Exploring the Application of Agile Principles to Tertiary Computing Education

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ABSTRACT

This paper defines a proposed set of Agile Principles for Tertiary Computing Education as developed through an Agile Education workshop held during the annual Computing South Island Educators' (CSIE) forum. The purpose of the workshop was to explore innovative and 'Agile' approaches that have been used within our South Island institutions to consider whether the principles of Agile development could be usefully applied or adapted to tertiary computing education. Each case study was analysed to determine alignment with Agile principles and emerging themes in the application of these principles to tertiary computing education were identified and discussed. This led to the development of a proposed set of Agile principles for tertiary computing education to support the development of computing courses, course components and programmes. Meaningful learning has emerged as a key factor for further exploration.

Keywords: Agile Education, Entrepreneurial Learning, Meaningful learning

1. INTRODUCTION

The New Zealand Government's Tertiary Education Strategy for 2014-2019 is strongly focussed on moving New Zealand's tertiary education system to become "more outward-facing and engaged" (NZ Government, 2014, p.6). This focus includes efficiency of delivery as well as economic, social and environmental outcomes for students, industry, schools, the community and the local and global economy.

As part of that strategy it is noted that changing patterns of competition, demand and work as well as technology driven changes will determine a need for the tertiary sector to rapidly develop its thinking on new delivery models to ensure an adaptive approach to tertiary education (NZ Government, 2014).

Anecdotally, the Institute of Technology and Polytechnic (ITP) sector – the organisations within the New Zealand tertiary sector that deliver technical, vocational and professional education ranging from introductory certificates through to Post Graduate research qualifications - has recently been exploring the changing nature of the education landscape and what it means both for us as educators and for our students.

Coming to grips with these changes is not about how to use technology in the classroom or how to design online courses – it is about understanding that technology is bringing about a fundamental shift in the way we learn and in the way we construct and use knowledge.

With potential large scale changes to the way we teach in the future it is important that, alongside new teaching models and technologies, we consider the values underlying these approaches.

In exploring these values for computing education it may be useful to identify successful approaches within computing practice and determine whether / how they can be applied to learning. One of these approaches is the Agile approach.

This paper defines a proposed set of Agile Principles for Tertiary Computing Education as developed through an exploratory Agile Education workshop held during the annual Computing South Island Educators (CSIE) forum and discusses their potential application.

2. BACKGROUND

The decision to explore the application of the Agile approach to tertiary computing education was driven from experiences in the development of a entrepreneurial learning framework at Nelson Marlborough Institute of Technology (NMIT) throughout 2012 and 2013 (NMIT, 2012). The aim of this framework was to guide future course development and delivery and to provide an aspirational target for creating authentic, relevant and engaging learning situations and experiences (Atkins 2013).

2.1 Entrepreneurial Learning

Deriving initially from the notion of teaching entrepreneurial skills, the concept of 'entrepreneurial learning', even though there has not yet been a single definition that has emerged, may be a promising strategy for the rapidly changing environment of current education and educational institutions (Atkins 2013).

Seely Brown (2012) discussed the difference between being an entrepreneur and an entrepreneurial learner. He described the entrepreneurial learner as having the 'sense of entrepreneur' which is centred on a continual search for new ways and new tools to learn new things. He suggested that in order to support entrepreneurial learning there was a need to move from an educational model that was based on a transfer of knowledge to one where learners were active participants in 'knowledge flows'. Play, and the permission to play, was highlighted as being an essential part of allowing entrepreneurial leaners to test and alter how they view the world.

The notion of entrepreneurial learning provides one possible model for creating relevant, engaging and valuable education for 21st century learners for whom the prospect of 'one life - one career' may well be as antiquated as the 20th century schoolroom. In this period of educational transition, teachers have to experiment with such models and be given the freedom and permission, as they must in turn give their students, to fail, to reflect on, learn from and share those failures and to try again (Atkins, 2013).

2.2 Agile Education

While we continue to believe that entrepreneurial learning is an important approach it may be that describing it as Agile is a more useful terminology. Agile methods are something that most computing educators are familiar with and there have been various studies in applying the principles to K-12 education (e.g. Peha, 2011; Salant & Hazzan, 2009). We would like to explore their applicability to tertiary education.

Peha (2011) has adapted the Agile principles as follows:

1. Our highest priority is to satisfy the needs of children and their families through early and continuous delivery of meaningful learning.
2. Welcome changing requirements, even late in a learning cycle. Harness change for the benefit of children and their families.
3. Deliver meaningful learning frequently, from a couple of days to a couple of weeks, with a preference to the shorter timescale.
4. School and family team members work together daily to create learning opportunities for all participants.
5. Build projects around motivated individuals. Give them the environment and support they need, and trust them to get the job done.
6. The most efficient and effective method of conveying information to and within a team is face-to-face conversation.
7. Meaningful learning is the primary measure of progress.

8. Our processes promote sustainability. Educators, students, and families should be able to maintain a constant pace indefinitely.
9. Continuous attention to technical excellence and good design enhances adaptability.
10. Simplicity-the art of maximizing the amount of work not done-is essential.
11. The best ideas and initiatives emerge from self-organizing teams.
12. At regular intervals, teams reflect on how to become more effective, then tune and adjust their behaviour accordingly.

In addition, Peha (2011) has adapted the Agile value statements as follows:

- *Individuals and interactions* over processes and tools;
- *Meaningful learning* over the measurement of learning;
- *Stakeholder collaboration* over constant negotiation;
- *Responding to change* over following a plan.

That is, while there is value in the items on the right, we value the items on the left more.

2.3 NZ ITP Computing Education Sector

The New Zealand ITP sector with a high prevalence of 'second chance' education brings significant diversity to the classroom. Some of our computing students 'live and breathe' technology while others enter our courses with little knowledge or experience in computing. In addition to this, we have observed that there is not necessarily a direct line between a familiarity with, and ease of use of, social digital technologies and the use of the technology set of a computing professional. When the definition of technology is extended to include educational technology the diversity in the levels of acceptance and engagement of students with technology may well increase.

Our sector is filled with quality teachers using innovative teaching methods. Educators teaching in computing are also armed with the skills and knowledge to harness technologies to support that teaching and learning. For many computing educators, computing may be viewed as an extension of self and they often have a level of comfort that enables quick adoption of existing tools or development of new tools with comparatively little effort (Pears & Malmi, 2009).

However, research is yet to reveal any clear causal connections between the use of new technology products or contexts and significantly increased achievement (Peha, 2011).

In order to take such a diverse group of students through a successful and rewarding experience in computing education we need engaged, highly motivated educators who can select between a variety of innovative methods to encourage some students while extending others.

We are taking a somewhat social constructivist stance in this respect as we believe that the best development of knowledge by the students comes from engagement in the environment and the relationship with the teacher and other students.

3. APPROACH

An invitation to submit a case study and participate in an Agile Education Workshop was sent to all Institutes of Technology and Polytechnics located in the South Island, New Zealand. This workshop formed part of an annual forum.

Seven participants submitted case studies with a further five participants taking part in the workshop. The purpose of the workshop was to explore innovative and 'Agile' approaches that have been used within our South Island institutions to consider whether the principles of Agile development could

be usefully applied or adapted to tertiary computing education. The aim was to gather our collective stories about how we as a group have taken approaches within our teaching that align with the '12 Principles of Agile Schools' developed by Peha and how they might translate to tertiary education.

Each case study was to be presented by the submitting participant at the workshop. This was to involve a fuller description of the activity that was carried out in that particular case. All participants were then to discuss that case, ask questions and, as a group determine how well it aligned with Peha's principles and an Agile approach in general.

Subsequent to the workshop, the original agile principles were referred to and the emerging themes identified in the workshop were grouped.

4. FINDINGS

The case studies (each submitted case study can be found in the Appendix) were analysed to determine alignment with Peha's principles and emerging themes in the application of these principles to tertiary computing education were identified and discussed. Also discussed were questions on the suitability of the terminology used in Peha's principles and suggestions for modification.

4.1 Case Study Analysis

Throughout the presentation and analysis of the case studies it was found that each case aligned with a subset of Peha's Agile principles, and that the case study set as a whole covered all principles as shown in Table 1, with principle five gaining the most coverage.

Table 1: Case studies against Peha's Agile Principles

Case Study	1	2	3	4	5	6	7
Principle 1		✓		✓		✓	
Principle 2	✓	✓		✓		✓	✓
Principle 3		✓		✓	✓	✓	✓
Principle 4				✓			
Principle 5	✓		✓	✓	✓	✓	✓
Principle 6		✓					
Principle 7		✓				✓	
Principle 8					✓	✓	
Principle 9		✓			✓		
Principle 10		✓		✓		✓	
Principle 11	✓	✓	✓	✓			
Principle 12	✓			✓	✓		✓

Throughout the presentation and analysis of each case study against Peha's principles the following were identified as being important when viewing these principles through the lens of tertiary computing education:

Principle 1: While Peha referred to the needs of children and their families, it was felt in the tertiary context that the term "Students and Society" may be more appropriate to allow for the inclusion of industry partners and the wider community as students and lecturers carry out a significant amount of work with and for those groups.

Principle 2: Welcome requirements changing to support autonomous learning but have higher level "rules" in place to provide a structure for learners.

Principle 3: Small chunks of learning could be counted in hours, rather than days when aiming for a short time span of an instructional component within a learning event. Could also include longer pathways for learning with smaller learning events throughout that pathway.

Principle 4: Should include the notion of students negotiating their own learning opportunities.

Principle 5: In addition to building projects around motivated individuals, knowing learners and sparking motivation through experience are significant factors.

Principle 6: Virtual interactions should be included in the definition of face-to face conversation.

Principle 7: Need to explore the relationship between product, process and learning. Meaningful learning is a key component of computing education.

Principle 8: Define this as the ability to have a persistent work ethic / commitment to learning – a small subset of what is generally considered sustainability.

Principle 10: The distinction between work and learning for lecturer and student needs to be made clear i.e. learning is important, not the amount of work done.

Principle 12: Reflecting in isolation won't produce as much meaningful learning as shared reflections. Practising failure is also important in students developing their own learning strategies.

These results were then compared with the original principles developed as part of the Agile manifesto (The Agile Alliance, 2001). This led to the development of a proposed set of Agile principles for tertiary computing education.

4.2 Proposed Agile Principles for Tertiary Computing Education

1. Our highest priority is to satisfy the needs of students and society through early and continuous delivery of meaningful learning.
2. Welcome changing requirements, even late in a learning cycle. Harness change to allow for autonomous learning.
3. Deliver meaningful learning frequently, from a couple of hours to a couple of weeks.
4. Students, educators and the community work together daily to negotiate and create learning opportunities for all participants.
5. Build projects around motivated individuals. Give them the environment and support they need, and trust them to get the job done.
6. The most efficient and effective method of conveying information to and within a team is conversation (face-to-face or virtual).
7. Meaningful learning is the primary measure of progress.
8. Our processes promote sustainability. Educators and students should be able to maintain a constant commitment to learning indefinitely.
9. Continuous attention to technical excellence and good design enhances adaptability.
10. Simplicity- the art of optimising the amount of learning and maximising the amount of work not done for both educators and students is essential.
11. The best ideas and initiatives emerge from self-organising teams.
12. At regular intervals, teams reflect on how to become more effective, then tune and adjust their behaviour accordingly.

These reworded principles would appear to cover the spectrum of tertiary computing education and can usefully be grouped into three distinct areas. The first concerns the design and provision of meaningful learning opportunities, the

second the design and provision of meaningful assessment and acknowledgement of that learning and the third concerns working as a meaningful team. See Table 2 below.

Table 2: Grouping of principles

Group	Principles	Comments
Learning	1,2,3,5,.9	activities/topics, classes, courses, programmes
Assessment	2,7,9	frequency, type, negotiated, formal/informal accreditation
Teams	1,4,6,8,10, 11,12	students/educators/stakeholders

Learning

The principles underlying this group relate specifically to the creation of opportunities for meaningful learning. This presupposes that the notion of 'meaningful learning' is understood and agreed by all team members but of course this may not be the case and may well differ between topics and cohorts of learners. An exploration of what 'meaningful learning' is will be the subject of another paper but for the purposes of this argument, it will be taken as being the learning outcomes agreed as the basis for any specific course or programme. It is perhaps important to remember that the discussion on what is meaningful in this context happens frequently within the ITP context but rarely includes the voices of the learners. These principles would encourage an ongoing and productive debate around what is meaningful learning in a variety of contexts. This may range from specific to generic skills, from individual insights to experiential learning from collaborative, constructivist activity but what is important is an agreement that the opportunity for learning is appropriate to both the content and the context.

Assessment

This set of principles encourage the debate on what is 'meaningful' when it comes to assessment. What is being assessed, why is it being assessed and how is it being assessed are questions that are central to the whole Agile process if meaningful learning is to be the primary measure of progress (Principle 7). Once again meaningful assessment may well cover a range of assessment methods and types relevant to the content and context of the learning but what these principles ensure is that the notion of assessment is something to be discussed and negotiated. While institutional and national policies may require specific formal regimes for determining and recording achievement, there is nothing to stop informal (or semi-formal) recognition of achievement through such mechanisms as letters of achievement and online badges.

Teams

This group brings together all those principles which relate to the organisation and dynamics of the learning team which importantly is considered to consist of all the relevant stakeholders which of course includes the learners. Empowering learners with an equal say in their learning has long been a principle of democratic education but to a large extent at the tertiary level has resorted to students voting with their feet, either not choosing particular courses or not attending or engaging when course completion is mandatory. Working as a team to determine which material or activity or

assessment is 'meaningful' and to negotiate variations could well be productive.

5. CONCLUSION

Peha's Agile principles, and indeed the original Agile principles, have been found to largely align with current practice in tertiary computing education. These principles, with some adjustments to allow for the context, can be used as an approach to the development of computing courses, course components and programmes and can usefully be grouped into three distinct areas. The first concerns the design and provision of meaningful learning opportunities, the second the design and provision of meaningful assessment and acknowledgement of that learning and the third concerns working as a meaningful team. Meaningful learning has emerged as a key idea within the CSIE defined approach to Agile Education and is one which warrants further exploration regarding its application.

6. FUTURE WORK

The proposed Agile principles for tertiary computing education can be used as a starting point to further explore the idea of Agile education within our sector.

- Principles as a reference point in learning design: while these could not form the basis of design alone, with an identification and use of complementary models throughout the development process, an Agile approach to teaching could be further explored.
- There is a need to explore how we determine what meaningful learning is and also who determines it. Is it the student, the educator, the accrediting board or society? We would welcome discussion/debate and definitions around what is meaningful learning and how it is recognised.

7. ACKNOWLEDGMENTS

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8. APPENDIX

To gather case study data, a simple form was used with headings to prompt the participant as shown in the case study descriptions below.

Case study 1: Agile, Agile, Agile: Sam Mann – Otago Polytechnic

Tweet: Developing a game to teach sustainability that builds Agile skills.

Why: Otago Polytechnic has a focus on enterprise as a graduate outcome and the Agile and entrepreneurial skills needed for this.

What: Bachelor of Information Technology students are developing a game for teaching enterprise skills. About to move to MVP fully developed board – card game version – similar to game called flux. Collecting attributes and then scenarios – depending on the attributes they have change the options.

Wishes: Using game elements to engage people in learning when there is no intrinsic motivation (ludic motivation). How to get people to reflect on their own learning and writing scenarios for further rounds of the game.

Case study 2: Education or Entertaining: Ken Sutton, Sam Zhao, Pheng Taing – Southern Institute of Technology

Tweet: Do we need to sell education to our students in this age? What ways can we help students to have fun learning?

Why: Student retention is a universal problem particularly now with funding attached to non-retention. We need to try and find ways to encourage students to take part and to enjoy learning, often taken for granted in traditional tertiary education

What: A selection of ideas which have been tried: Programming Competitions - the adrenaline rush!; use of technology in education, use of games in learning

Wishes: To increase the enjoyment of the learning experience, and indirectly to keep students interested and attending classes!

Outcome: There is no magic solution, all ideas have worked to a limited level, but as a whole making the environment more friendly, fun and team-oriented usually encourages students to stay.

Comments: Programming competitions have been actively encouraged (pushed), lowering financial barrier to participation, seeking of prizes (now ACM does this), the achievement of national selection! Mixing ability levels to encourage new programmers.

Technology in Education – Lego Technic, Phidgets, Kinect (student projects), Leap, Motion, later in 2014 AR Drone and Oculus Rift DK2

Using games to encourage revision such as tailored Trivial Pursuit, Quizzes, learning in the disguise of fun, introduction of a Game Development paper – programming, teamwork and project management

Variety, using the same approach loses effectiveness, variations in the way the technique is applied, or alternating over a period of time

Case Study 3: Generation Zulu: Neil Benson and James Irvine – Nelson Marlborough Institute of Technology and Sam Zhao – Southern Institute of Technology

Tweet: This is an official IT skilled based game. The game will require you to apply the technical skills that you have developed within the course to progress through the game.

Why: Why develop a game? This game was designed to help reach the students of the Y and Z generations. We have found that the average student today likes to play games in between classes and on their breaks. We have created this game with this in mind.

Think of the advantages of a truly exciting game which is reapplying and reinforcing the knowledge that they have obtained from the lectures. The student will actually improve and progress through the game with the knowledge and skills that they obtain through the course.

What: Our highest priority is to satisfy the needs of our students and we believe giving them an opportunity to enjoy their learning is relative to the theme of our workshop.

Wishes: This games provides not only theory but a virtual practical experience, where the student can apply their skills in a competitive or cooperative environment. This game is still in the process of being developed. We will be applying this game in a networking course and documenting the outcome.

Comments: Our hope is that Generation Zulu will engage and entertain the students. Allowing them to benefit through their passion for gaming.

No more holding down the (E) button to complete a task. What are we talking about? It is very common in today's games to complete a task such as opening a locked door, take over a turret, or the taking over of a network by holding down a button on the keyboard for a period of time. When this period of time expires you have done what is required. This is done without any real knowledge of the technical aspects of the job completed.

The point of difference that we are providing is that these technical tasks will no longer will be meaningless obstacles to overcome to win the game. The person playing this game will have to know what they are doing.

There even could be more than one way to complete a task. Some ways might be faster than others. So, the more you learn and play, the better you become.

The student can then apply these same skills that they have used within the game with technology that is used in the real world.

Case study 4: #Gigatown Dunedin: Lesley Smith – Otago Polytechnic

Tweet: Hands off project based learning produced great outcomes for both school pupils and for Gigatown.

Why: As part of the Dunedin Gigatown campaign, Otago Polytechnic invited schools within the greater Otago region, but outside the competition zone, to the polytechnic for a day to complete a submission for the Gigatown schools video competition. It was seen as a win-win for the country school pupils and for Otago Polytechnic, providing learning, an educational day out in Dunedin and the experience of being at Polytech for the day.

What: Schools were hosted for a day to develop a video clip on a 'day in the life of a Gigatown school'. This was supported by Apple / Cyclone Computers in supplying technology and instruction on i-movie software.

Each student group was supplied with an i-pad (for the day). The schedule of the day allowed for filming in the morning at various locations around Dunedin and then using i-Movie to

edit it and produce a video clip in the afternoon. Cyclone computing gave a half hour session on how to use the i-Movie software.

Wishes:

- That submissions were completed for the Gigatown Schools Video competition.
- That school students thought about the benefits that technology could bring for them.

Outcome:

The schools appreciated learning about polytechnic and about the places they visited in Dunedin. They produced some really good videos, demonstrating good production skills and a great sense of humour. Parents, teachers and a team of BIT students were on hand to help out but the school students needed little direction. Even though the day was not highly structured and the technologies were new to many pupils, everything worked as it should. Those involved were able to watch the kids explore the technology and very quickly be able to use it well.

Comments: Less instruction can work better. During the event there was no time to argue – the groups had to just get on and do it. This leads to a question of whether we perhaps over teach within our classes.

Case Study 5: Maths Challenge: Rachel Trounson – Otago Polytechnic

Tweet: Individual assignments based on Basic Facts Ladder aims to minimise copying and give purpose to programming.

Why: Due to the large amount of code on the Internet it is getting harder to stop the students plagiarising, or sharing files. By giving students an assessment based on Primary Mathematics with a view to a real world application, where each student has a different assignment question.

What: With using individual assignments they will need to work on their own topic and when helping each other they still have to apply it to their individual topic. The Agile principle applies to the way that the topics covered over that time are based around requirements of the students. The students were able to direct their questions to what they needed, and the topics also loosely related to all the assignments. The students would then be able to try to adapt the ideas if they suited to their individual topic. At this point they hadn't covered all aspects of the language that they could use for the assignment (they were about to start using lists). The motivated students developed the code past the initial criteria and added the bonus areas. Overall creating a fun learning experience with students helping each other but not copying.

Wishes: The plan would be to develop parts of this into a group project enabling student to work together to help the students gain confidence with programming.

Outcomes: The assignments varied from covering the basic criteria to students who worked out functions, passing variables between functions and using lists to give detailed feedback at the end of the program. I was impressed with the students who did work together and helped each other with their individual issues; they were able to find errors and give helpful suggestions. I will use this assignment structure again and even pick additional topics to develop into a group assignment. The student informally presented their assignments and explained how they covered their topic. They shared features they had added and some commented on the aspects they had become more confident with.

Comments: This was fantastic for developing the students, and the motivated students found that they became a lot more confident with using functions and lists. One specific student had started using global variables and lists, which they later changed to local variables by passing data between the functions. Overall the assignment was a great way to expand the students from the level they were at.

Case Study 6: A transfer of power: providing learner choices in assessment: Clare Atkins and Aaron Griffiths – Nelson Marlborough Institute of Technology

Tweet: Exciting options challenge students to follow their passion and step outside taught course content for a major assessment.

Why: A 600 level course in Immersive Multi-user Environments covers a broad range of content. We wanted a challenging project based assignment at the end which encouraged the students to delve deeper into one area that interested them but that we hadn't specifically covered in depth.

What: We constructed an assignment brief where students could choose from six quite different tasks (or negotiate with us to construct their own). The tasks could be individual or in pairs. The choices included two options which were based on taught material and four which were not. These four had been touched on but required the individual student to complete considerable self-directed learning. It was also possible for a student to negotiate their own option with the required components of the assessment being agreed, at the start of the assessment, between the educators, the student and the programme manager.

Wishes: The measure of success would be the engagement of the students in their chosen tasks and their willingness to extend their learning into uncharted waters!

Outcome: Very successful and have now used it three times. Constantly surprised by how enterprising students can be in sourcing their own learning resources when it is for something that they have identified that they want to learn!

Challenges: The biggest challenge was in constructing a marking schedule which allowed for fairness and consistency over all the choices.

Comments: We decided to include two options which allowed students to complete the assignment successfully based largely on content and skills that had been taught.

Each year we have had some students who have deliberately challenged themselves to complete the assignment by way of new learning - for example creating a machinima (a topic which is not covered in the class). One student constructed his own assignment deciding to bring the virtual into the real world via an Augmented Reality application, rather than focusing on creating within the virtual space.

Case Study 7: Would you like a taste of IT with that? Hamish Smith – Otago Polytechnic

Tweet: Two IT 'Taster' initiatives undertaken within Otago Polytechnic, in 2014, are examined for alignment with the '12 Principles of Agile Schools' model developed by Peha (2011).

Why: The College of Enterprise and Development (CED) is a college within Otago Polytechnic (OP) that provides IT and Business education and commercial services. CED was approached by another school, within OP, to provide 4 hours of IT "Taster" experience for a group of individuals (clients) who were unemployed and looking at future pathways options through both short education "Tasters" and work placement.

These clients were part of the Altitude Programme run by the MalCam Trust in conjunction with Work and Income New Zealand (WINZ). The brief was to "give the individuals a taste of IT, without necessary an understanding of what they were experiencing". Within a few weeks CED was approached by a commercial arm of OP to run an IT "Taster" course for a group of Probation clients as part of their community service hours, with the same brief but over 8 hours. Both were new initiatives for CED as we traditionally had not provided this type of IT Taster course.

What: We decided upon a pilot of two 2 hour sessions, which included four subject threads of IT, for the Altitude clients. We then used the same four subject threads for a pilot course for the Probation clients, over two four hour sessions. The four subject threads were IT Professional Practice, IT Customer Service, Computer Networking, and Computer Hardware. These threads were chosen as an attempt for a balanced experience of some technical and capability skills within the IT industry. We wanted to provide this taster experience in an applied manner for each of the subject threads. We decided upon how to do this and ran both pilot taster programmes. This case study examines the approach of these pilot courses and aligns this with the '12 Principles of Agile Schools' model developed by Peha (2011). We made one adjustment to the model as we replaced "children and their families" with "the client".

Wishes: By using this model as a framework for reflecting on the approaches undertaken within the pilot courses, it was hoped for the outcome to better inform future development of IT taster courses. It was also an opportunity to examine the appropriateness of the application of this model to very short courses, of only a few hours duration.

Outcomes:

- This concept of an IT Taster provides an experience of IT before meaningful learning takes place. However some understanding may be needed in order to provide context for the experience. This taster experience may be the catalyst for future meaningful learning. The Taster sessions support the focus that Peha's model has on the continuous delivery of meaningful learning but does not fully provide this.
- Taster based sessions can be easily and quickly adapted to the client group's requirements due to the emphasis on experience over formative learning. This flexibility around change requirements is discussed in Peha's model.
- Taster based sessions are consistent with the emphasis of learning over a shorter timescale, as discussed in Peha's model.
- The modular design of the Taster Sessions simplifies the process of lesson design and therefore provides a more sustainable workload, as discussed in Peha's model.

Comments:

- Follows concept of doesn't matter if things go in unexpected direction. Don't be afraid to just do things, if go completely wrong it is still a taster.
- Odds with concept that learning has to take place. Meaningful learning – but meaningful experience and learning. Overview of what was going on.
- Meaningful learning without the content underneath. Thought gotten to space in life where doors were closed. But this opened the doors to what they could do. Had never gone on the campus before.