

# Reflective Learning Journals in Computer Science: The Student Experience

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## **Abstract**

This paper is centred on undergraduate students enrolled on a BSc in IT programme in Dublin, Ireland, with a view to enhancing student engagement in learning through reflexivity. Reflective learning places the emphasis on the self as the source of learning and is inherently an individual and interactive process. Boud et al. (1985) state that reflection is an important human activity in which people recapture their experience, think about it, mull it over and evaluate it. It is this working with experience that is important in learning. The authors developed and evaluated a reflective learning journal tool that was used to capture the reflective learning processes within students studying computer programming, a subject known to present significant learning barriers for 1<sup>st</sup> year BSc computing students. In addition, existing student study habit behaviours were investigated to determine which approaches, materials and sources they had a preference for, to further shape the delivery of module content in the future.

The conclusions from this study indicate that the use of a reflective learning journal can lead to frustration for some students. While some students did indicate benefits in using the journal, the negative comments outweighed the positive overall, and therefore reflective learning journals should not be recommended to all students, at least for environments such as that studied in this paper.

The possible benefits of using a reflective learning journal can be discussed with future cohorts, but in our case it will be up to the individual student if he or she chooses to use one. Reflecting on learning is complicated and is not a simple activity for all to engage in, and this research highlights the challenges. The approach and tool used in this empirical research must be factored into the conclusion, as other approaches and tools may yield a more encouraging result.

Any further research in reflective learning should include other tools and approaches that have proven successful in higher education, and perhaps, an appropriate method might be evaluated.

## **Keywords**

Reflective learning journal, Reflexivity

## **1. Motivation**

The motivation for this study is drawn from the professional practice-based experience of the authors within higher education, with the objective of attempting to introduce reflexivity through the use of a reflective learning journal for 1<sup>st</sup> year students enrolled on a BSc in Information Technology programme. Attrition rates from computing programmes during the first two semesters are often between 30% and 40% and can be as high as 50% during the first semester (Beaubouef et al. 2001; Beaubouef & Mason 2005). Failure rates in introductory programming modules have been reported as being between 20% and 50% (McKinney & Denton 2004). This early departure of students represents a waste of potential, resources and skills. The authors selected computer programming as the research environment, and introduced the use of a reflective learning journal, which was completed by the students throughout their second semester of 1<sup>st</sup> year. The students were invited to use the reflective journal outside of class time to capture their understanding of lectures and practical activities performed during their day. The authors captured data through three methods, a questionnaire to ascertain the students' existing study behaviour, a reflective learning journal to document their individual learning and reflection throughout the semester, and interviews to gather feedback upon the completion of the reflective learning journal exercise. This study is interpretive, but useful in determining the use of a reflective learning journal can, or should be, developed further within the research environment.

## **2. Related Work**

An important, if not crucial, factor in student learning and personal development is student engagement, or the quality of effort students themselves devote to educationally purposeful activities that contribute directly to desired outcomes (Astin, 1993; Pascarella and Terenzini, 1991). Carini et al. (2006) state that student engagement is generally considered to be among the better predictors of learning and personal development. The more students study or practice a subject, the more they tend to learn about it out of an expression of interest. Likewise, the more students practice and get feedback on their writing, analysing, or problem solving, the more adept they should become (Kuh, 2003). Students who are involved in educationally productive activities in college are developing habits of the mind and heart that enlarge their capacity for continuous learning and personal development (Shulman, 2002).

Self-regulation of cognition and behaviour is an important aspect of student learning and academic performance in the classroom context (Corno & Mandinach, 1983; Corno & Rorhkemper, 1985).

Pintrich et al. (1990) identify three components of self-regulated learning that seem especially important for classroom performance. First, self-regulated learning includes students' metacognitive strategies for planning, monitoring and modifying their cognition. Secondly, students' management and control of their effort on classroom academic tasks has been proposed as another important component. The third important aspect of self-regulated learning are the cognitive strategies that students use to learn, remember, and understand subject material. The theoretical framework for conceptualising student motivation is an adaptation of a general expectancy-value model of motivation. Pintrich et al. (1990) identify three motivational components that may be linked to the three different components of self-regulated learning, those being: an *expectancy* component, which includes students' beliefs about their ability to perform a task, a *value* component which includes students' goals and beliefs about the importance and interest of the task, and an *affective* component, which includes students' emotional reactions to the tasks.

Reflective learning is the process of internally examining and exploring an issue of concern, triggered by an experience, which creates and clarifies meaning in terms of the self, and which results in a changed conceptual perspective (Boyed & Fales 1983). Reflective learning places the emphasis on the self as the source of learning and is inherently an individual and interactive process. Boud et al. (1985) state that reflection is an important human activity in which people recapture their experience, think about it, mull it over and evaluate it. It is this working with experience that is important in learning. According to Wong et al. (1995), reflective journal writing involves a reflective process that is initiated when the learner documents the experience encountered, returns to the experience, recollects what has taken place and replays the experience, and re-evaluation takes place. Gibbs Reflective Cycle (Gibbs, 1998) is a well referenced reflective model and will be used as the basis for constructing a reflective journal for the research participants in this study. The Gibbs model tries to get the participant to reflect at all times. By starting off using basic reflective models the students may progress to a deeper reflective process and the more they engage in reflection the deeper their learning experience may become. The reflective journal, initially, will focus on the practical elements of their subject areas but is open for them to make modification to include theoretical aspects as well.

According to Wong et al. (1995) reflective learning and thinking can take place only in an environment that is conducive to thinking and learning. Such an environment can be created by keeping the journals anonymous and confidential; building a relationship of trust before requesting a reflective journal to be written and informing the learners on who is going to read the journal. It

is important that the learners should develop a sense of trust, independence and ownership of their learning.

### **3. Research Design & Approach**

An interpretive methodology was selected for this study as the emphasis was to make sense and meaning from the research investigation. Creswell and Millar (2003) describe the interpretative approach as a method of seeking knowledge that resides “inside” the individual as opposed to “out there” beyond the individual – the voice of the student.

This study was guided by the following research questions:

Q1 *Can the use of a reflective learning journal motivate students to reflect on their learning and perform additional study?*

The research suggests that reflecting on learning encourages additional study for the purpose of deeper understanding.

Q2 *What methods of studying do the students currently adopt and have a preference for?*

These findings will be compared with an (unpublished) reflective learning journal research study the authors conducted in 2015 for the purpose for identifying study method trends.

Data was collected using mixed-methods, which can be summarised as follows:

#### **Questionnaire**

Students were asked to participate in an online questionnaire composed of ten closed questions, to capture their existing study habits, such as how and when they study and which tools they find most useful when studying. The questionnaire results were compared to the results of the study the authors conducted in 2015. These results may influence the faculty in terms of how they currently approach their lectures and choose their support materials, particularly supplementary materials.

#### **Reflective learning journal**

Students were invited to use a reflective learning journal tool shown in Appendix 1. The students were advised to use the journal throughout the semester, with specific focus on their computer programming study. The journals were submitted anonymously and were analysed with a view to identifying themes and other relevant insights.

## **Interviews**

At the end of the semester (May 2016) students were invited to participate in an interview to gather feedback on their use of the reflective learning journal during the semester, or why they chose not to, or why they disengaged in the use of the reflective learning tool. This was to ascertain other thoughts and feelings about the reflective journal that were not captured through the written journal activity. The interviews were semi-structured and were open to those who did, or did not take part, in the reflective learning journal exercise.

## **4. Results**

The results of each of the three data collection methods are summarised in the following subsections.

### **4.1 Analysis of study behaviour questionnaire**

The participants were asked ten questions relating to their existing study habits at the commencement of their semester. These questions were the same ones used in a similar study in 2015 for the sake of comparison. The findings from the questionnaire will now be summarised in terms of their usefulness to the research study. In particular questions with responses that form interesting comparisons to the 2015 study are discussed. It should be noted that the majority of respondents are classified as international students.

Out of a class of 80 regular attendees, 53 completed the questionnaire. In the 2015 study, 110 were considered regular attendees and 30 completed the questionnaire. The participation in the questionnaire was positive, and the results show similar trends to the findings of the 2015 study.

Question 2 asked students to rate their level of motivation to study outside of class time. 23% selected 'Very little motivation', 49% selected 'Sometimes motivated' and 28% selected 'Highly motivated'. The 'very little' and 'sometimes' motivated students represent 72% of the population. This is a high percentage, but interestingly, the 2015 questionnaire revealed that 74% of the population selected the same level of motivation towards study. The results are interpretative as the underlying causes for lack of motivation, and in high levels of motivation, need to be better understood in order to apply an appropriate supportive strategy.

Question 5 asked the students to select their preferred method(s) of studying. 85% selected 'I read the materials provided by the lecturer'. The 2015 study revealed 97% for the same question. This indicates that two years in succession, both groups selected the importance of the materials provided by the lecturer which further highlights the importance of providing high quality materials

and resources for students. Within the same question, 79% selected 'I look at video clips related to the subject area' as their number two method of study. This result correlates with evidence from the interviews, which is discussed later. It is also important to consider that a video clip in a native language is a useful support resource for international students.

Question 6 asked students to select reasons why they may find it difficult to study outside of class time. 47% selected 'I am too busy with my job' as the number one reason, which correlates with the 2015 study where 53% selected this option. Work commitments, particularly for international students, are a heavy burden in terms of their serviceable time. This also needs to be factored in when providing a framework for enhanced engagement.

Question 7 asked students if they thought a new method of self-study would be helpful. 51% selected 'Yes' and 45% selected 'Maybe'. In the 2015 study 30% selected 'Yes' and 57% selected 'Maybe'. Both studies indicate an appetite for exploring new methods of self-study which is encouraging.

Question 8 asked students to select the subject areas they found academically challenging. Unsurprisingly 74% selected computer programming with 53% selecting networking. The 2015 study revealed a similar trend, where 65% selected computer programming and 32% selecting networking. A careful analysis is required to further understand the specifics of their difficulties in order to provide the appropriate supports within these identified subject areas.

#### **4.2 Analysis of reflective journal submissions**

The analysis of the reflective journal exercise will now be summarised and discussed. The journals were categorised in terms of whether the journal was complete or incomplete. The analyses of individual journal submissions is not a focus of this research paper, however, the results indicate a low number of participants who completed the reflective journal which raises concerns on the viability of the journal as a learning tool. This can be associated with programme assignment time pressures and also the structure of the journal itself. The time required to complete the journal, on a weekly basis, was listed as an issue within some of the journal entries. Out of the 18 journals submitted, 10 expressed an interest in continuing with a reflective learning journal. Five participants indicated a 'Maybe' response while 3 indicated either 'No' or did not complete this section. The interview analysis revealed relevant feedback on the use of the journal itself, indicating that in its current form it is not a viable method for majority participation. This feedback warrants careful consideration on its future use.

### 4.3 Interview analysis

A thematic analysis coding methodology was applied to the interview transcripts for the purpose of identifying trends and for cross-analysis purposes. The list of codes which emerged through the thematic analysis can be viewed in Appendix 2. The complete coding and comments for each interview transcript can be viewed in Appendix 3. Presented below are responses which represent two specific aspects of the research relating to positive and negative comments raised by the participants with regard to the reflective learning journal activity.

#### Summary of positive comments raised by the interviewees:

- Interviewee 1  
*'helped me like, okay, what did I learn really today? So I just focusing on web design....it was easy, it's just questions and you don't have to go like deep.....actually it's like a sort of blog about my things'*  
*'It helped me with my English, helped me organise things, it's definitely a tool for me, it's a tool for me I can use for improving my life a little bit'*  
**Analysis:** This student referred to the reflective learning journal as a 'blog' which perhaps helped in how they understood it and used it. They also mentioned how it helped with their English which is interesting as this was not specifically considered before.
- Interviewee 2  
*'Definitely very simple, and for me will be something more like a personal journal that I will have, and I will try to find like a – I don't really need to write down what happened. I just need to write down what I learned'*  
**Analysis:** This student indicated a positive experience, they suggested it was simple for them to use and it was of some use in the learning process.
- Interviewee 4  
*'I used just once. I mean, I found it really nice because help me to understand some kind of subjects in another perspective, like. For example, I remember the one that I filled was about the test in programming, like the quiz that we make'*  
**Analysis:** This student only used the journal once, with one positive experience in helping them remember content for a programming quiz. The reasons for discontinued use will be addressed in the next section.

## Summary of negative comments raised by the interviewees:

Interviewee 1

*'I didn't use it during the day, sometimes I hadn't the time to sit down and think what I'm doing.....so there's nothing, there's no reward' for using the journal.....it's like students are rabbits in a lab, like you have to give something'*

**Analysis:** The student relates to the journal as a form of assessment which has no reward. The student expects some type of reward for the reflection they are undertaking. This is perhaps associated with all other activities that the lecturers provide which do carry marks which accrue to their continuous assessment mark. This is an exercise which they cannot see any perceived value.

*'When I was doing that, it was um, like extra assignment. I saw it like that because I had to put it like that, it means – it was not habit for me.....I had to come back to the sample to see, what is he – what does he really want like right here?'*

*'But I was very concerned like no I need to fill in every section but for me they were maybe one or two less would be better'*

Interviewee 2

*'the journal as a homework sort of thing, but it doesn't mean that it cannot work'*

*'In my opinion, that's why I feel that it was not really beneficial for me because when I was doing this it's like, "I know, I know, I know what I have to do – but I now I need to explain it – frustrating.'*

**Analysis:** The student makes the same point raised by the previous interviewee; not having a particular reward for completing the journal makes it a painful task for some. This student struggles to see the point of the exercise and interestingly suggests that it has to be completed in a certain way for the 'assessor' to understand. The student also suggests it is frustrating to fill in something that they already know, indicating it is a duplicated, and time consuming task.

*'Me and my friend said lets' do it, let's try it, but it was too much information, we're studying hard and have to do assignments – there's always something, so I couldn't put much effort in'*

Interviewee 3

**Analysis:** This student expressed some interest in using the journal initially but the focus clearly shifted to the assessed work, which carried marks. Students do have to undertake a large number of continuous assessments during their semester, so it is understandable that some students would not take on a reflective journal purely for this reason alone.

*'For me, it's still not a better way to do, how can I say that, to evaluate a student because you just memorize the thing that should be done and nobody is going to grade you'*

Interviewee 4

**Analysis:** Again, this student did not see any particular value in taking part in the reflective journal exercise, firstly because they believe it is something that they already know, and does not need to be reflected on in this way, and secondly, because no marks are awarded for completion.

## **5. Recommendations**

The recommendations are drawn from the three principle data collection methods and subsequent analysis - namely, the questionnaire, the interviews and the reflective learning journal.

### **Recommendations from Questionnaire Analysis**

1. The results serve as a reminder of the importance of the quality of the learning materials, generated and supplied by the lecturers, as students regard these with the highest importance.
2. The respondents expressed an interest in evaluating new methods of self-study and this should be factored into future programme planning.
3. Unsurprisingly the students selected programming and networking as two particularly difficult subject areas, correlating with the 2015 questionnaire results. It serves as a reminder to the faculty to be mindful in the selection of tools and pedagogical approaches for these subject areas.
4. A large percentage of students indicated a lack of motivation to study. Some of these reasons were identified while some remain unidentified. This indicates that study skills and methods need to be part of orientation, and continued with workshops to support the students throughout their programme.
5. The students indicated how their employment impinges on their ability to study, which is connected to the above recommendations on study skills. We should provide guidance on effective methods of studying, not only for those with sufficient time to do so, but also those who have reduced serviceable time.

### **Recommendations from Interview Analysis**

1. The mature interviewees indicated a higher level of understanding concerning their need to study, and approach to use. Their previous studies and life experience most likely play a key role in this. Further investigation into the success of experienced students versus 'new' students in higher education is warranted.
2. The interviewees place high importance on the use of online video sources for their study practices. This is also consistent with the study conducted in 2015. The faculty need to consider how best to introduce video content directly into their lessons, and for including video content in supplementary learning.

3. The interviewees also used video study content created in their native language, thus making it easier for them to digest some of the technical English that is spoken in the majority of their lectures. This places importance on the delivery of key terms and concepts to an international audience, where English is not a native language. Faculty need to consider this in the delivery of their lectures.
4. The participants suggested offering some type of reward for completing the reflective learning journal. The students are generally used to completing continuous marked assessments in their various subject areas. The participants believed this research exercise had no direct benefit to them. This needs to be considered when designing or selecting a research method in the future.
5. Reference was made to the high quantity of continuous assessments throughout the academic semester, suggesting that this is a burden in terms of finding quality time for additional study. This is something the faculty are already aware of, and this evidence feeds in to supporting a review of assessment.
6. The participants discussed the importance of peer communication in supporting their learning and study practices. The college should consider allocating additional resources to support social activities for students to interact and to collaborate.
7. Lecturers should consider using video content in their lectures, given the high weight of importance the students put on video content for study purposes, as this may enhance engagement in subject material.
8. Lecturers may find it beneficial to relate theory to current trends occurring in the IT industry. Students need to reference the subject matter covered to real world contexts to aid in their understanding of its importance and use.
9. The interviewees made reference to their life outside of college and how this affects their ability to academically engage. This affects 1<sup>st</sup> year students particularly, because of their need to familiarise themselves with their peers, the college environment, housing and employment. This should be considered when lecturing students within their first semester.
10. It is important to create a classroom culture where questions are welcomed and encouraged by the lecturer, to stop and pause and ask questions, to speak slowly, and clearly, and to breakdown newly introduced technical concepts and terms with an international audience in mind.
11. Lecturers need to consider the negative perceptions students have when beginning a programme of study in computing. These perceptions should be challenged in a very supportive way, to provide a platform for students to discuss their fears and expectations within their first semester of study.

## **Recommendations from the reflective learning journal analysis**

The reflective journal exercise may be considered for future student groups but this needs to be carefully examined. The findings from the interviews clearly indicate the existing journal format is not effectively used. If a journal is to be considered, a more engaged process is required to ensure both student and facilitator are communicating their experiences during the reflective process. It is not sufficient to provide a reflective journal on its own - there needs to be a follow up discussion session at regular intervals during the process. More engagement is required from the facilitator to encourage reflection and to show benefits from the process.

## **6. Conclusions**

The conclusions presented are interpretative and reflect the qualitative nature of the study. The findings reveal insights into student study preferences, and specifically, reaction to the use of a reflective learning journal in computer science. The questionnaire results reveal what is already known within the field, that computer programming presents a challenging subject area for 1<sup>st</sup> year students. In addition, the high importance students place on materials provided by the lecturer needs to be highlighted. Students also place a significant preference for support videos over other forms of learning resources, and indicate external pressures, such as part-time employment, decrease quality time for studying. Language issues are also a contributing factor.

The interviewees who participated in the reflective learning journal activity had mixed opinions on its use. While some indicated some positive benefits, such as a method of focusing on what was learned during a particular class and the ability to review this at a later date, the majority questioned its usefulness. Students were not convinced of the benefits of using the journal over a long period of time, and found the activity a burden in some cases. Some viewed it as a piece of additional assessment without a grade. While some positive benefits were noticed, the authors would suggest careful consideration if recommending such a tool for a class cohort, as some individuals seem to adapt better to this type of journaling activity than others. The reflective learning journal tool should be viewed as a single tool within a toolbox, in which some will have a preference for, and some will choose a different tool that suits their circumstances.

The prior reflective learning journal study the authors conducted in 2015 revealed some drawbacks to the use of the journal as a learning tool, and this study, particularly through the use of interviews, revealed more compelling evidence to caution general cohort use.

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## Appendix 1: Reflective Learning Journal Screenshot

Reflection on Learning	Date: n/a
<b>Description of Task / Lecture</b> <i>What happened?</i>	The lecturer asked us to perform the same task that he went through during the class - this was to perform a loop in Java which we had to do on our own laptops
<b>Feelings</b> <i>What were you feeling?</i>	At first I didn't think I could do this so I was a little nervous, during the task I wasn't as nervous as I remembered some of the things that I did last semester. I was happy during the task and didn't feel frustrated.
<b>Evaluation</b> <i>What was good/bad?</i>	The end result was good, I'm not 100% sure if I did this correctly though! There is probably a quicker way of doing this but I think the way the lecturer explained it was the easiest, but perhaps the slowest way.
<b>Analysis</b> <i>What sense could you make of the situation?</i>	This task, I think, could be useful in a larger program, I'm not sure though as it wasn't explained by the lecturer. It was just an example that we had to follow.
<b>Conclusion</b> <i>What else could you have done?</i>	
I think I could have done a little research online to make sure I understand the basic concept and perhaps this research would enable me to understand why the loop program would be useful in a larger program. I'm happy enough with how I completed the task.	
<b>Action Plan</b> <i>Are you going to do any further research or practical activity?</i>	
Perform additional research just to gain a bit of confidence in what I am doing. While I can do the task without any major difficulty I don't really understand why or how this would be used in bigger programs.  Also, the next time, as the lecturer is working through the example I might write down some of the steps and I will also ask some questions, if I have the confidence to do so!	

## Appendix 2: Interview codes through thematic analysis

Code	Definition in Context
Motivation-I	Internal motivation to study, to engage, to progress
Motivation-E	External motivation that influences engagement to study, to focus, to progress
Study Habits	The current attitude to, and methods, of studying on the BSc in IT programme
Employment	What affect is work distracting from study, from engaging in the BSc in IT programme
Journal-N	What aspects of the reflective learning journal exercise were negative
Journal-P	What aspects of the reflective learning journal exercise were positive
Peer Influence	Have class peers positively or negatively influenced engagement and study practices
Recommendations	Teaching and learning recommendations from the interviewee perspective
Flag	Unexpected / Insightful comments (in the context of the interview theme)

### Appendix 3: Interview Transcripts with Coding Analysis

#### Internal motivation to study, to engage, to progress (Motivation-I)

Interviewee 1	<p><i>'I'm doing online courses and tutorials.....connection between what is covered in class and what is shown online, I see in class I understand what I see that on the online courses'</i></p> <p><b>Analysis:</b> The student has made reference to conducting additional study online for further subject matter understanding, a clear indication of the internal motivation of this student to understand the topic areas covered in class. It is clear, with previous empirical research, that some students have the drive to conduct this additional research while others would like to, but have various external pressures preventing them from doing it.</p>
Interviewee 2	<p><i>'If I say this to somebody who 18 maybe it's not a good idea but for somebody who is 30, I don't know. I will say them: relax, relax enjoy. You're not 20 years anymore, you are doing this because you – you know why you are doing this, relax, enjoy and learn'</i></p> <p><b>Analysis:</b> A mature perspective on doing a programme of study, in this case this student relates to age as a reason to relax and enjoy the programme, thus reducing the possible stress and anxiety faced by younger students commencing a programme of study for the first time. This previous experience of studying, or life experience, may be an indicator for success for mature students.</p>
Interviewee	<p><i>'I'm 28 and I think it's time to have my degree'..... 'I came from a city of 4000 people, I'm doing everything on my own, so it's going to be really important for me'</i></p> <p><b>Analysis:</b> Again, this is a mature perspective, and the background of the student is used as a driver for success.</p>
Interviewee 4	<p><i>'In parts I feel comfortable because I know more what is my weakness in that subject....I need to have time to keep this and do disciplinary thing to keep things in my like...otherwise I'm going to have a new lecture that I didn't finish that one and the new subject's coming....'</i></p> <p><b>Analysis:</b> This student is drawing on past experience as a mechanism for motivating them. The student makes reference to focusing on subject areas that they feel they are weak at, and recognising the future benefits of this approach in terms of later semesters.</p>

## External motivation that influences engagement to study, to focus, to progress

### (Motivation-E)

Interviewee 1	<p><i>'I think it's the motivation is different to come to class in that way, and that could be one because if you are among people with the same way of thinking at least they are studying the same way'</i></p> <p><i>'I'm influenced by young people doing new things, cool things, apps or companies or whatever'</i></p> <p><b>Analysis:</b> This student makes reference to other peers around them, and how they can positively influence continued engagement. This student also mentioned young people in industry, particularly in the IT field, who are creating software applications that have brought them industry success. This student can relate with these 'young' entrepreneurs in IT and finds it inspiring.</p>
Interviewee 3	<p><i>'In 2017 when my father comes here, everybody will be here and I really want a big celebration'</i></p> <p><i>'One guy for me in my case was the same one that's in the first year, like the labs he finished in five minutes and other stayed there for the whole afternoon and still couldn't finish. So I was thinking, ok, he's very good, I'm not, so I have to – he was actually my motivator I think'</i></p> <p><b>Analysis:</b> This student makes reference to family as an external motivator, and perhaps the positive influence family can have in maintaining engagement. This student also mentions a peer who provided motivation through their commitment to complete the lab work; this had a positive effect on this student which is a key part of social learning through observation of others.</p>

## The current attitude to, and methods, of studying on the BSc in IT programme (Study Habits)

Interviewee 1	<p><i>'I always consulted Google and YouTube for that kind of tutorials anyways'</i></p> <p><b>Analysis:</b> This student indicated their preference of online sources for study, not surprisingly YouTube is mentioned, which is consistent with the questionnaire results and also in the previous study in 2015. Support videos are a very popular source of study amongst our IT students and perhaps this needs to be considered when developing learning materials for our students.</p>
Interviewee 2	<p><i>'I obviously prefer to watch YouTube videos...and sometimes in your own language that helps because sometimes you are like listening but you try to understand the meaning of one word and after it's like, ok, let's try to listen to both languages'</i></p> <p><i>'normally I'm the kind of person who writes down, if I don't write it down it's like, it's gone'</i></p> <p><b>Analysis:</b> Again, this student has indicated the importance of videos for their learning and study practices. And interestingly, they mention the importance of hearing something in their own language – this enables students to ensure they have understood something correctly. Particularly in IT related programmes, there is a vast amount of terminology associated with many subject areas, thus adding additional pressure to their learning.</p>

Interviewee 3	<p><i>'I'm focused on programming, it was the most difficult one'</i></p> <p><i>'for the second semester I didn't want to rely on help from others, so since the first week of the second semester, I was studying, I think I studied six days a week'</i></p> <p><b>Analysis:</b> This student has made the decision to study for the majority of the week to avoid seeking help from others, which they see as a possible weakness. This approach to study is successful according to the student, and one which they will continue with in future semesters. Based on the results of the questionnaires, in 2015 10% of students said they studied for 3 hours or more per week, and in 2016, 25% said they studied 3 hours or more per week, this would indicate that this student is within these high studying groups. Clearly this is not a method of choice by the majority of the students under investigation, for a variety of reasons.</p>
Interviewee 4	<p><i>'I'm more visual person than like read and understand the content, especially because it's not my language'</i></p> <p><i>'But for example, Network for me. Some kind of concepts of course I watch first, uh, I watch in English as well but I watch first in Portuguese to understand how -- how is -- how is talking about, because I don't know'</i></p> <p><b>Analysis:</b> This student makes reference, again, to language difficulties as the basis for their study. Networking, particularly, has vast amounts of new terms and concepts that would not be normally covered or required within the international English language programmes and tests required for higher education. We must be cognisant of this when we deliver our materials, and at the very least, stop and pause to explain key terms and to break them down to ensure an appropriate level of understanding is taking place.</p>

**What affect is work distracting from study, from engaging in the BSc in IT programme (Employment)**

Interviewee 1	<p><i>'work is a big factor in terms of preventing putting a lot of time into studying....but work definitely, at least in my case, is getting in the way'</i></p> <p><b>Analysis:</b> Unsurprisingly work commitments, particularly for international students, has an influence on any potential study time outside of class. In the student questionnaire, 47% in 2015, and 53% in 2016, selected work as the primary reason preventing them from studying. This student is within this category, and this should be considered when considering a framework for enhanced engagement. The other three interview participants did not make any particular reference to work as being the root cause of their lack of study time.</p>
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**What aspect of the reflective learning journal exercise were positive (Journal-P)**

Interviewee 1	<p><i>'helped me like, okay, what did I learn really today? So I just focusing on web design....it was easy, it's just questions and you don't have to go like deep.....actually it's like a sort of blog about my things'</i></p> <p><i>'It helped me with my English, helped me organise things, it's definitely a tool for me, it's a tool for me I can use for improving my life a little bit'</i></p> <p><b>Analysis:</b> This student referred to the reflective learning journal as a 'blog' which perhaps helped in how they understood it and used it. They also mentioned how it helped with their English which is interesting as this was not specifically considered before.</p>
Interviewee 2	<p><i>'Definitely very simple, and for me will be something more like a personal journal that I will have, and I will try to find like a – I don't really need to write down what happened. I just need to write down what I learned'</i></p> <p><b>Analysis:</b> This student indicated a positive experience, they suggested it was simple for them to use and it was of some use in the learning process.</p>
Interviewee 4	<p><i>'I used just once. I mean, I found it really nice because help me to understand some kind of subjects in another perspective, like. For example, I remember the one that I filled was about the test in programming, like the quiz that we make'</i></p> <p><b>Analysis:</b> This student only used the journal once, with one positive experience in helping them remember content for a programming quiz. The reasons for discontinued use will be addressed in the next section.</p>

**What aspects of the reflective learning journal exercise were negative (Journal-N)**

Interviewee 1	<p><i>'I didn't use it during the day, sometimes I hadn't the time to sit down and think what I'm doing....so there's nothing, there's no reward' for using the journal.....it's like students are rabbits in a lab, like you have to give something'</i></p> <p><b>Analysis:</b> The student relates to the journal as a form of assessment which has no reward. The student expects some type of reward for the reflection they are undertaking. This is perhaps associated with all other activities that the lecturers provide which do carry marks which accrue to their continuous assessment mark. This is an exercise which they cannot see any perceived value.</p>
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Interviewee 2	<p><i>‘When I was doing that, it was um, like extra assignment. I saw it like that because I had to put it like that, it means – it was not habit for me....I had to come back to the sample to see, what is he – what does he really want like right here?’</i></p> <p><i>‘But I was very concerned like no I need to fill in every section but for me they were maybe one or two less would be better’</i></p> <p><i>‘the journal as a homework sort of thing, but it doesn’t mean that it cannot work’</i></p> <p><i>‘In my opinion, that’s why I feel that it was not really beneficial for me because when I was doing this it’s like, “I know, I know, I know what I have to do – but I now I need to explain it – frustrating.</i></p> <p><b>Analysis:</b> The student makes the same point raised by the previous interviewee; not having a particular reward for completing the journal makes it a painful task for some. This student struggles to see the point of the exercise and interestingly suggests that it has to be completed in a certain way for the ‘assessor’ to understand. The student also suggests it is frustrating to fill in something that they already know, indicating it is a duplicated, and time consuming task.</p>
Interviewee 3	<p><i>‘Me and my friend said lets’ do it, let’s try it, but it was too much information, we’re studying hard and have to do assignments – there’s always something, so I couldn’t put much effort in’</i></p> <p><b>Analysis:</b> This student expressed some interest in using the journal initially but the focus clearly shifted to the assessed work, which carried marks. Students do have to undertake a large number of continuous assessments during their semester, so it is understandable that some students would not take on a reflective journal purely for this reason alone.</p>
Interviewee 4	<p><i>‘For me, it’s still not a better way to do, how can I say that, to evaluate a student because you just memorize the thing that should be done and nobody is going to grade you’</i></p> <p><b>Analysis:</b> Again, this student did not see any particular value in taking part in the reflective journal exercise, firstly because they believe it is something that they already know, and does not need to be reflected on in this way, and secondly, because no marks are awarded for completion.</p>

**Have class peers positively or negatively influenced engagement and study practices**

**(Peer Influence)**

<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Interviewee 2</p>	<p><i>'yesterday we were studying and I have one of my friends, she's a senior but she's studying this, so she said like 'I can't believe that you do all this note taking' and then she said 'I might do it like this', she came back to me and told me that it worked for her'</i></p> <p><i>'Because most of the times you don't feel motivated for brilliant people, well In my case. I feel motivated for people who are making the effort. That makes me more – feel more motivated'</i></p> <p><i>'So, for me it's try to do an effort like in maybe ask, talk with the people who knows. Like, sit behind him, you – you identify somebody who knows. Sit behind him, do the exercises with him, you will learn because some guys or girls are really nice and they explain, and – or read in – check in the internet, check in YouTube'</i></p> <p><i>'We respond to you, to the teacher, and the teacher respond to us. If I want - and it sounds bad but sometimes I said to my friends like, "you want a good class? Let's make a good class." If we say something the teacher's going to feel his part and he's gonna start to talk different. The other guy says something, the teacher's gonna change, and then the class is going to be okay so it's the both directions'</i></p> <p><b>Analysis:</b> This student has clearly identified specific examples of how peers have influenced, or how he/she, has influenced others in engaging in the programme. Interestingly, this student makes reference to the power the students have within the classroom in influencing the lecturer to engage with their students. This social learning within the classroom is worth further evaluation, and again, reminds us of the importance of communication between teacher and student and how a class can be shaped and structured on this basis.</p>
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Interviewee 3</p>	<p><i>'I was doing the labs, trying to do them, and it was frustrating, my colleague was sitting beside me was doing everything'</i></p> <p><i>'all my friends are saying, 'Ah stop studying, let's go out', but I don't want to, I really want to study and I'm getting good grades'</i></p> <p><i>'One guy for me in my case was the same one that's in the first year, like the labs he finished in five minutes and other stayed there for the whole afternoon and still couldn't finish. So I was thinking, ok, he's very good, I'm not, so I have to – he was actually my motivator I think.....last semester the same guy asked me for some help in file writing, I couldn't believe he was asking me for help, you are the best one, it was weird actually because I don't like much being the power person and I like being anonymous'</i></p> <p><b>Analysis:</b> This student talks about the positive, and negative, influences of their peers. They talk positively about how they view others performing and how that motivates them, and how they can share their learning with others which has its own positive benefits. They also mention the negative influence of others with the reference to others trying to persuade disengagement with study for the purpose of a social activity. Finding the balance between study, work and social activities would seem to be a difficulty for most students, particularly based on the evidence produced from the empirical questionnaires in 2015 and 2016.</p>

Interviewee 4	<p><i>'And I know some guys in the class already have more knowledge, had their own past, so some of those work in Network, some of those are IT programmers, so I found really nice when we say our weakness for the colleges, the course just, "I can help you to understand that." And for me this is really nice like we have a friend who teaches Network in their own way, so I -- that's really nice'</i></p> <p><i>'I think united us more because everybody's in the same boat, everybody wants to learn so we have the same objective. We want to learn and want to be success in that subject, in that knowledge and everything. So I found studying with others really nice'</i></p> <p><i>'Everybody has their own weakness, so try to know your colleagues because they can help you as well, actually. Try to make friends. Make the ambient really nice to go every day because if you don't know everybody it's kind of boring actually'.</i></p> <p><b>Analysis:</b> This student makes reference to positive experiences of sharing knowledge with others, learning from others and the importance of communicating with others to fulfil a social need. This is something that needs to be further considered in my research environment as there is a lack of social activities for the students to participate in.</p>
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### Teaching and learning recommendations from the interviewee perspective

#### (Recommendations)

Interviewee 1	<p><i>'to use more like videos or experience with current facts' (for lecturers). Probably the lecture could say: I found this article this week and that could be interesting for you – something to do with facts / changes that are occurring in industry.... 'lecturer is a little bit more engaged with the current trends'</i></p> <p><i>'use a video to show something, they're going to watch it, they're going to pay more attention to that'</i></p> <p><b>Analysis:</b> This student indicates a desire for lecturers to engage with what is happening in industry contexts, relating classroom content to the real world. This is something that we are mindful of as a faculty, but perhaps it can be delivered in a different, more inclusive way. The student also suggests further use of video content stating students will engage better with video content during class. This should also be considered given the high importance students place on the use of videos for studying outside of class time.</p>
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Interviewee 3	<p><i>‘Networking: ‘and when I try to read his material it’s too much information, and you don’t understand one word or something – nothing makes sense, like cables, distance etc.’</i></p> <p><i>‘The importance of study sometimes isn’t a focus in our education. I think sometimes students when they arrive in its -- they’re overwhelmed with all this stuff, new concepts, all in English of course, not your native language’.</i></p> <p><b>Analysis:</b> This student makes reference to similar themes raised earlier, we need to consider the level of technical language used in class and how this can be better delivered to an audience where English is not a native primary language. The student also reminds us of the importance of orientation for first years, they have lots of things to familiarise themselves with, including new faces within their classroom, the building itself, the staff and faculty, the local environment, housing and employment.</p>
Interviewee 4	<p><i>‘I think it’s easier if you teach what the company needs’</i></p> <p><b>Analysis:</b> Again, this student also makes reference to the importance of relating classroom content to contexts in the real world. We need to be mindful of this, particularly given the technical nature of some of the subject areas, it can be hard to understand its importance until it is related to industry contexts, or physically used or evaluated by the student.</p>

#### Unexpected comments (in the context of the interview theme) (Flag)

Interviewee 1	<p><i>‘With regard to asking questions in class: ‘I know this is stupid but, we’re adults, but if I say something wrong he’s going to laugh and whatever’.</i></p> <p><b>Analysis:</b> Some faculty members would consider a lack of questions coming from students in class as an indication of disengagement with the subject material. While this may be the case, this student points out that students, and perhaps particularly within the first year, are apprehensive of asking questions because of possible negative reactions to what might be seen by others as an irrelevant or simple question.</p>
Interviewee 2	<p><i>‘I know that many teachers say that you have to focus and pay attention but I start to feel stressed if I do that. I do that but I like to write down and mark, highlight what is important for me later’</i></p> <p><i>The lecturer speaks too fast ‘I feel that, ok, I’m the slow one, so in that case you have to use a second resource, because otherwise I will be saying I don’t understand. Other students will be like, come on, move on’</i></p> <p><b>Analysis:</b> This student makes reference to two important classroom points; firstly, some students have a different way of paying attention which may be different from what is expected by the lecturer. In this context, the student prefers to write down and take notes during the class while the lecturer is speaking. Secondly, the student makes reference to the fear of asking questions, particularly because of the potential negative reaction from their peers, as opposed to the lecturer. A supportive environment where questions are encouraged should be developed, and I believe sometimes this practice is forgotten within my research environment.</p>

Interviewee 4	<p><i>'I just scribble down things in class because of the speed of how the lecturer talks'</i></p> <p><i>So, and I always found thought IT was so complicated to understand that and I thought, "Oh this is just for nerds, this not for me, like" do you know? And then when I started the degree was kind of funny because I was really scared at the beginning because everybody said to me, even when I pay the courses, "You're going for IT?" And I, yeah, I'm not going for Business. And say, "Why IT?" And I think it's a big challenge, I think I'm gonna like that. And they said, "No, it's so hard, it's so complicate."</i></p> <p><i>Students have their own stories and they carry on like they come from work, they have all the things, it's not just college you know?....I think that college should be more understanding because we don't have just have the academic life here. We have a life actually, we are humans and we suffer outside, we have outside as well. So everything for -- when I go to the lecture for example of course if I no pay attention it's my own fault, but I think we should have a kind of way that we can talk or, "I'm not pay attention because I have this problem now." There is something that you can do for help me or, you know, that kind of stuff. Maybe if you are distracted it's not just because we want to but it's because something outside'</i></p> <p><b>Analysis:</b> This student made a similar reference to how fast the lecturer speaks during class; this has been raised several times and needs to be addressed by the faculty. The student also mentioned the negative perceptions that some students may have who are new to studying IT. This is not uncommon, particularly when discussing programming and maths with first year students in general, in how they perceived those subjects to be, and what they actually experienced. This is usually a shift from negative to positive. But it does flag the importance of negative perceptions within first year and how this can influence their level of engagement and commitment to studying and learning. We need to provide a positive platform to challenge these negative perceptions which may yield a higher level of engagement for some. The final point is similar to one that was raised previously, in that we need to be mindful of the lives of our students outside of college and how external influences can impact academic engagement.</p>
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