



What are the Barriers to Independent Study and Learning in First Year Undergraduate Engineering Students?

Robert Morris

robert.morris@dit.ie

Dublin Institute of Technology (Ireland)

Abstract

This mixed method case study was carried out in the Dublin Institute of Technology, Ireland and was conducted with the co-operation of four experienced lecturers of engineering and three groups of first year undergraduate engineering students.

The main aim of the research was to identify factors which represent barriers to the independent study and learning of first year engineering students.

Many first year engineering students do not return to college for the second year of their programmes. Many reasons for this are identified in the research, including the failure of students to pass assessments and exams as a result of the lack of independent study and learning. For this research qualitative interviews were carried out with four experienced lecturers to capture their views and experiences of the study and learning habits of first year students. The data gathered during these interviews, in conjunction with my own personal experiences, and knowledge gathered from the research literature on the subject, served to guide and inform the selection of the questions which were used in a student survey.

The Quantitative student survey consisted of two parts, the first included questions relating to the profile and study habits of the students, the second employed a set of questions titled "a brief measure of learner autonomy". This resource provides a numeric value for the student's learner autonomy which provided the mechanism used to explore the relationship between the level of autonomy of some students and their profile and study habits.

The analysis of the data gathered provides a detailed insight into the views of the engineering lecturers and the factors which represent barriers to the first year students study and learning.

Introduction

This paper outlines the findings of the qualitative element of mixed methods case study conducted as part of the research for an M.A. in Higher Education. There is much recognition that students in higher education must gather and develop competent study skills in order to succeed in their studies and later in their working lives. Tinto, (1993); Upcraft et al (1989) [1]. when they first enter higher education is when their need is greatest. Many lecturers teaching in the third level system in Ireland express the view that the methods of assessment adopted in second level Irish education do not contribute to the preparation of the student for the independent student and learning required in third level education. This is reflected in the high number first year students who do not complete and submit the individual assignments.

Experienced lecturers would see this as an early indicator of how familiar the student is to engaging in independent study and learning. To be successful in higher education, students must develop the ability examine their behaviour and become more independent self learners Ritzen, (1996) [2]. A high



percentage of under-prepared first year students is increasingly seen as a retention issue for programmes in engineering.

This study focuses on attempting to establish the factors which constitute barriers to independent study and learning in first year engineering students studying engineering at the Dublin Institute of Technology In Ireland. This study is being presented as part of a work in progress and includes in the analysis of qualitative interviews with four experienced lecturers of engineering.

1. Research Methodology

This research has been carried out from the position of one with a pragmatic world view. Pragmatists focus on the research question and allow it to inform the procedures, methods and techniques of the research that best meet their needs and purposes. Creswell, (2009) [3].

The case study approach was best suited to the mixed method design of the research methodology. For this research the "case" is regarded as being the failure of some students to engage independent study and learning.

Henn et al, (2010) [4]. Suggest that cases are units of investigation..individuals..communities..groups Stake, (1995) [5]. does not see the case study as a method, but suggests that mixed methods inform the case, he offers that, Case is not the method, it is the object of study. Yin, (2009,) [6]. holds the view that, a case study is an empirical study that investigates a contemporary phenomenon in depth and with its real-life context"

A combination of both qualitative and quantitative forms of research is employed in the mixed method research approach. The qualitative and quantitative research data collection can be carried out in sequence or simultaneously Creswell, Plano Clarke, (2007) [7].

A Sequential mixed research method approach was selected for the collection of the research data, beginning with qualitative research element which involved the interviewing of four experienced lecturers of engineering. These interviews were exploratory in nature, the aim being to use the findings to guide and inform my selection of the questions used in a quantitative survey, which would be later completed online by a group of first year under undergraduate engineering students.

As part of this online survey I have opted to utilise a quantitative research tool, which comprises of twelve questions and provides a numeric value of the students learning autonomy. This resource which was developed and published online in May of 2010 is titled, "A brief measure of student autonomy"

Macaskill and Taylor (2010) [8].

This measure was incorporated into the student survey as a mechanism to identify students with varying levels of learner autonomy, which in-turn will allow further exploration into the relationship between the level of autonomy of some students and how they answered the other questions.

The following are the questions which were asked in the qualitative interviews with the four experienced Lecturers of Engineering.

Q. How do students respond to being given individual assignments to complete?

Q. Does the assignment design influence their response? For example if the assessment is summative or formative.

Q. What proportion of students do not meet the deadline for the completion of assignments?

Q. Have students who have not completed assignments provided reasons why, if yes please elaborate?

Q. Do you feel students are familiar with studying independently, are they aware of the need to study outside of class?

Q. Have students approached you seeking help with study skills?

Q. Autonomous learning is described as the learner's ability to acquire knowledge or skills of value by processes that he or she determines. Do you think that there would be merit in the measurement of each student's autonomy at an early stage in the first semester?

Q. Which of the following do you feel present greater barriers to independent study and learning in first year engineering students most?



1. The lack of the students study skills.
2. The students lack of self motivation.
3. The distractions which occur during the onset of adulthood.
4. The student being in paid employment.
5. The student living away from home.
6. If in your opinion you believe there are other factors please elaborate.

Q. Do you have any suggestions for survey questions relating to Barriers to independent study and learning that have we have not covered already in this interview and that would contribute to my research?

The Interviews were carried out over a period of four weeks, and all of those approached to be interviewed agreed without hesitation.

2. Analysis of the Qualitative data

The methodology for the coding the qualitative data into themes which is championed by Taylor and Gibbs (2010) [9]. was selected for the analysis of the qualitative data for this research. The recordings of the four interviews were transcribed and the responses to each individual question were extracted and grouped together in a separate document generated specifically for analysis of the data. This facilitated the analysis of the data. This facilitated the analysis of the data one question at a time. This document was then printed with the line spacing adjusted to double to allow sections of text to be circled and identified with common key words which when grouped became the codes. These codes were subjected to further scrutiny and were assembled under the four main emerging themes. Seidel (1998) [10] describes the basic process of qualitative data analysis as being cyclical in nature and consisting of three parts, noticing, collecting and thinking about interesting things. As the data was read, items were noticed and listed, these lead to further searching of the text for similar or related items and then their collection. The thinking involved in the examination of these resulted in the cycle starting over again.

These themes were,

1. The Students Profile,
Age, nationality, whether they were in paid employment and if so how many hours they worked per week, whether were living away from home while attending college, and their CAO points level.
2. The students level of study skills,
If they studied on their own, when and where and how long they studied, whether they thought they thought they spent enough time studying, whether they had ever been thought any study skills, whether they were aware that a study skills class was available to them
3. The students approach to individual assessments, whether they spread the work over the time available or leave it until near the time the assessments is due.
4. The students level of learner autonomy,

It became clear that the questions in the student survey needed to closely follow these themes.

As was the intention at the outset of this research the emerging data combined with the research question itself guided and informed the selection of the questions which formed the online student survey.

3. The Student Survey.

The following questions were selected for inclusion in the student survey.

1. Are you a first year student on a whole-time undergraduate engineering programme?
2. Are you Irish or from another country?
3. Are you male or female?
4. Are you living away from home while attending college?
5. Are you in paid or unpaid employment?
6. I Yes, how many hours per week 0-10 10-20 more than 20



7. Have you ever been taught any study skills/or attended a study skills class?
8. Are you aware that there is a study skills course available to you?
9. Do you study on your own?

If you answered no to the last question please proceed to question 15.

If you answered yes please continue by answering question 10

10. Where do you study most on your own?
I.e. at home in college etc
11. Which days of the week do you study on your own?
A. On weekdays
B. At weekends
C. Both
12. How much time each week do you spend studying on your own?
A. 0 to 2 hours
B. 2 to 4 hours
C. More than 4 hours
13. Do you think you spend enough time studying on your own?
14. Does the time you spend studying on your own increase the closer it gets to exam time?
15. When given an individual assignment do you,
A. Spread the work for it evenly over the time available?
B. Leave the work until near to the time it is due?
C. Check with your classmates before deciding when you will start it?
16. Which of the following best describes you? Please mark the number with a tick. i.e. (1✓)

1	2	3	4	5
Not at all	quite	neither like	quite	very
like me	unlike me	or unlike me	like me	like me

- | | | | | | | |
|-----|---|---|---|---|---|---|
| 1. | I enjoy finding information about new topics on my own | 1 | 2 | 3 | 4 | 5 |
| 2. | I frequently find excuses for not getting down to work. | 1 | 2 | 3 | 4 | 5 |
| 3. | I am good at meeting deadlines. | 1 | 2 | 3 | 4 | 5 |
| 4. | My time management is good. | 1 | 2 | 3 | 4 | 5 |
| 5. | I am happy working on my own. | 1 | 2 | 3 | 4 | 5 |
| 6. | Even when tasks are difficult I try to stick with them. | 1 | 2 | 3 | 4 | 5 |
| 7. | I am open to new ways of doing familiar things. | 1 | 2 | 3 | 4 | 5 |
| 8. | I enjoy being set a challenge. | 1 | 2 | 3 | 4 | 5 |
| 9. | I plan my time for study effectively. | 1 | 2 | 3 | 4 | 5 |
| 10. | I tend to be motivated to work by assessment deadlines. | 1 | 2 | 3 | 4 | 5 |
| 11. | I take responsibility for my learning experiences. | 1 | 2 | 3 | 4 | 5 |
| 12. | I enjoy new learning experiences. | 1 | 2 | 3 | 4 | 5 |



At the time of print the analysis of the quantitative data has not yet been conducted.

References

- [1] Tinto, V. (1993) Leaving College: Rethinking the Cause and Cures of Student Attrition. Chicago: The University of Chicago Press.
- [2] Upcraft, M.L., and Gardner J.N. (1989) The Freshman Year Experience: Helping Students Survive and Succeed in College. Jossey-Bass Inc., USA.
- [3] Ritzen, M.M.J. (1996) 'Study Skills, Multimedia and Business Economics', IEEE International Conference On Multimedia in Engineering Education, Melbourne, Australia 65-70.
- [4] Henn, M; Foard, N; Weinstein, M (2010) A Critical Introduction to Social Research 2nd Ed SAGE Publications Ltd.
- [5] Stake, R.E. (1995) The art of case study research, Thousand Oaks, Calif.; London: Sage.
- [6] Yin, R.K. (2009) Case study research : design and methods, Thousand Oaks, Calif. Sage Publications.
- [7] Creswell. J. W., & Plano Clark, V. L. (2007) Designing and conducting mixed methods research. Thousand Oaks, CA:Sage.
- [8] Macaskill, Ann and Taylor, Elissa(2010) 'The development of a brief measure of learner autonomy in university students', Studies in Higher Education, 35: 3, 351 — 359
- [9] Taylor, C and Gibbs, G. R. (2010) "What is Qualitative Data Analysis (QDA)?" , Online QDA Web Site, [onlineqda.hud.ac.uk/Intro_QDA/what_is_qda.php] accessed March 15th 2010
- [10] Seidel, J (1998) Qualitative Data Analysis. The Ethnograph v5 Manual, Appendix E.
- [11] Available online at: <http://www.qualisresearch.com/> accessed March 15th 2010.