTech programme to inform its ongoing refinement offered by Auckland ICT Graduate School at University of Auckland and University of Waikato in order to contribute to the overall robustness of the programme.

## Participants

Participants were students who embarked on their internship for a period of 10 weeks from 14th November 2016 to 10th February 2017. There were four students enrolled at the University of Waikato in the FCMS596 Computer Science Internship paper and seven students in an equivalent paper at the University of Auckland. All students based at both universities were invited to participate in the project. All students consented to participating in the study, however their participation/attendance varied across the three focus group interviews.

This study obtained ethical approval from the Faculty of Education University of Waikato's Human Ethics Committee (31st October 2016). All participants took part on a voluntary basis. To maintain anonymity, the universities are referred to as University 1 and University 2.

## Research design

The study was a developmental evaluation (Patton, 2010). This approach is particularly suited to the evaluation of innovation and change initiatives in complex environments because of its focus on providing support for developmental decision-making through the provision of close to real-time feedback.

Data was collected through:

1. Three focus group interviews scheduled prior to, during and after completion of students' internship experience (see Appendix 1 for the interview protocol). Each interview was an hour long and was audio taped. The focus of the interviews was on students' analysis of the extent their coursework had prepared them to develop the competencies and knowledge needed to be successful in the internship environment, which teaching strategies they found most effective for this and why, and any issues faced in preparing for and during the internship.
2. Students' internship assessments and any informal student reflections during the internship period.

All interviews were transcribed and participants given the option of reviewing them. Emergent themes (thematic analysis) from the transcribed interviews were identified through a process of inductive reasoning (Braun & Clarke, 2006). The educational researchers from WMIER undertook the analysis, interpretation and reporting of the data.

## FINDINGS

The findings are reported according to issues raised by students about their experiences prior to, during and after the internship. Seven themes were evident from students' responses and are elaborated here through participant quotes and contextualised examples of participants' practice.

### Prior to the internship

#### Internship as a pathway to better professional prospects

Students unanimously agreed that the internship component was the chief reason for their enrolling in the MInfoTech programme. They felt the internship would offer them opportunities for professional upskilling in a relevant IT industry, open doors into the job market and allow them to try out a new industry to see if it aligned with their interests before committing to it after graduation.

I did check out other countries as well, but this one did attract me more because of the internship. And I thought being an international student, when you're moving to another country you always need that experience. That was one of the reasons also as to why I chose the MInfoTech programme. (University 1 student, prior to the internship interview)

I joined it [the programme] because I wanted to further my education. And I also wanted to get some practical experience, 'cause I found that I kind of needed a bit more confidence as well in approaching job applications and that. So I felt like with an internship it might help me prepare more for future work. (University 2 student, prior to the internship interview)

Students commented on the value of the work experience in bringing to life and developing their technical and transferable competencies especially problem solving and communication. What was important was being adaptable, willing to learn, and asking for help when they were stuck. Students recognised the value of informal learning on the job as being key to their navigating their new internship environments and tasks. They considered this would be a useful competency to target in future coursework within the programme.

## Greater clarity about internship

Students asked for more clarity regarding the length of the programme and the costs for enrollment especially for the internship component. Students were caught unaware as their offer letter was not explicit enough in detailing these resulting in some distress amongst international students who needed to take out extra loans to cover the cost of their fees for the internship component at the last minute. They requested clearer communication around the programme and course structure and ongoing fees. They also queried the high cost of the internship and its value for money.

I think in general, we need more information up front. Transparency has to be there, knowing the courses, knowing how the whole programme is structured. Like I knew it was 180 points but I didn't realise that the internship was actually 60 points. And also knowing the internship details up front, what internships we are able to get, what the courses will teach you, and what courses you should take for the internships as well. Instead of just giving a list of courses and course numbers, and telling us to go do our own research. (University 1 student, prior to the internship interview)

But the offer that we got, like most international students did not have any clue that the internship's going to actually cost ... because for international students its double. So everyone was worried because there are people that take student loans. The emails the office sent out—if you've gotten accepted into this programme—those emails will state that for one year, so for two semesters the cost would be this. However, we didn't really realise that this programme is actually across three semesters. So you've got the two semesters of study and the 10 weeks of internship. So technically this counts as three periods of study but the cost of the Master's programme was only laid out for two. This was an issue with how the University releases their information, and they only ever really release it for two periods of study. (University 1 student, prior to the internship interview)

## The relation between coursework and the internship

Students raised the need for clarity regarding the length of the programme and the costs for enrolment especially for the internship component. They requested clearer communication about these matters.

I think in general, we need more information up front. Transparency has to be there, knowing the courses, knowing how the whole programme is structured. Like I knew it was 180 points but I didn't realise that the internship was actually 60 points. And also knowing the internship details up front, what internships we are able to get, what the courses will teach you, and what courses you should take for the internships as well. Like all that information should be presented more up front. (University 1 student, prior to the internship interview)

We didn't really realise that this programme is actually across three semesters. So, you've got the two semesters of study and the 10 weeks of internship. So technically this counts as three periods of study but the cost of the Master's programme was only laid out for two. This was an issue with how the University releases their information. (University 1 student, prior to the internship interview)

All students raised the need to sort out their internship earlier in the programme because had implications for the courses they chose.

We selected all of our courses before we had known what internship opportunities were available. Had I known that I would have ended up in a software development role I would have taken a few more courses relating to that to improve my knowledge there. So

there's that disjoint between the papers I've selected for my Master's and the internship position I'd actually got. (University 1 student, prior to the internship interview)

I picked them [four papers] out of interest, and it just happens that the internship that I'm going to be doing has skills that overlap from the paper—the skills I learnt in those papers are what I'm actually doing. (University 2 student, prior to the internship interview)

They considered that the theoretical focus of their 700 level papers was better suited to preparing students for PhD careers (this was reiterated by lecturers) whereas they had enrolled in a programme focused on preparing them for working in industry.

I wasn't able to use much of the exact knowledge that was gained—some of the concepts were definitely useful, these were the very practical things, such as cyber security, parallel programming, etc. The other high level concepts were useful in trying to understand the many other more technical parts of the company's framework but weren't directly applicable to my project. My project had more of an engineering focus rather than research so it was the more implementation skills that were useful. (University 2 student, after the internship interview)

Students felt the transferable competencies they had developed from their time at university were more important than the technical content learnt in preparing them for their internship. They cited competencies such as communication (both oral and written), help seeking, problem solving, creative thinking, understanding other's ideas, taking criticism, negotiation skills, being a team player, and, motivation to complete tasks as important. They were appreciative of courses that embedded a combination of activities that valued these competencies. The following comment sums up the aspects students found they used.

Basically, finding out how to solve problems, or finding out more information and all of those transferable skills I feel are a lot more useful than specific content-based skills. But in terms of actually solving problems, I feel that it's not so much the content, it's more just the ability to find information and use that information in the way that you need. Especially with this industry, any technical kind of industry, things change so fast that by the time you start university, and by the time you finish, in four or five years' time, things will be different. What you learn in your first year, what you learn will be out of date ... So they have to sort of remove the focus from the content to it as a means of learning the other skills. It's just a tool that is used to try and teach you the other skills. (University 2 student, prior to the internship interview)

I found that a lot of the courses had us give presentations and interact as a class, which I feel is very important in building the dynamic of like, interacting with other people in IT. Because in the internship you're going to be interacting with other peers. (University 2 student, prior to the internship interview)

The most useful courses were those that successfully combined the teaching and learning of technical knowledge and transferable competencies. These courses involved either project-based work or were scenarios-based or involved open-ended tasks that had real-world implications, required students to communicate/interact with others within an authentic context, allowed them to grapple with uncertainty and pursue a project of interest with the lecturer as a facilitator of their learning.

## **Variation in internship opportunities**

Despite the overall positive response to the internship, some students expressed some concerns regarding the usefulness and scope of some of their internship.

The internship wasn't quite an internship, in a classical sort of sense. It was like he was giving me a project to do, and I was sort of expected to either work at uni, or from home on that project. So it wasn't like a work environment ... It was a more consulting internship. It was like doing freelance work for him as an internship. (University 2 student, prior to the internship interview)

I was going for work development but they wanted people just to be working, sit in a room themselves and work. So it wasn't really an internship, it was more, 'We're paying you for 10 weeks to come and do some work for us.' Instead of learning. So, it was a bit tricky like that. (University 1 student, prior to the internship interview)

Students raised a preference for being interned at more established rather than starter companies, and especially positions where they could maximise their learning experience and develop their career pathways.

## **During and after the internship**

### **Positive learning on-the-job experiences during the internship**

All students valued their internship experience in terms of fostering their learning and development as an industry professional. It offered opportunities for interaction with colleagues, for sharing knowledge and discussions to extend and further develop their skills.

Honestly, it's been absolutely amazing, it's been such a good time. The people there are great, they've sort of just slotted me into the team quite nicely. They're making use of me. I don't feel like I'm just doing some trivial task that maybe they'll use and it doesn't seem to have any sort of meaning at this point in time. I am actually working in the production environment. It's been very exciting, and very enjoyable. (University 1 student, during the internship interview)

Students commented on the value of the experience in bringing to life and developing their technical and transferable competencies especially problem solving and communication. What was important for students was an attitude of being adaptable, willing to learn, and asking for help when they were stuck during the internship. They recognised the value of informal learning on the job in navigating their new internship environments and tasks. These would be useful competencies to target in future coursework within the programme.

Less of the content because content tends to be very specific. I mean unless you go directly into that, which in my case I have, a couple of papers I am actually using some of the skills, ... knowledge. But it's more so—like learning practices that you have, and your approach to them. How you deal with difficulties and new [challenges] ... to learn. (University 2 student, during the internship interview)

### **Variable experiences of interacting with their university supervisor**

Students highlighted the overall lack of shared understanding of the roles and responsibilities of university staff. While one or two students had had regular and constructive feedback from their university supervisors, a majority pointed out the lack of contact and input from supervisors to reflect on and improve their learning in comparison to the very regular contact they had with and useful feedback they had from their workplace mentors.

The only thing I'm aware of that he [university supervisor] did was mark the work I submitted. Yeah, he gave me a few sentences of feedback from the work that I submitted, but overall it seemed like a pointless exercise to have that person, to be honest. (University 2 student, after the internship interview)

This left students feeling unsupported and questioning whether their university supervisors were the appropriate people to grade their assessments and the validity of their supervisors' assessment given their lack of contact and contribution to students' learning during the internship. Students felt the grading of the assessments needed to recognise the contribution of the workplace mentor as opposed to that of the university supervisors.

Basically, I worked closely with him [Industry Mentor] on any sort of technical issues I was having, sort of just talk to him. And he'd go, 'Oh yeah, this is how we're doing it.' Okay. And it would be simple; it would be resolved just like that. Yeah, definitely closer working with the Industry more than the Academic Supervisor. (University 2 student, during internship interview)

But the Industry Mentor's input only accounts for 10 percent, or part of 10 percent of our grade. The internship matters so little in an internship course ... In the end, this is similar to every other university course that we've taken, we're getting marked on how well we can do our research writing, how well we can do our report writing then all of the work that we actually can do. (University 1 student, after the internship interview)

## **Concerns about the internship assessment**

Students questioned the overall aim of the internship in the programme because, in their view, it the assessments did not cohere with their experiences or view of the purpose of the programme. Students thought the nature of the assessments was too theoretical and did not align with the knowledge and skills that their internship developed and should value. They felt the abstract nature of the assessments was not well suited to their providing an account of their more practical industry-based work and nor did the assessments value their on-the-job learning.

I don't think the university actually understands what being in the industry really entails. Like the whole point of this course is to be industry ready. But I think what the university's done, is they've set these points that they have to hit, but then they don't actually understand what doing industry work actually entails. All of our assessments have been university-focussed, and not industry/work-focussed. It should be the other way around. Our assessments should be industry/work-focussed. And the university work should be a supplement to that industry work. It's getting graduates IT industry ready, not getting graduates more graduate work. (University 1 student, after the internship interview)

Students queried the weighting of the final report (currently allocated at 65% of the total grading) compared to the other milestone assessments. They felt this heavy weighting focused the assessment on their report writing skills and did not acknowledge the work they could do or the knowledge and skills they had developed during their 10 weeks.

You could have the most amazing internship, you could resolve a massive issue that saves the company billions of dollars, and you could still fail because you didn't write about it academically enough. (University 1 student, after the internship interview)

They pointed out that the report and milestone assessments implicitly assumed that they were involved in an individual project but the reality was that they were often involved in lots of different projects/tasks working with different people due to the at times collaborative nature of their internship environment.

They also noted issues around the confidentiality associated with some of their work, the teams and tasks they were involved in which precluded detailed reporting. They pointed out that this diversity was not acknowledged in the assessment/ assessment rubric.

## **STUDENT SUGGESTIONS FOR CHANGE**

Students were keen to contribute to the process of improving the programme. They were willing if asked in the future to contribute to a Moodle forum to advise other cohorts of students regarding tips for surviving and succeeding in the internship. Reflecting on their experience as a whole the students offered main four suggestions for improving the support for their learning in the programme. These reflected the points made above and were:

1. Provide a roadmap to guide course selection.
2. Customise courses to students' learning needs now and into the internship.
3. Review internship assessments so that they more effectively support student learning and provide evidence of learning on-the-job.
4. Review the role of the university supervisor.

### **1. Provide a roadmap to guide course selection**

One suggestion was to group the courses offered into categories linked to different kinds of internship opportunities so that students have a better understanding of the 'paths' they might follow. Such a roadmap could provide some structure and guidance for course selection and offer some flexibility should students already have the necessary experience or knowledge and wish to explore further areas of interests:

Have a kind of type of job, and say, 'These papers are recommended for this type of job'. And say, 'This is an internship that happened last year'. So you can kind of see, 'Oh this is the kind of internship that's available, and if I want to do that sort of thing, then these papers might help with it'. (University 2 student, prior to the internship interview)

### **2. Customise courses to students' learning needs now and into the internship**

Students suggested including a course, customised for the MInfoTech programme, where all students came together as a group to take on a longer term/bigger project or class as a group. The course project should be sufficiently complex to simulate workplace environments and/or include working across disciplines with students from other faculties. Students saw this as worthwhile strategy for fostering camaraderie and providing informal support as wells as a forum for sharing and discussing content knowledge and practicing collaborating with peers.

Students working on larger projects, i.e., projects with bigger scopes that maybe last through the whole semester either as an extra component or a whole paper that is available for students across many faculties. ... I believe that a paper such as that which could bring together a team of 4–6 students, as that is representative of industry, and work on a project

that counts for all or at least the majority of their coursework would be the best preparation for industry. It would also help students in interviews as in every interview I attended I was asked to describe a team project and my role within that project etc. (University 2 student, after the internship interview)

Some students suggested reverting to a PGCert format type of courses to give them a wider exposure to a range of technologies, ideas and hands-on learning experiences in preparation for the internship.

I know it's meant to be an academic course, 'cause it's a Master's—maybe not have it as a Master's, if that's the issue. Make it a postgraduate diploma, and do these actual like courses, like modules of coding, modules of problem-solving, modules of project management. (University 1 student, during internship interview)

An alternative was to have optional dedicated workshops.

It would be really useful to have some optional tech workshops. Even if it was just once a week, and students could get help with a personal project or work on some set tasks that they could complete in their own time and get help from a tutor for one or two hours a week. (University 2 student, after the internship interview)

### **3. Review internship assessments so that they more effectively support student learning and provide evidence of student learning on-the-job**

Students suggested the regular reflective journals students they contributed in Moodle (currently not allocated marks) ought to be assessed, as these were more indicative of students' learning and development while on internship and better reflected their internship realities (in comparison to conducting a literature review, for example).

Students suggested that all staff (university supervisor and industry mentor) involved in monitoring students' internship come together to discuss: a) the kinds of assessment that would recognise students' learning during the internship, b) students' formative progress and areas for improvement over the period of the internship, and, build these progress reports into the final grade to recognise students' learning during the internship. This is favoured over being assessed based on their ability to write a final report, which removed from their internship learning experiences.

Instead of assessing us based on our report, why can't we have the Industry Mentor—we have the University Mentor, and get everybody together, and get them to discuss what we've done, what we can improve on maybe twice over the period. And that would give you a good idea of what we've done in the internship. That would give them [internship organisers] a way better view of what we've done in the internship compared to us writing a report. (University 1 student, after the internship interview)

### **4. Review the role of the university supervisor**

The suggestion was to consolidate the role of the university supervisor and programme coordinator into one person for more consistent communication and feedback. Students valued their already established relationship with the programme coordinator compared to their university supervisor.

I think [the programme developer name] would definitely be a better person to contact and get in touch with if I have any problems. And yeah, having him would be the first point of contact, rather than our university supervisor because we've been dealing with him

anyway. So it's kind of like natural, 'Oh hey [programme developer's name], I need help with this' ... Rather than being like, 'Hello Professor Blah, Blah, Blah. I have been struggling with this'. It's kind of like the relationship that we've already established with [programme developer's name] is quite good. (University 2 student, during internship interview)

Caveat: We would like readers to note that:

1. The respondents in the study were from the first major cohort of students in the programme.
2. The interview was only conducted on a small portion of this cohort.
3. The aim of the course work provided is not only to prepare students for an internship

## **DEVELOPMENTAL EVALUATION RECOMMENDATIONS AND AUCKLAND ICT GRADUATE SCHOOL RESPONSES**

As part of a process of continuous improvement, the Auckland ICT Graduate School (AGS) acknowledged the findings and reviewed their processes and effected actions to address the issues raised. The developmental evaluation recommendations offered for refining the programme are in bold, and the actions/responses from AGS are provided under these recommendations.

### **Greater clarity regarding the programme structure and courses content as this links to the role of the internship as part of the overall programme**

Responses and actions taken by AGS include:

1. At the beginning, enrolment information (such as length of programme and fees)/course selection are sent out to students. The email includes course details and Q&A sections on advising the course choices.
2. The programme structure is also explained at the orientation seminar.
3. Throughout their academic programme, academic and general staff continue to be available to answer queries about the programme.

### **Greater coherence across programme goals and assessment to further emphasise the depth and breadth of student experience and learning**

Responses and actions taken by AGS include:

1. Review the academic programme and identification of specific themes (areas of specialisations). These themes are provided to help guide the students in their academic programme and help identify the pathway from coursework to internship.

2. Assessments in the internship evaluate the students' project experience as well as reflection of their internship experience. The aggregate of students' journals/progress reports are presented in the final report which is assessed.
3. As such, the assessment from the journals and final report would indicate the depth and breadth of the students' experience and learning.

### **Further development of communication practices to ensure workplace mentors and university supervisors, along with students, have a shared understanding of and coordinate student support responsibilities and actions**

Responses and actions taken by AGS include:

1. To ensure the shared understanding of the different stakeholders, a kick-off meeting/seminar with mentors, supervisors, and students is held prior to the students' internship. In the meeting/seminar, the topics covered include: course outline of the internship; setting of expectations; roles and responsibilities of mentors, supervisors and students; as well as, explanation of the assessment components and guide documents. In addition, the students are introduced to their academic supervisors (and/or mentors) and provided with an opportunity to clarify any issues pertaining to the internship.
2. AGS, through the internship coordinators, monitor and follow-up with the supervisors and mentors regularly, to ensure the communication between all three parties occur during the internship.
3. AGS continues to encourage greater interaction between the supervisors and the students.

### **Further responses to student comments about internships:**

#### **All students raised the need to sort out their internship earlier in the programme because these had implications for the courses they chose. (p3)**

1. When the students start their MInfoTech Programme, the type of internships that are available to students in a years' time, is dependent on the market. Typically, companies may only have opportunities available 2 to 3 months before the students undertake the internships.
2. As much as possible, AGS considers the skill-sets and preferences of the students when looking for internship opportunities.
3. Students are also advised on the type of opportunities that are available based on existing and anticipated demand; these demands are reflected in the themes/specialisations offered. For example, the increase in opportunities for Data Scientists, or Software Engineers (e.g. in web application development), would help guide the students on what courses to take.
4. In addition, as more internships are hosted, and the number of repeat "business" with organisations, AGS would be in a better position to anticipate the type of internships that will be available.

**They considered that the theoretical focus of their 700 level papers was better suited to preparing students for PhD careers (this was reiterated by lecturers) whereas they had enrolled in a programme focused on preparing them for working in industry. (p4)**

A goal of the AGS is to provide opportunities for stronger collaboration between tertiary education providers and industry. With students exposed to state-of-the-art research, the students would be able to play an important role in potential knowledge transfer from the university to industry.

## **ACKNOWLEDGEMENTS**

The research team is grateful for the support of the Dean of FCMS, The University of Waikato; the Director of Auckland ICT Graduate School, University of Auckland; the Industry/Student Liaison, University of Auckland, and, the 2016 cohort of the MInfoTech students at the universities of Waikato and Auckland for their valuable time, insights, and participation.

## **REFERENCES**

- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative research in psychology*, 3(2), 77–101.
- Patton, M. Q. (2010). *Developmental evaluation: Applying complexity concepts to enhance innovation and use*. New York, NY: Guilford Press.

# APPENDIX 1: FOCUS GROUP QUESTIONS FOR MINFOTECH STUDENTS

## Prior to the Internship experience (first focus group)

What did you learn in your coursework so far that will be useful for preparing you for the internship? [What kinds of competencies, skills, knowledge]

How did you learn these? [What supported students' learning? Useful teaching strategies and how they were useful]

How do you anticipate using these knowledge/skills/competencies in your internship? [What anticipated benefits and issues]

## During the Internship experience (second focus group)

Now that you are in the middle of your internship, thinking back, did you actually use the knowledge/skills/competencies that you had said you would use?

Are there other knowledge/skills/competencies that you have become aware of/realised during your internship? [Any specific technical and non-technical competencies/knowledge/skills]

How did these knowledge/skills/competencies become visible?

How did your learning in your course support your developing these? [What else supported the development of these knowledge/skills/competencies]

Are there any other knowledge/skills/competencies that you anticipate using for the rest of your internship?

What suggestions do you have for better supporting you to be successful during your internship? [What benefits and issues]

## After the Internship experience (third focus group):

Reflecting back on your internship experience, did you actually use the knowledge/skills/competencies that you anticipated using?

Are there other knowledge/skills/competencies that you have become aware of/realised in the rest of your internship?

How did these knowledge/skills/competencies become visible?

Did your learning in your course support your developing these?

What suggestions do you have for better supporting you to be successful during your internship? [What benefits and issues]