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Gender and Stereotypes in Motivation to Study Computer Programming for Careers in Multimedia

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Abstract

A multimedia university program with relatively equal numbers of male and female students in elective programming subjects provided a rare opportunity to investigate female motivation to study and pursue computer programming in a career. The MSLQ was used to survey 85 participants. In common with research into deterrence of females from STEM domains, females displayed significantly lower self-efficacy and expectancy for success. In contrast to research into deterrence of females from STEM domains, both genders placed similar high values on computer programming and shared high extrinsic and intrinsic goal orientation. The authors propose that the stereotype associated with a creative multimedia career could attract female participation in computer programming whereas the stereotype associated with computer science could be a deterrent.

Keywords: gender; motivation; computer programming; multimedia

Subject classification codes: include these here if the journal requires them

Introduction

Women are the minority cohort in computing courses and careers in Australia. They accounted for only 18% of the workforce in Information and Communication Technology (ICT) in Australia in 2010 (Multimedia Victoria, 2010, p. 9) and the majority of those are employed in the less technical areas of the ICT industry (DEEWR, 2010, p. 34). Similarly female enrolments in university computing courses are declining from an already low base in the USA and other developed nations (Singh, Allen, Scheckler, & Darlington, 2007). Knowing these trends we observed an interesting phenomenon in our own university, which has a Faculty of Information and Communication Technologies (FICT) and a Faculty of Life and Social Sciences (FLSS). Computer programming subjects are offered by FICT and also by FLSS within Multimedia undergraduate and postgraduate degrees. Our observation was that the gender composition in the FLSS Multimedia programming elective subjects was
traditionally in the range of 30 to 50% female, a much higher proportion than the total female student cohort in the FICT (17% female student enrolments in 2009\(^1\)).

This observation led us to investigate the motivation of the students who had chosen to enrol in the more technical elective computer programming subjects within the FLSS multimedia degree program. We were interested to determine if there was any gender differentiation in student motivation, or whether the higher proportion of female students in these courses was the result of drawing students from a pool where women are the majority (58% in FLSS, 35% enrolled Multimedia degrees) and perhaps where the masculine stereotype associated with computing courses was not so prominent.

Our research aim was to gain a better understanding of factors that may relate to the gender differences in enrolments in computing. Identifying these factors will inform strategies that can be employed to improve the gender balance in all computing courses at our university and subsequently in the workforce. Anything that can be done to enlighten, better teach and increase diversity in computing courses will benefit all society because, according the head of Microsoft Research “what works for women works for society” (Prey, 2010).

The next section provides a summary of relevant theories into motivation and gender that underpin the current study. The findings are then presented followed by a discussion section and our concluding remarks, which incorporate both limitations and future research opportunities.

**Achievement motivation**

The need for achievement can be conceptualized as a form of motivation that involves cognitive processes that enable individuals to set and achieve their goals (Murphy &

\(^1\) Swinburne University of Technology Statistics Book 2009
Consequently achievement (or competence) motivation is considered relevant in learning contexts (Alexander, 1997) and career choices (Eccles, 1987). Within this set of theories, goals can be viewed along a continuum of relatively stable traits, or needs, to unstable dynamic states that respond to environmental and internal factors, with stability attributed to patterns of activation (Pintrich, 2000). For example, motivation to earn sufficient money for food and shelter could be viewed as a stable trait; motivation to learn in a domain (Alexander, 2004), like computer science or literature, could be viewed as moderately stable; and motivation to perform a learning task, like a science experiment, could be seen as a relatively unstable state or situational interest.

Within the achievement motivation umbrella, expectancy-value theory (Wigfield & Eccles, 2000) views motivation from the perspective of moderately stable individual goals, and the impact of relatively transitory tasks upon those goals. Students who value a task within a domain of learning, and expect to succeed at that task, are more likely to expend effort on the task than those who do not value the task and those who do not expect to succeed, or achieve. The value students place on a task, and their belief that effort in learning will result in positive outcomes is associated with their individual learning goal orientation - their fundamental reasons for engaging in the task and the overall course or domain. Goal orientation can be categorized along a continuum from intrinsic to extrinsic. Intrinsic motivation is evident when a task is performed for its own sake out of goals such as challenge, interest and curiosity (Deci, 1975). Individuals are more likely to be intrinsically motivated to perform a task if their needs for self-determination are fulfilled, in other words, if they believe they have some autonomy or control over the task; feel a sense of relatedness to the task; and have a sense of competence or feel good about themselves while engaging in the task (Ryan & Deci,
In contrast to intrinsic motivation, extrinsic motivation is evident if a task is performed in order to receive a reward or some form of recognition. For example, students are more likely to be extrinsically motivated if they wish to achieve high marks, or approval from others such as peers, family or teachers. At higher levels of extrinsic motivation, individuals can adopt and internalise an intrinsic goal (Ryan & Deci, 2000). Individuals use experience to predict the rewards and/or consequences of a behaviour and their predictions or expectations influence motivation to initiate that behaviour. The experience of previous success or failure influences perceptions of self-efficacy (Schunk, 1989) and confidence in ability to achieve the goal (Wigfield & Eccles, 2000). Attribution is the meaning and cause individuals impose, or attribute, to the achievement or failure of their goals (Murphy & Alexander, 2000). Achievement of goals is more likely to be associated with attribution of failure to internal or unstable sources (for example, effort) than to external or stable sources (for example, task difficulty). Expectancy for success can be mediated by other affective and cognitive factors. A primary mediator is test anxiety, which can decrease not only expectancy for success, but also academic performance.

**Gender and choice of ICT**

Many factors can influence student course choice and consequently motivation to pursue particular careers, such as parental influence, self-efficacy, habitat and societal stereotypes (Anderson, 1998; Bandura, 1997; Hackett, 1995; Pajares, 1996). Cohoon and Asprey (2006) suggest that we “know” computing is masculine, but whether the culture is a cause or a consequence of its gender composition are different questions. Wacjman (2000) suggests that gender relations influence the gender construction of the technology we use, suggesting it is a conscious decision of power; a product of
social construction, “women's absence from spheres of influence is a key feature of gender power relations through history” (Wajcman, 2000, p. 452). She posits that in many positions of power, men are set up as the norm against which women are measured and found wanting and that "neither masculinity, femininity nor technology are fixed, unitary categories, but that they contain multiple possibilities and exist in relation to each other" (Wajcman, 2000, p. 460). We may then surmise that the increasing masculinisation of computing in the Australian context is a product of societal perceptions, a downward spiral influenced by stereotypes and gender construction of the discipline.

Stereotypes have been identified as associated with deterrents to female involvement in the computing discipline (Corneliussen, 2005; Lang, 2010; Lewis, Lang, & McKay, 2007; Margolis & Fisher, 2002; Wajcman, 2000) primarily that of an antisocial ‘geeky’ male cohort and secondarily careers that do not require or value personal skills and do not involve helping others (Beyer, Rynes, & Haller, 2004).

Fewer females graduate, on average, from computer science departments in engineering colleges than from computer science departments in non-engineering colleges (Camp, 1997). Corneliussen (2005) reported a finding that informs this current study in that it may explain the anomaly in the gender that we observed between our two faculties. When a course of computing was removed from a science faculty and placed in a humanities faculty in Corneliussen’s university, not only did more women enrol in the program but they also admitted taking pleasure and having competence in their studies. Corneliussen concluded that there is an embedded technical reluctance in female students because of the male stereotyping of the computing discipline. This technical aversion in females may indeed be similar to the observed maths and science aversion reported in other studies (Grundy, 2000; Lang, 2002).
Inaccurately low confidence in their computing skills could also deter females from selecting and persisting in computing courses. In the relatively new discipline of computing, computer anxiety is related to gender, educational experiences and quality of instructors, with females more anxious than males (Buche, Davis, & Vician, 2007). High levels of test anxiety have been associated with low levels of achievement for females, but not necessarily males, in introductory programming subjects (Yukselturk & Bulut, 2009). Some females may feel uncomfortable with abstraction, and may prefer more concrete or tangible domains (Singh, et al., 2007).

A complex set of factors influences student motivation that is particularly gender focused in the computing discipline (Multimedia Victoria, 2004). Within expectancy-value theory exists a body of work in gender differences in career choices (Eccles, 1987) with recent work in the gender imbalance in STEM (Science, Technology, Engineering, and Mathematics) domains (Eccles, 2007). Consequently this study builds upon literature related to expectancy-value theory within achievement motivation.

There is considerable agreement amongst the research that females have a lower self-concept of ability than males in STEM domains that continues from an early age (Denissen, Zarett, & Eccles, 2007) to postgraduate study (J Cohoon, 2007) despite an equivalent and sometimes higher level of achievement (Eccles, 2007; Singh, et al., 2007). Within the STEM field of computing, females have significantly less confidence than males in their ability to learn and succeed (Beyer, et al., 2004; Singh, et al., 2007) and are more likely than males to attribute outcomes to external influences (Dickhauser & Stiensmeier-Pelster, 2002).

Females who do not chose (Watt, 2006) or who change their aspirations from (Frome, Alfeld, Eccles, & Barber, 2006) a STEM career over time do not appear to value (Eccles, 2007) the tasks and activities in STEM domains very highly. They also
place low utility value on learning within the domain whereas females who do persist place a high value on its usefulness in their careers (Eccles, 2007). In at least one study, the low proportion of females who chose science and maths careers placed unusually low value on society or human-related occupations (Eccles, 2007).

Small sample sizes of females in STEM courses prevent robust gender comparison (Richards, 2009) and this may explain why some research addresses the causes of deterrence (Beyer, et al., 2004). Consequently much of the literature related to STEM career choices relies upon a framework of career aspirations (Frome, et al., 2006) rather than positive choices. The underpinning rationale for our study is to build on this literature base while cognisant of the apparent trend for a critical mass of females in FLSS to willingly pursue non-core programming courses while their peers are less attracted to computing in general.

**Research Method**

The relatively even gender balance in FLSS undergraduate and postgraduate multimedia classrooms presented an opportunity to collect and analyse questionnaire self-report data.

**Objectives**

The study aimed to investigate factors relating to gender differences in programming subjects, with the ultimate goal of improving the gender balance in computing courses and careers. The primary factor investigated was achievement (competence) motivation to learn computer programming. In order to assess the utility value of computer programming for the experimental cohort, the secondary factors included motivation to pursue programming as a career.
**The sample**

Participants were students in interdisciplinary university multimedia program focusing on production in web programming, 2D animation programming as well as graphics, 3D animation, audio and video. The program includes undergraduate degrees and coursework Masters degrees. Although the degrees are offered in a non-computing faculty, they include one and a half first-level and two second-level programming subjects targeted at students with low entry skills. The undergraduate subject is an elective and although the postgraduate subjects are core, it is possible to enrol in a similar degree without any programming subjects. Eighty-five undergraduate and postgraduate multimedia students in three second-level programming subjects submitted complete sets of data.

**Instrument**

The three page questionnaire instrument collected responses primarily in Likert scale format, with three sections:

1. **Background information**

Six demographic items from a previously used survey for a major project were reused (WITS, 2005).

2. **Motivation to use computer programming in career**

Five items aimed to assess the utility value of learning computer programming by distinguishing the goal of becoming a computer programmer from the goal of learning programming as a means to assist prospects in a related career.
3. Motivation to study the domain of computer programming

Thirty-one items were adapted to computer programming from the Motivated Strategies for Learning Questionnaire (MSLQ), created in 1986 to measure achievement motivation, self-regulated learning and mediating components of academic performance (Pintrich, 2000; Pintrich & Schunk, 2002; Pintrich, Smith, Garcia, & McKeachie, 1991). The tool demonstrates reliably robust scales and good factor structure (Pintrich, Smith, Garcia, & McKeachie, 1993) with a strong correlation between the self-report measures obtained and academic performance (Zimmerman, 2008). It continues to be used widely in research around the world (Artino, 2005; Doube, 2006; Lee, Zhang, & Yin, 2010; Linnenbrink-Garcia et al., 2010), including related studies, for example motivation and learning strategies in introductory computer programming performance (Bergin & Reilly, 2005) and gender differences in online learning (Yukselturk & Bulut, 2009).

The original questionnaire is a seven point Likert scale instrument with 81 items that can be adapted to a specific domain of learning. It consists of six motivation scales and nine learning strategies scales, all of which can be used independently. This study used the six motivation scales only. This approach is quite the norm (Artino, 2005, p. 2) facilitated by the modular nature of the tool. Although there could be limitations associated with the self-reporting aspect, Artino concluded that it is a “very sound instrument” (2005, p. 11). See Appendix 1 for the version of the MSQL used in this research.

The 31 motivation items address three components of achievement motivation:

(1) The value component consists of three scales:

- intrinsic goal orientation
• extrinsic goal orientation
• task or domain value

(2) The expectancy component consists of two scales:

• Belief in control of ones’ learning
• Self-efficacy for learning and performance which includes evaluation of ability, and confidence in skills, to accomplish a task together with expectancy for success.

(3) The affective component is a single scale that measures test anxiety on the understanding that concern and preoccupation with performance can disrupt performance and negatively moderate expectancy.

Procedure

The questionnaire instrument was administered during class-time in three classes towards the end of each of two semesters in 2010. All data was converted to percentages for consistency. The individual MSLQ scales were first calculated by adding all responses for a scale and then dividing by the number of questions (four to six) in that scale. The totals for each scale varied and were therefore standardised to percentages to facilitate comparison. Total MSLQ percentages were calculated for the:

• Sum of the value and expectancy scales
• Sum of the value and expectancy scales less the test anxiety scale

The means of the MSLQ individual scales and totals were compared by gender using ANOVA, as was the difference in career goals.
Findings

Background information

Students in one undergraduate (UG) and two postgraduate (PG) second-level computer programming subjects were surveyed in seven different degree programs (See Appendix 2). 73% of participants were postgraduates with 61% in the Masters of Multimedia program. 45% were female. The gender distribution by subject is shown in Table 1.

Table 1: Gender distribution in computer programming subject survey completions

<table>
<thead>
<tr>
<th>Subject code</th>
<th>Subject description</th>
<th>Female</th>
<th>Male</th>
<th>Total</th>
<th>UG/PG</th>
</tr>
</thead>
<tbody>
<tr>
<td>HET123</td>
<td>Client –Server-Database programming in PHP, JavaScript, MySQL</td>
<td>8</td>
<td>14</td>
<td>22</td>
<td>UG</td>
</tr>
<tr>
<td>HET723</td>
<td>Client –Server-Database programming in PHP, JavaScript, MySQL</td>
<td>14</td>
<td>13</td>
<td>27</td>
<td>PG</td>
</tr>
<tr>
<td>HET732</td>
<td>2D Animation programming in Adobe ActionScript</td>
<td>17</td>
<td>19</td>
<td>36</td>
<td>PG</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>39</td>
<td>46</td>
<td>85</td>
<td></td>
</tr>
</tbody>
</table>

Participants were aged between 17 and 50, with 70% aged between 21 and 30. 42% were domestic Australian students and 58% were enrolled as international students. 19% studied part-time and the remainder studied full-time. Of the 39.5% that were in paid employment (studying part-time) only 16.3% [n=14] currently worked in a computing related position.
Motivation to use computer programming in career

There was no significant difference between the genders in their career goals, as assessed by ANOVA of the questionnaire responses. When the slightly, moderately and strongly agree responses are combined, 67% of the sample had enrolled in the subjects with the goal of assisting their chosen careers and 75% were confident that what they were learning would assist their careers. In other words, they placed high utility value on learning computer programming. Although 41% claimed to be more strongly interested in programming than in other topics in their course, 64% thought that programming would assist them to perform work they were more interested in. The implied contradiction is accounted for in the degree of the responses. When moderately and strongly agree responses are combined, 29% were most interested in programming and 38% were more interested in other topics, implying that extrinsic goal orientation was more predominant than intrinsic goal orientation. Alternatively, these responses could suggest that future workplace tasks were generally expected to be more interesting than current learning tasks. Only 12% were not learning what they had expected to learn when they enrolled in the subject, indicating that the goals of the majority of the class were aligned with their learning experiences.

Motivation to study computer programming

No significant overall difference between the genders in their overall motivation to study programming can be inferred from the MSLQ totals, although females were slightly less motivated than their male counterparts. The means of MSLQ total responses converted to percentages are shown in Table 2.

Table 2: Motivation to study computer programming in MSLQ total scores by gender
<table>
<thead>
<tr>
<th>Total for Scales</th>
<th>Female%</th>
<th>Male%</th>
<th>Mean%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value + Expectancy</td>
<td>73.78</td>
<td>76.79</td>
<td>75.41</td>
</tr>
<tr>
<td>Value + Expectancy – Anxiety</td>
<td>50.87</td>
<td>54.41</td>
<td>52.78</td>
</tr>
</tbody>
</table>

When the individual scales are examined, ANOVA of the Values scales by gender reveals no significant differences. Both genders appeared to similarly value the domain of programming and the tasks they performed in learning programming, although females appeared to be slightly more intrinsically and slightly less extrinsically motivated than males and valued the tasks involved in learning programming slightly more. In fact both genders valued tasks involved in learning the domain of programming very highly, and appeared to have higher intrinsic, than extrinsic, goal orientation.

Table 3: Motivation to study computer programming in MSLQ sub-scales by gender

<table>
<thead>
<tr>
<th>Scale</th>
<th>Sub-scale</th>
<th>Female %</th>
<th>Male %</th>
<th>Mean %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Intrinsic Goal Motivation</td>
<td>75.82</td>
<td>72.83</td>
<td>74.2</td>
</tr>
<tr>
<td></td>
<td>Extrinsic Goal Motivation</td>
<td>69.78</td>
<td>71.97</td>
<td>70.97</td>
</tr>
<tr>
<td></td>
<td>Task Value</td>
<td>92.53</td>
<td>90.93</td>
<td>91.66</td>
</tr>
<tr>
<td>Expectancy for success</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Control of learning beliefs</td>
<td>85.53</td>
<td>91.38</td>
<td>88.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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<tr>
<td>----------------------</td>
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<td></td>
<td></td>
</tr>
<tr>
<td><strong>Self-efficacy</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) Self-efficacy for learning</td>
<td>68.41</td>
<td>75.47</td>
<td>72.23</td>
<td></td>
</tr>
<tr>
<td>b) Self-efficacy for performance</td>
<td>64.38</td>
<td>73.84</td>
<td>69.5</td>
<td></td>
</tr>
<tr>
<td><strong>Affective</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test anxiety</td>
<td>68.28</td>
<td>61.99</td>
<td>64.87</td>
<td></td>
</tr>
</tbody>
</table>

In contrast, there were significant differences in the Expectancies scale. Females exhibited significantly lower overall Expectancies for success than did males, with significantly lower scores in the Self-efficacy sub-scale \(F(1,83)=5.43, \ p=.022\) and both its components. Females scored significantly lower in the self-efficacy for learning component. They had lower confidence in their skills and abilities to learn programming \(F(1,83)=4.30, \ p=.041\) than males did. They also scored significantly lower in the self-efficacy for performance component. They expected their academic performance to be significantly lower than males did \(F(1,83)=5.30, \ p=.024\).

In the Control sub-scale of the Expectancies scale, although females believed themselves to be less in control of their own learning than males did, and were more likely to attribute outcomes in learning to external factors than to their own efforts, the difference was not significant with a reliable degree of confidence \(F(1,83)=2.63, \ p=.108\).

In the Affective scale, at the 0.1 level females could be considered as more anxious than males about doing tests \(F(1,83)=3.00, \ p=.87\).
Discussion

The results of this study replicated and extended results of similar research and are interesting in several respects. The rare phenomenon of university computing classes with moderate numbers and nearly equal proportions of males and females can contribute valuable insights into the customary gender imbalance.

The results for the MSLQ Expectancies and Affective scales are interesting because the female cohort chose to persist despite common deterrents to female participation in computing subjects in the form of significantly lower confidence in their skills and abilities; significantly lower expectancies for academic success; and significantly higher anxiety than their male counterparts. Furthermore females were more likely to feel less in control of their own learning and attribute their performance to external rather than internal sources, both of which are indicators of low confidence and poorer performance.

The results for the MSLQ Values scale are equally interesting because no significant differences were found. In common with their male classmates, and unlike females who do not persist with computing and other STEM disciplines, the females in our study placed a high value on the tasks and activities in learning computer programming. They also placed a high utility value on programming, believing that it would assist their careers.

Females were highly extrinsically motivated to learn programming, only slightly less than males, indicating that they were motivated by factors such as good marks, competition, and approval or respect of others. They were even more intrinsically motivated to learn programming, slightly more than males, indicating that they found computer programming interesting, challenging and enjoyable. There is considerable evidence that females rarely choose or persist in STEM careers they are not intrinsically
motivated to pursue (Eccles, 1987; Frome, et al., 2006; Watt, 2006) and that females who do persist are likely to choose more ‘caring’ options such as medicine. The few who chose the more technical fields can be highly intrinsically motivated but possibly place exceptionally low value on society and humanistic pursuits (Eccles, 2007). It is highly unlikely that a critical mass of 39 females could share such an unusual characteristic for their gender or that the programs in our study could be described as ‘caring’, so other possible explanations for the results should be explored.

These students were not aiming for careers in traditional computing but in multimedia development and production. The prevailing stereotypes of computing courses and workplaces may not have been considered relevant. The major stereotype of a computing faculty or department may not have presented a barrier. An interdisciplinary course including graphics, video and audio design and production could be perceived as creative and leading to exciting careers, in contrast to a stereotypical computing position. Furthermore it could be perceived as a less masculine career.

In contrast to stereotypical views of computing as ‘geeky’ and ‘anti-social’ (J. Cohoon & Asprey, 2006), multimedia learning and working environments could be perceived as fashionable amongst the general population. Consequently females could expect their needs for relatedness to be fulfilled because they would be learning and working with peers with similar status and interests (Messersmith, Garrett, Davis-Kean, Malanchuk, & Eccles, 2008). The high values for extrinsic goal orientation support this view by suggesting that impressing their peers and others with their results and the portfolio that they produce during their studies could be important to multimedia students. Some creative careers, like ‘caring’ careers, could appear suitable for females, and may avoid appearing male dominated.
Once females were engaged in the course, possibly the ‘concrete’ nature of multimedia production anchored the more abstract programming concepts. Possibly the production project assessment tasks were more relevant to their creative interests and their career goals than more general programming assessment tasks, and consequently more intrinsically motivating.

**Other considerations**

The next stage of this investigation aims to broaden the research methodology (Zimmerman, 2008) with triangulation of the questionnaire data with academic performance data and alternative sources of qualitative data such as interviews with students in the same courses. The study would benefit from being replicated in other universities that offer similar courses.

**Conclusion**

It is unusual for university computer programming classes in Australia to have a relatively even gender composition. This research was able to capitalise on this occurrence to provide a greater insight into gender differences or similarities in motivation to study computer programming. It found that motivation to learn computer programming for a creative career was associated with high utility and task values for both male and female students. The creativity utility of the curricula was important in ensuring that females persisted in the class, despite having lower self-efficacy and greater anxiety than their male peers. Both genders also shared similarly high extrinsic and intrinsic goal orientation. This research makes an important contribution to an understanding of ways in which to increase diversity and improve teaching in computing courses. The authors posit that females could be motivated to learn technical
concepts that are associated with domains which are considered creative, fashionable and sociable and which are not perceived as dominated by anti-social masculine stereotypes. The method in which computer programming is presented through relevant concrete and creative projects rather than through abstract concepts may also influence student persistence. The main limitation of the study is that this is one program in one university faculty. It would need to be replicated in several universities, perhaps where similar subjects are offered in different faculties, to verify our findings.
Appendix A: Gender and motivation questionnaire *(This instrument has been reformatted for publication)*

**Section One  Demographic information**

1. Female □  Male □
2. Full-time student □  Part-time student □
3. What is the name of your degree course?
4. Age as at 1 January 2010
5. Enrolment status (domestic or international?)

6. **Are you in paid employment? If so how many hours?**

7. On the scale of 1 (strongly disagree) to 7 (strongly agree) select the number that best matches your experience:
   - This unit is just what I expected
   - I am confident that what I am learning in this unit will help me in my chosen career.
   - I enrolled in this unit to help me in my chosen career
   - I am more interested in programming than in other topics in my course
   - Programming can help me perform other work that I am more interested in

**Section Two  Motivated Strategies for Learning Questionnaire (MSLQ)**

The following questions ask about your motivation for and attitudes about this unit. Remember there are no right or wrong answers, just answer as accurately as possible. Use the scale below to answer the questions. If you think the statement is very true of you, circle 7; if a statement is not at all true of you, circle 1. If the statement is more or less true of you, find the number between 1 and 7 that best describes you.

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</thead>
<tbody>
<tr>
<td>1</td>
<td>In a unit like this, I prefer course material that really challenges me so I can learn new things.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td>If I study in appropriate ways, then I will be able to learn the material in this unit.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>When I take a test I think about how poorly I am doing compared with other students.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>4</td>
<td>I think I will be able to use what I learn in this unit in other units.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td>I believe I will receive an excellent grade in this unit.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Statement</td>
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</tr>
<tr>
<td>6</td>
<td>Getting a good grade in this unit is the most satisfying thing for me right now.</td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>7</td>
<td>I'm certain I can understand the most difficult material presented in this unit.</td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>8</td>
<td>When I take a test I think about items on other parts of the test I can't answer.</td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>9</td>
<td>It is my own fault if I don't learn the material in this unit.</td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>10</td>
<td>It is important for me to learn the material in this unit.</td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>11</td>
<td>The most important thing for me right now is improving my overall grades for the entire degree, so my main concern in this unit is getting a good grade</td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>12</td>
<td>I'm confident I can learn the basic concepts taught in this unit.</td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>13</td>
<td>If I can, I want to get better grades in this unit than most of the other students</td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>14</td>
<td>When I take tests I think of the consequences of failing.</td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>15</td>
<td>I'm confident I can understand the most complex material presented by the instructor in this unit.</td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>16</td>
<td>In a unit like this, I prefer course material that arouses my curiosity, even if it is difficult to learn.</td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>17</td>
<td>I am very interested in the content area of this unit.</td>
<td></td>
<td>1</td>
<td>2</td>
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<td>4</td>
<td>5</td>
</tr>
<tr>
<td>18</td>
<td>If I try hard enough, then I will understand the course material.</td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>19</td>
<td>I have an uneasy, upset feeling when I take an exam.</td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>20</td>
<td>I'm confident I can do an excellent job on the assignments and tests in this unit.</td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>21</td>
<td>I expect to do well in this unit.</td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>22</td>
<td>The most satisfying thing for me in this unit is trying to understand the content as thoroughly as possible</td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>23</td>
<td>I think the course material in this unit is useful for me to learn.</td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>24</td>
<td>When I have the opportunity in this unit, I choose assignment topics that I can learn from even if they don't guarantee a good grade</td>
<td></td>
<td>1</td>
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<td>5</td>
</tr>
<tr>
<td>25</td>
<td>If I don't understand the unit materials, it is because I didn't try hard enough</td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>26</td>
<td>I like the subject matter of this unit.</td>
<td></td>
<td>1</td>
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<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>27</td>
<td>Understanding the subject matter of this unit is very important to me</td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>28</td>
<td>I feel my heart beating fast when I take an exam.</td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>29</td>
<td>I'm certain I can master the skills being taught in this unit.</td>
<td></td>
<td>1</td>
<td>2</td>
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<td>4</td>
<td>5</td>
</tr>
<tr>
<td>30</td>
<td>I want to do well in this unit because it is important to show my ability to my family, friends, employer, or others.</td>
<td></td>
<td>1</td>
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<td>3</td>
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<td>5</td>
</tr>
<tr>
<td>31</td>
<td>Considering the difficulty of this unit, the teacher, and my skills, I think I will do well in this unit.</td>
<td></td>
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<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
References


WITS. (2005). Women in ICT student survey (Faculty of ICT, Trans.). Melbourne, Australia: Swinburne University.
