

Active and collaborative learning items on the Irish Survey of Student
Engagement (ISSE); Interpretations of, and responses to by students and staff of
the Department of Science at LYIT

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Disclaimer 1

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Abstract

This study focusses specifically on questions on collaborative learning within the area of ‘Active learning’ in the Irish Survey of Student Engagement (ISSE) which was piloted in Ireland in 2013 and was rolled out in full across the 3rd level sector in 2014, 2015 and 2016.

Data published by ISSE suggested that the discipline area of science has scored poorly in the Active learning index to date, indicating that science students have reported partaking in active learning with low frequency. The reasons behind this were investigated in the current study by exploring how the ISSE measures active and collaborative learning and exploring student and staff interpretations of these questions. ISSE data was used to ascertain how LYIT compares with other institutions in the area of active learning.

A case study approach was used as the general methodology which allowed links to be made between national and LYIT specific data from the ISSE and responses given by student and staff in focus group sessions. Seven focus groups were conducted involving 33 students and 8 members of staff.

The study revealed that LYIT performs well on the scale of ‘Active learning’ compared with other institutions nationally but that science students within LYIT, and nationally report infrequent incidences of active collaborative learning.

Focus groups revealed that students did not consider laboratory based learning when answering questions on active and collaborative learning on the ISSE due to the emphasis placed on assessment rather than learning in the questions. This has not been investigated until now and represents a significant gap between what is supposedly being measured in the survey and what is *actually* measured.

In addition, the focus groups with students gave insight into how students view laboratory classes and the unique pedagogy of the undergraduate laboratory. Students stated that the practical class is where they do most of their learning and a clear picture of an active learning environment emerged from focus group discussions which has not been reported on previously in the literature and is not being captured by the ISSE.

Focus groups with staff unexpectedly revealed that there is incongruity between staff and students regarding how important team-working and interpersonal skills are in the laboratory. It is clear from this study that greater articulation between educators and students surrounding the skills that are being valued and assessed is required.

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Chapter 1

Introduction and research objectives

The aim of this section of the document is to set out the background to the current study, explain why it is of interest to the author and what this study aimed to investigate. The focus of this study involves the Irish Survey of Student Engagement (ISSE) which is currently being used to measure student engagement in Higher Education (HE) institutions nationwide. Of particular interest are the responses by science students to this survey, with focus paid to student interpretation of particular question.

1.1 Background to the study

The author attended a workshop organised by the team behind the ISSE in April 2016 in which data from the ISSE was disseminated specific to designated disciplines. At the workshop, national data for all disciplines from the fieldwork using the survey from the pilot year 2013 as well as 2014 and 2015 were collated and presented against data specific to the disciplines ‘Science, Mathematics and Computing’ and ‘Engineering, Manufacturing and Construction’ (Appendix A). Data for average responses was presented for each item of the ISSE was given. The data pertaining to science students was of particular interest given the authors role as a lecturer in this area at Letterkenny Institute of Technology.

The data in the ‘Active and Collaborative’ learning index was notable given the responses indicating low frequency of particular activities by students within the ‘Science Mathematics and Computing’ discipline, henceforth referred to as SMC. This data can be viewed in Appendix A. Particularly striking was the fact that almost 50% of both first year and of final year undergraduate students reported that they ‘never’ or ‘sometimes’ work with other students inside class to prepare assignments. Given the frequency with which science student work together in laboratories, this was surprising. However, it is acknowledged that not all science courses are laboratory based although it could be safely assumed that the vast majority at undergraduate level would feature extensive laboratory work. It is also likely the data will be offset by responses from mathematics and computing students, about whose programmes of study little is known, but almost certainly do not feature work in ‘wet labs’.

1.2 Student engagement and the ISSE

Education is the product of interaction between what students ‘do’ and how their experience is enriched by teachers, support staff and the institution (Coates, 2011). The practice whereby students participate in a meaningful way with their studies is termed ‘student engagement’, a

term that most, if not all educators within the Irish 3rd level sector will have heard of even if they are not familiar with all that it entails. It has been argued by many authors, such as Carini, Kuh & Klein, 2007 and Kuh, 2009a that the commitment of students to their studies is the best indicator of student success, and the extent to which 3rd level institutions encourage and support this is the benchmark of a quality institution.

Not only is this important for ensuring successful outcomes for students and for institutional quality assurance, it is also enshrined within the policy levers that steer the future of higher education in Ireland. The ‘National Strategy for Higher Education to 2030’, or ‘Hunt Report’ as its most commonly known, is the strategy document for higher education in Ireland until 2030 and features student engagement within one of its six Higher level System Objectives (HLSO). HLSO 3 of the strategy entitled ‘Excellence in Teaching and Learning to underpin a high quality student experience’.

For this reason it is important to identify institutional policies and practices that motivate students to devote more time and energy to activities tied to learning, because the more effort students devote to these activities, the more they benefit.

One of the means of assessing this is by surveying students about their studies and what their institutions are doing to support their learning and to encourage their engagement. The establishment of a national survey of students is a recommendation of the Hunt Report. While this will doubtless benefit student outcomes, at the heart of this is the governmental need to benchmark and apply a metric to student engagement to inform funding allocation within the HE system.

An understanding of the concept of student engagement, its measurement and the interpretation and action upon this data is of paramount importance within Irish HE. It is in this context that this current study was undertaken.

The key recommendation in Hunt regarding a national student survey has since been implemented with the development of the Irish Survey of Student Engagement (ISSE) which was trialled in 2013 and is now in its 3rd year of full implementation. This survey has been adapted from American and Australasian counterparts, the National Survey of Student Engagement (NSSE) and the Australasian Survey of Student Engagement (AUSSE), respectively.

From an Irish perspective, the use of a pre-existing survey that was developed in the USA means that it works like a 'survey in a box' that has already been validated and has undergone extensive psychometric testing in the US and in Australia. Another key advantage for the Irish education system is that results from the survey can be directly compared to those from international counterparts which permits cross-national benchmarking.

The ISSE was refined from the pilot version such that the 2016 iteration was comprised of 66 questions which allow student engagement to be measured based on 5 outcomes, derived from years of extensive research in the field. These are; Academic Challenge, Active Learning, Student and Staff Interactions, Enriching Educational Experiences and Supportive Learning Environment. The survey is open to all students in their first year or final year or an undergraduate program or those undertaking a taught postgraduate programme. The team behind the ISSE disseminate data nationally following yearly fieldwork and each institution receives data specific to its students which can be sorted according to the stage of study or by discipline. These disciplines are used to delineate programmes of study nationally for data analysis.

Following on from attendance at the ISSE workshop in April 2016, the following research questions arose, which were investigated using the approach outlined in the rest of the document.

Research Objectives;

1. To investigate that extent to which LYIT data for 'Active learning' concurs with the national data and to ascertain what this tells us about active learning at LYIT.
2. To compare science discipline specific student responses to questions on Active and collaborative learning national counterparts.
3. To establish the origins of the 'Active learning' questions in the ISSE pertaining to collaborative learning, with a focus on classroom based learning.
4. To ascertain the interpretations of students of the ISSE questions on active and collaborative learning used in the ISSE.
5. To compare the interpretations of ISSE questions by students to the interpretations of these by staff in the Department of Science at LYIT and to identify any differences between the two groups.

Chapter 2

Literature review

The aim of this chapter is to give context to the study by presenting a detailed overview of the main concepts of importance in the current study. Of particular interest is the concept of student engagement and the various studies that have informed the meaning of the term. The measurement of student engagement by student surveys of engagement is also reviewed with an overview of how this is accomplished in the USA and Australia, two countries with significant experience in this field, prior to giving the background to the ISSE. The validity and usefulness of these surveys is also explored prior to an exploration into the origin of questions on the surveys regarding 'Active learning'.

2.1 Student Engagement

The concept of 'student engagement' which is omnipresent within the higher education sector globally, has evolved over time, possibly from literature that dates back over seventy years, although some authors argue that it is possible that even earlier discussions of student motivation might be the earliest predecessor of the concept (Huntley-Moore *et al.*, 2013) The more recent precursor is that of work conducted on the concept of 'student involvement' which was a feature of educational research in the 1980s and 1990s and underpinned by Alexander Astin's seminal 'Student Development Theory' (Astin, 1984). In the years since then, many authors (Coates, 2007; Kuh *et al.*, 2007; Kuh, 2009a) have laboured towards a definition of what student engagement is, and how to measure it.

The various definitions has been succinctly summarised by Vicki Trowler in a 2010 publication by UK body The Higher Education Academy which has also been adopted by Irish policy makers (HEA, 2016);

'Student engagement is concerned with the interaction between the time, effort and other relevant resources invested by both students and their institutions intended to optimise the student experience and enhance the learning outcomes and development of students and the performance, and reputation of the institution' (Trowler, 2010 p.3).

Upon review of the literature in this field, it is evident that several authors have emerged as key players in this area of educational research, mainly George Kuh of Indiana University, USA, and Hamish Coates of the University of Melbourne, Australia. The work carried out by these authors over the last few decades underpin the surveys carried out within the 3rd level

sectors within their respective countries and demonstrate the robustness and validity and reliability of these instruments.

Kuh, in 2002 stressed the importance of student engagement in higher education with the assertion that what a student does while at college is more important than who they are or where they actually go to college. In another publication Kuh and colleagues contend that student background characteristics have only minor influences on educational gains (Kuh, Pace and Vesper, 1997).

These statements are supported by thirty years of research that indicates that increased engagement is linked to positive outcomes for students on a variety of measures including increased satisfaction, academic results and positive engagement with society (Astin, 1984; Carini, Kuh & Klein, 2006; Chickering and Gamson, 1987; Pace, 1995; Pascarella & Terenzini, 1991, 2005).

So convincing is the evidence that student engagement is currently viewed as a decisive indicator in student success at 3rd level education, with student engagement measurements in the US having been demonstrated to serve as ‘proxies’ for student growth and learning (Pascarella, Seifer and Blaich, 2010). Other authors state that student engagement is *generally considered* to be among the better predictors of learning and personal development (Carini, Kuh & Klein, 2007) while Kuh (2009a) has argued that engagement has a compensatory effect on performance in students who need a ‘boost’ due to poor academic preparation for college.

In fact the concept has expanded from higher education to primary and secondary level students where it is viewed as the means to addressing problems of ‘low achievement, high levels of student boredom, alienation and high dropout rates (Fredricks, Blumenfeld, & Paris, 2004).

2.2 Characterisation of ‘Student Engagement’

In the face of criticisms levelled at the Higher Education (HE) sector in the USA in the ‘80s that they sector was producing ‘apathetic students, illiterate graduates, incompetent teaching and impersonal campuses’, Chickering and Gamson (1987), laid out a seven point guide to good undergraduate teaching. These essential consisted of aimed at improving student engagement and were;

1. Encourages contact between students and faculty
2. Develops reciprocity and cooperation among students.
3. Encourages active learning.

4. Gives prompt feedback.
5. Emphasizes time on task.
6. Communicates high expectations.
7. Respects diverse talents and ways of learning.

The authors stated that ‘we address the teacher’s *how*, not the subject-matter *what*, of good practice in undergraduate education’. The concept was expanded several years later, by Fredricks, Blumenfeld, & Paris (2004) who introduced an emotional aspect to the concept. They studied engagement at school level and used the framework developed by Bloom in 1956 to identify three emotional aspects to student engagement; behavioural engagement, emotional engagement and cognitive engagement.

Combining both the student activity and feeling focused construct with teacher led actions, Hamish Coates distilled the concept further by incorporating both the action and emotion led constructs in a 2006 publication. He presented 5 facets of engagement comprised of both ‘academic as well as non-academic aspects of the student experience’.

- Active and collaborative learning
- Participation in challenging academic activities
- Formative communication with academic staff
- Involvement in enriching educational experiences
- Feeling legitimised and supported by university learning communities.

Coates went on to further refine this dual aspect characterisation in a 2007 publication. Student responses to the ‘Student Engagement Questionnaire (SEQ) (Coates, 2006) were analysed and their responses plotted along two axes; social and academic. Students therefore fell into 1 of 4 typologies of engagement (Figure 1). These are named; intense, independent, collaborative and passive.

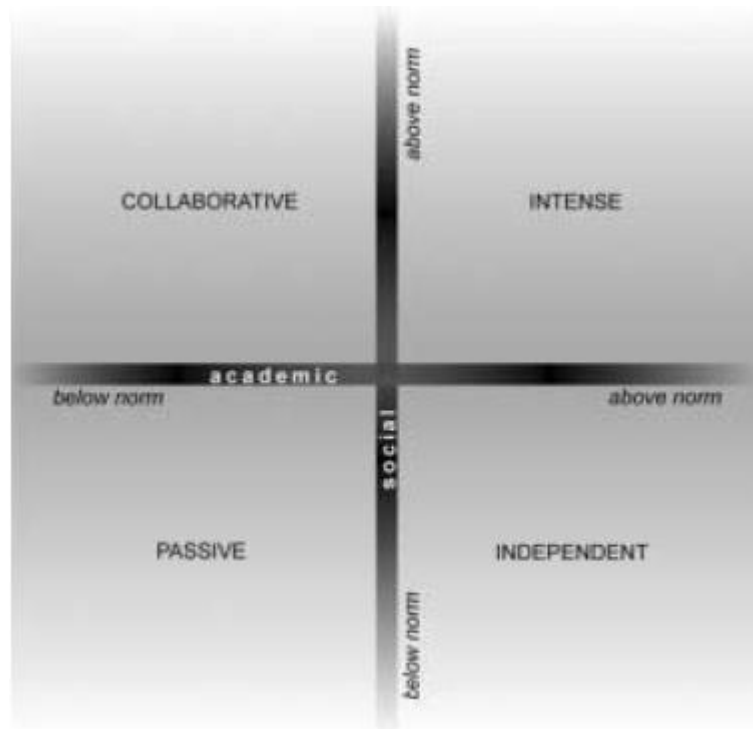


Figure 2.1 Typological model of student engagement styles (Coates, 2007)

Students who fell into the ‘passive’ style were noted to ‘rarely participate in the only or general activities linked to productive learning’, thus inferring that a level of activity is required for engagement. It was noted by the author, however, that ‘these styles of engagement refer to transient states’ rather than fixed student types and that these behaviours and qualities could change depending on the context or time (Coates, 2007).

Other definitions emphasise that engagement involves not only the choices made by students but in the opportunities available through the institution. Indeed, institutions themselves have been studied and categorised into engagement types based on NSSE results (Pike and Kuh, 2005, p. 202). Kuh (2003) provides a definition integrating both student and institutional actions by stating that student engagement is ‘the time and energy students devote to educationally sound activities inside and outside of the classroom, and the policies and practices that institutions use to induce students to take part in these activities (Kuh, 2003, p. 25).

2.3 Measuring student engagement

It is evident from the model presented by Coates (2007) that in order to measure student engagement, the results of student examinations or learning outcomes will not capture the extent to which students are engaged with learning. It is now generally acknowledged that student engagement converges to emphasize three interrelated aspects of student engagement: cognitive, behavioural, and affective. The dynamic and varied nature of engagement thus necessitates a measuring tool that captures the interactive characteristics of the behavioural, affective and cognitive dimensions of student engagement (Mandernach, 2015) and so it is imperative the surveys are used in order to gather information on each of these domains. It is acknowledged within the literature on student surveys of engagement that ‘although they cannot substitute for direct measures of learning, student self-reported outcomes appear to be generally consistent with other evidence, such as results from achievement tests (Kuh, 2009b).

2.3.1 Surveys of Student Engagement in the USA

Since the 1970s, surveys measuring some facets student engagement have been used in the USA. These include the College Student Experience Questionnaire (CSEQ) which ran from 1979 until 2014, used by around 500 colleges and universities to assess the quality of the undergraduate experience (Pace, 1990). The survey contained 191 items questioning students regarding their experience in three areas; what they gained from attending college, the amount of time and energy they devoted to various activities and finally, their perceptions of their institution’s environment. The CSEQ was based on student self-reports which although subjective, is essential in measuring engagement as outcomes related to attitudes, time spent on tasks and collaboration with other students cannot be measured any other way (Kuh, 2001)

The CSEQ was primarily used for research rather than for accountability and improvement and as such were lengthy and had low response rates. In response, the U.S. Department of Education sought to develop a tool to provide institutions with useful information about the student experience and commissioned an evaluation of existing instruments to this end (Kuh, 2009b). The desire was to shift emphasis away from institutional reputation towards authentic, measurable evident of student learning and good educational practice.

2.3.2 The National Survey of Student Engagement (NSSE)

The end product of this scheme was the National Survey of Student Engagement (NSSE) which is now the cornerstone of student engagement measurement in the USA. Following extensive validation, this was launched in 2000 by a team at Indiana University and involved 276 colleges and universities in the USA. Survey design drew largely from the content of the CSEQ, with an estimate of two-thirds of the original NSSE questions coming directly from the CSEQ (Kuh, 2009b).

The survey was significantly updated in 2013 such that the current iteration of the survey consists of 106 questions answered via multiple choice response scales provided, as well as an open ended question allowing students to make general comments on their experience (NSSE, 2016). The survey collects information in 5 categories with the flexibility for consortia of institutions of 6 or more to add up to twenty additional questions in order to obtain information specific to the interests of the group. The current categories are designated as follows;

- Participation in dozens of educationally purposeful activities
- Institutional requirements and the challenging nature of coursework
- Perceptions of the college environment
- Estimates of educational and personal growth since starting college
- Background and demographic information

The survey also includes benchmark questions that are integral to the survey and capture the most important aspects of the student experience. These permit inter-institutional benchmarking and comparisons. These questions fall into the following categories;

- Level of Academic Challenge
- Active and Collaborative Learning
- Student-Faculty Interaction
- Enriching Educational Experiences
- Supportive Campus Environment

The NSSE has, to date, been used in 1,500 higher education institutions. It has been adopted and adapted for use internationally by the higher education sectors of; Canada, Australia, New Zealand and South Africa with a pilot study currently underway in China (ACER, 2012; Hennock, 2010; Strydom and Metz, 2012).

An overview of the data captured annually by the survey is disseminated for the public within the 'NSSE Annual Results' and the operators of the survey choose a finding from that years data to headline the publication and the press surrounding it. In 2015 this was the statement was 'Many students are not sufficiently challenged to do their best work, and course challenge bears little relation to admission selectivity, survey finds' (NSSE, 2015). National data and information pertaining to each participating institution is delivered via an 'Institutional report' In addition, the NSSE team disseminate work that has been carried out in institutions nationally in response to survey data as 'Lessons from the Field'. This publication is characterised as 'a repository of practical ideas for NSSE institutions to improve evidence-based assessment and improvement initiatives (NSSE, 2015).

2.3.3 Surveys of Student Engagement in Australia

Along with the work from USA, researchers in Australia, most notably Hamish Coates, have also been prolific contributors to the literature in the area of student engagement. It is therefore unsurprising that the next national student survey of engagement launch was that of the Australasian Survey of Student Engagement (AUSSE) in 2007 (Coates, 2010). This was concurrent with a national review of higher education in Australia in 2008 and resultant policy reforms which highlighted the importance of measuring student engagement (Coates, 2010).

2.3.4 The Australasian Survey of Engagement (AUSSE)

Initially the AUSSE involved 20 Australian and 5 New Zealand institutions and increased in scale to encompass 35 institutions by 2009 (Coates, 2010). The instrument of the survey used to survey first and final year undergraduate students is the Student Experience Questionnaire (SEQ) which was provide under licence by NSSE and tested by Australian Centre for Educational Research (ACER) to ensure its validity for surveying Australasian students. The AUSSE also consists of two other instruments; the Postgraduate Student Engagement Questionnaire (PSEQ) which is administered to postgraduate coursework students, and the Staff Student Engagement Questionnaire (SSEQ) which is used to survey academic staff.

The 2011 version of the AUSSE consisted of 131 questions which students answer using the provided response scale, plus 2 open ended questions that allow them to make general comments on their institution (AUSSE, 2011). The questions map onto 6 engagement scales and 7 outcome measures that draw from the various scales. The 6 scales are as follows;

- Academic Challenge
- Active Learning
- Student and Staff Interactions
- Enriching Educational Experiences
- Supportive Learning Environment
- Work Integrated Learning

These categories are comprised of the five scales used in the NSSE as well as a category unique to the AUSSE ‘Work Integrated Learning’. One of the main advantages of using the NSSE based SEQ was the availability of a pre-validated instrument which permitted international comparisons to be made. In turn, this brought some issues in the 3rd level sector to light in Australia, most notably the dissatisfaction experienced by Australasian students in their relationships with teaching staff when compared to American students (Stephenson, 2013).

2.3.5 The University Experience Survey (UES)

This survey has been largely superseded due to the mandatory nature of the ‘University Experience Survey’ (UES) which was launched in 2012 after development by a team headed by Professor Hamish Coates. This was in response to an Australian government initiative ‘Advancing Quality in Higher Education (AQHE) that was established to ‘ensure the quality of teaching and learning in higher education during a period of rapid growth in enrolments following the deregulation of Commonwealth Supported Places in undergraduate education’ (UES, 2012). The UES instrument was developed for the primary purpose of allocating performance-based funds to ‘Table A’ universities. The secondary purposes included use for transparency initiatives and for each institution’s own continuous improvement. However, following development and validation of the survey, policy reforms meant that the Australian Government announced that it would no longer allocate performance funds based on measures of the student experience, including the UES (UES, 2012).

Development involved rigorous testing and validation prior to initial roll out in 2012. This involved circulation of the draft survey to stakeholders within the sector prior to conducting pre-pilot focus groups followed by additional validation following a pilot trial (UES, 2012). The ability to internationally benchmark and compare results from the survey to those from other countries was of importance to the consortium that developed the instrument. For this reason, other national surveys of student engagement; NSSE, the AUSSE as well as UK, OECD

and EU assessments informed the design of the UES (UES, 2012). In 2014, the UES project included a pilot of the UES questionnaire and methodology on students of 15 volunteer non-university higher education institutions under the name Student Experience Survey (SES) (UES, 2015).

The survey itself questions students on five main thematic areas which bear little resemblance to the NSSE and AUSSE question categories;

- Skills Development
- Learner Engagement
- Quality Teaching
- Student Support
- Learning Resources

The most recent iteration of the survey consists of 46 questions falling into one of these five areas, to which students indicate their answer using a response scale. There are also two open ended questions. The structure of the UES is such that it contains core items, denoted ‘common core’ as well as items that are relevant to particular contexts and demographic groups which may be optional (UES, 2015).

2.3.6 Measuring student engagement in Ireland

As with international counterparts the USA and Australia, in Ireland the measurement of student engagement in the 3rd level sector has come to the fore in the wake of higher education reform, policy development and the economics of managing an expanding sector.

The main policy driver is the ‘National Strategy for Higher Education to 2030’ or ‘Hunt Report’ as its most often referred to, which outlines 6 overarching priority areas referred to as ‘Higher Level System Objectives’ (HLSO) for the sector to work towards via the implementation of key recommendations (DES, 2011). Several of these pertain to ‘Teaching and Learning’ including the recommendation that ‘Higher education institutions should put in place systems to capture feedback from students, and use this feedback to inform institutional and programme management, as well as national policy’ and stipulates that to achieve this ‘a national student survey system should be put in place and the results published.’ (DES, 2011). Research findings from the USA indicating that increased student engagement has been shown to increase productivity by increasing student learning without increasing cost (Kuh *et al.*,

1997) suggest that the proposal from Hunt was a very relevant recommendation in a post-2008 Ireland.

The Hunt Report also recommends increased accountability of institutes to government via the establishment of a ‘strategic dialogue’ process with each higher education institution to ensure that ‘institutional strategies will be defined and aligned with national priorities.’ (DES, 2011). The objectives laid out in the Hunt report have trickled through national stakeholders and now find themselves enshrined in the strategic plan of LYIT, where an entire ‘Strategic Domain’ is devoted to the ‘Student Experience.’ (LYIT, 2014)

The HEA has clearly stated its remit in the management of the sector in its 2012 – 2016 strategic plan, in which it outlines its intention to be ‘accountable’ for managing the strategic objectives, activities, timeframes and Key Performance Indicators (KPI) of the higher education sector in Ireland (HEA, 2012). In this document, details are given as to how the ‘strategic dialogue’ process between the HEA and each institution will take place and stipulates that funding of the sector will be based on how well each institution performs against a self-assessment based on KPIs and other national strategy. As part of its proposed work plan in the strategic document, the HEA states its intention ‘develop and implement a new national student survey system to monitor the student experience in higher education (2012).

In 2013, the HEA went on to publish the KPIs against which each institution is to benchmark itself in collaboration with the HEA in ‘Mission based performance compacts.’ Within the compacts there are 7 Key System Objectives composed of between 5 and 7 High Level Indicators (HLIs) each. Key System Objective 3 is ‘To promote excellence in teaching and learning to underpin a high quality student experience’ with HLI 3.2 entitled ‘Student Engagement and satisfaction scores. The document indicates that the source of this information for institutions is the ‘National Student Survey’. To date, one round of self-assessment using ‘Mission based performance compacts’ has already been completed by HE providers in Ireland (HEA, 2014; LYIT and HEA, 2014).

2.3.7 The Irish Survey of Student Engagement (ISSE)

It is in this policy landscape that the Irish Student Survey of Engagement (ISSE) was developed and piloted in 2013. The ISSE project was developed and co-funded by a consortium of the HEA, the Union of Students in Ireland (USI), Institutes of Technology, Ireland (IOTI) and the Irish Universities Association (IUA). The survey instrument is based on the NSSE and AUSSE with student opinions and experience categorised into same 6 engagement scales and featuring

6 of the 7 outcomes measured by the AUSSE (O'Reilly, 2013). The benefit of this is the ease of international benchmarking that it permits and the extensive psychometric testing that these surveys have undergone (O'Reilly, 2013). The reliability and validity of the survey in an Irish context was established by conducting focus groups and interviews prior to rollout followed by post-survey reliability tests. As a result of these tests, amendments were made to some questions to make them more 'culturally appropriate' to the Irish HE system prior to the pilot survey in 2013 (ISSE, 2013).

The first full survey encompassing all HE institutions in Ireland was conducted in 2014 with almost 60,000 students surveyed by the completion of the 2015 fieldwork (O'Reilly & Maguire, 2016). The 2014 survey consisted of 120 questions whereby students answered using a response scale along with two open-ended questions. The content of the survey was refined for the 2016 fieldwork for a number of reasons, primarily due to the length of the survey which had been shown to negatively impact on completion rates (O'Reilly, 2015). It was also acknowledged by the ISSE survey review group that questions were being revised to increase the similarity to the UK Engagement Survey (UKES) offering the possibility of comparing Irish data to that from our closest neighbours who also operate a survey based on the NSSE (O'Reilly, 2015). Feedback was sought from institutes and stakeholders before using the revised question set in fieldwork. The revised survey operated in 2016 consisted of 66 question items, a significant reduction from the previous version of the survey while still allowing comparison with previous data (O'Reilly, 2015).

Following fieldwork, data from the ISSE is 'cleaned' and scored by the various indices measured. National data from the ISSE information is disseminated to each institution, as well as the data generated by the students within that institution, so that comparisons can be drawn. National data is published online, with a focus on a particular area; for 2015 this was 'Active learning and Student-Staff Interactions'. In the manner of the NSSE publication 'Lessons from the field' (NSSE, 2015), in 2015 ISSE published 'Effective feedback and uses of ISSE data: an emerging picture' outlining how individual institutions have used survey data, with a focus on a study carried out at NUI, Maynooth into student and staff opinions on what is meant by 'prompt' in the context of feedback which led to a change in a survey item (ISSE, 2015b).

Of course the original basis of the ISSE was to allow institutional responses to student engagement to be measured for the purposes of funding allocation. To this end, ISSE data has

been used to evidence Key System Objective 3 in the strategic dialogue process between the HEA and institutions, as well as ‘clusters’ of institutions that have emerged in post-Hunt Ireland (HEA, 2014; LYIT and HEA, 2014).

2.3.8 Criticisms of surveys of engagement.

Of course with all self-report surveys, there are issues with validity and bias, and for surveys of student engagement these pertain particularly to those involving the likert scales including central tendency bias (Wolf-Wendel et al., 2009) and bias due to memory recall (OECD, 2013). However, the value of the ISSE is that it is based on the NSSE which has been extensively validated in multiple institutions, psychometrically tested and studied in the USA, and to a lesser extent, in Australasia where it is used as the AUSSE which permits international comparisons to be drawn.

The NSSE itself is not without its critics however, some authors have found no relationship between NSSE scores and academic outcomes (in the form of grade-point averages) or graduation rates, i.e. retention (Jaschik, 2011). They argue that a glowing report from NSSE may actual correspond with negative outcomes for students, with less ‘time on task’ that a student could be devoting to coursework and studying. A study by Brint and colleagues (2008) at the University of California, Riverside showed that students will score differently on the NSSE, depending on their field of study. They examined data from upper-division students in their university and found that two distinct patterns of engagement existed on campus. Their findings indicated that students of the arts, humanities and social sciences focused on interaction and participation – synonymous with active learning indices while science and engineering students focused on quantitative reasons and graduate job market based concerns that were not captured by the NSSE.

Other authors find fault with the design of the NSSE, including fact the NSSE was originally focussed on four year programmes and law students (Jaschik, 2009). Adrianna Kezar, associate professor of higher education at the University of Southern California notes that the NSSE was designed around students who were attending a single college and resident in the area. She argues that many of the questions concern ‘out of college’ experiences only available to someone attending a college on a residential basis and that this is no longer the reality for many students (Jaschik, 2009).

Stephen R. Porter of North Carolina State University has written an extensive critique of the NSSE (Porter, 2011) in which he calls into question the validity of the instrument as well as lack of evidence for the inclusion of certain items and justification as to how they evidence student engagement. He focuses on the question regarding use of email between students and instructors and queries why a high score on this question would indicate engagement. Porter also argues that lack of consideration has been given to students' understanding of survey question and that studies regarding interpretation of questions date from the 70s and 80s (Porter, 2011). He argues that there has been little rigorous research into how students understand the questions asked of them in surveys and that this presents an area 'ripe for analysis'.

In the face of these criticisms, the board of NSSE have countered that the purpose of NSSE was never purely for academic research for to provide tools for higher education practitioners and for discourse in the area of engagement (McClenney and McCormick, 2011). In a submission to the website 'Inside Higher Ed' they argue that there is no absolute standard of validity in educational measurement, and that the essential test for NSSE is 'consequential validity' whereby the results are useful as part of a larger body of evidence in 'informing action'. They note that the NSSE benchmarks which are traditionally used for inter-institutional comparison do not constitute 'scales' in the scientific measurement traditional but rather 'groups of conceptually and empirically related survey items.'

This is all well and good but of concern when a survey initially developed as a 'heuristic' is to be used in an Irish context for funding allocation which one would hope will be done using a 'scientific measurement tradition' rather than a conceptual approach.

2.4 Active Learning

It is challenging to distil a succinct and coherent definition of active learning from the literature such is that variety of activities that the term encompasses. It is most generally defined as 'any instructional method that engages students in the learning process.' (Prince, 2004) It is perhaps most easily understood by comparing it to the traditional lecture where students passively receive information and do not participate in the 'learning' process. Although this could include homework, it is most frequently understood to involve activities in the classroom (Prince, 2004).

In his description of student engagement, Coates (2007) describes it as a ‘broad construct’ of which ‘Active and Collaborative’ learning are one of the core aspects. In his typological model (Figure 1), it was argued that students who are ‘passive’ rarely participate in ‘activities linked to productive learning’, thus inferring that a level of activity is required for learning to take place (Coates, 2007).

In his definition, as is often the case, active learning is grouped with collaborative and cooperative learning where students work with others in the learning process. This grouping has gone on to form the basis of indices of student engagement in the NSSE, AUSSE and the ISSE, (and the UES where it is termed ‘Learner Engagement’) such is its importance.

2.4.1 Measuring Active and Collaborative Learning

The index questions on ‘Active and Collaborative’ learning are therefore key features of all the international surveys currently under review and the focus of this study. Of particular interest are the questions regarding student collaborative learning during designated class time, as the question(s) on this in the ISSE are the focus of the current study. It is therefore of interest to examine these more closely.

i NSSE questions of interest.

In the current suite of NSSE questions which were revised in 2013, the question of interest is worded as follows;

During the current school year, about how often have you done the following;

- ‘Worked with other students on course projects or assignments’

To which students may answer either; Very often, often, sometimes or never. (NSSE, 2016)

ii AUSSE questions of interest.

In the 2011 version of the AUSSE, students are asked in the following way;

‘In your experience at your institution during the current academic year, about how often have you done each of the following;

- ‘Worked with other students on projects during class’
- ‘Worked with other students outside class to prepare assignments’

As with the NSSE, students may answer either; Very often, often, sometimes or never. (AUSSE, 2011)

iii ISSE questions of interest.

In the version of ISSE that was used from the 2013 pilot until 2015, the questions were asked in the following way;

In your experience at your institution during the current academic year, about how often have you done each of the following;

- Worked with other students inside class to prepare assignments
- Worked with other students outside class to prepare assignments (ISSE, 2013)

In the revised ISSE survey, the questions were condensed to form a single question, worded as follows;

In your experience at your institution during the current academic year, about how often have you done each of the following;

- Worked with other students on projects or assignments (ISSE, 2016)

iv CSEQ questions of interest.

All these surveys, the NSSE directly, and the AUSSE and ISSE indirectly, are based on the CSEQ survey that was developed in the USA in the 1970s. In the 4th edition of this survey, the questions on classroom collaborative learning are asked as follows;

In your experience at your institution during the current school year, about how often have you done each of the following;

- Worked on a class assignment, project or presentation with other students (CSEQ, 1998)

v UES questions of interest.

The UES which is currently the survey used in Australia for studying student engagement is much shorter in length than the surveys that have been based on the NSSE (and its predecessor the CSEQ). In the interest of completeness, the questions on ‘Learner engagement’ which equates to ‘Active and Collaborative’ learning in the NSSE, AUSSE and ISSE is as follows;

In 2014, how frequently have you:

- Worked with other students as part of your study?

2.4.2 Language used in Active and Collaborative learning survey questions.

For all questions except the UES item, the questions on collaborative learning include either the word ‘assignment’ or ‘project’. The ISSE questions used from 2013 – 2015 referred to ‘assignments’ but has since been condensed to form a single question pertaining to collaborative learning both inside and outside class and expanded from the use of only the word ‘assignment’ to also include ‘projects’.

In order to fully expand on the meaning of the questions, it is therefore useful to define both of these terms. Upon a survey of the literature, it is difficult to discern the origins of either word in an educational context, so long have they been in use. An online search yields a result from The University of Texas where an ‘assignment’ is defined as a ‘task requiring student engagement and a final tangible product that enables you to assess what your students know and don’t know.’ The same webpage goes on to describe a project as a type of assignment that is ‘an exceptional method to assess student’s creation or innovation abilities. For example, a student has to understand the material, apply their understanding to another context, and construct a project based upon this comprehension’ (The University of Texas at Austin, 2015).

What is clear is that both refer to forms of assessment, with the connotation that both require substantive amounts of work by a student and are therefore forms of summative assessment or ‘high stakes’ assessments (Carnegie Mellon University, 2015). What is also important in these definitions is that the end result of both an ‘assignment’ and ‘project’ is a product. This is in contrast with educational psychology theory in which learning is recognised as a ‘process that results changes in behaviour that result from experience or mechanistically as changes in the organism that result from experience’ rather than a *product* (de Houwer *et al.*, 2013; Lachman, 1997).

The implication of the use of these terms in survey items on ‘Active and Collaborative’ learning (Referred to as ‘Active learning’ in the ISSE) are therefore quite important. Very simply, students are being asked about frequency of collaborative assessment rather than learning. This calls into question the validity of these questions, in so far as what is thought to be measured is different from what is *actually* being measured.

It is therefore a distinct possibility that the ISSE survey over the last number of years has been measuring group *assessment* rather than collaborative *learning*, and the concern of the current study is that this pertains particularly to the science laboratory.

Chapter 3

Methods and Methodology

This chapter pertains to the general methodology used in the study as well as the individual methodological tools which have been selected. Focus is paid to why each particular tool was used in the study. A full explanation of how each method was carried out is given in the context of best practice in the literature pertaining to educational research.

3.1 General methodology

A case study based approach was used in the current study to probe the data presented in Appendix A, which was obtained from the ISSE team in April 2016 (Section 1), and to answer the research questions that arose from this. Case studies have been described elsewhere as allowing the researcher to ‘penetrate situations in ways that are not always susceptible to numerical analysis but allow demonstration of a more general principle (Cohen *et al.*, 2007).

As well as utilising the national ISSE data, institutional data specific to LYIT was obtained. This allowed comparison of LYIT data to national data. Following on from this, focus groups were conducted with staff and students of the Department of Science at LYIT. This approach permitted triangulation of the quantitative data generated from the ISSE nationally, institutionally at LYIT with responses from focus groups. A similar approach has previously been recommended by NSSE to aid in interpretation of NSSE Data, in ‘A guide to contextualising your NSSE Data: Cognitive Interviews and Focus Groups’ (NSSE, 2010).

3.2 ISSE data

The ISSE is based on an instrument that has been extensively prevalidated and tested in the USA, as outlined earlier (Section 2.3.6) and several years of data has been generated in Ireland using the first iteration of the survey, from 2013-2015. A range of ISSE data was used in the study; discipline specific data and national data collated for the years 2013 – 2015 was obtained from the ISSE team directly. The data set used from this set for the current study is presented in Appendix A. Data specific to 2015 only was obtained from the 2015 publication ‘The Irish Survey of Student Engagement (ISSE) Results from 2015’ (ISSE, 2015).

ISSE data generated by students at LYIT in response to particular questions were obtained from Tracey Dobbs, a computer services administrator with responsibility for ISSE data at LYIT who had access to the complete data sets returned to LYIT from ISSE, from the 2013 pilot up to and including 2016 responses which was the first set of responses to the newly designed survey, as outlined earlier (Section 2.3.6).

In handling data generated from ISSE responses, attention was paid to the fact that biases in self-report surveys can be an issue, particularly those involving likert scales including central tendency bias (Wolf-Wendel et al., 2009) and bias due to memory recall (OECD, 2013). In ISSE survey data analysis, responses to questions of ‘often’ or ‘very often’ were therefore grouped in an attempt to circumvent these biases and to aid in comparison to responses of ‘sometimes’ or ‘never’.

3.3 Focus groups

Focus groups were conducted in order to obtain both quantitative and qualitative responses regarding ISSE data from students and staff within the Department of Science at LYIT.

Although commonly associated with market research, focus groups are becoming an established part of the methodological tool kit within the social sciences although not within education as much as other disciplines (Barbour and Kitzinger 1998; Cohen *et al.*, 2007). Williams and Katz argue that focus groups are a useful technique in education when adopted correctly and give guidelines as to how to do so in their 2001 publication ‘The Use of Focus Group Methodology in Education: Some Theoretical and Practical Considerations’ which was used to inform focus group design in the current study.

Cunningham-Burley, Kerr and Purvis (1998) stress the importance of using focus groups to obtain meaningful information rather than ‘tokenism’ and this was considered prior to their utilisation in the study presented. The rationale for their use in this study was to ascertain the responses of students to the questions in the ISSE on Active and Collaborative learning explored in Section 2.4.1. Responses to the questions used from 2013-2015 as well as the revised question used in 2016 were sought. Initially, an online survey was planned for this purpose but the interpretation of the questions by was also sought and these may not have been obtained in an online survey. Depending upon survey format, there is a possibility that while clicking through the survey, if participants felt that they had given an ‘incorrect’ answer to one of the ISSE items following further probing regarding interpretation, there is a danger that they could go ‘back’ and change their initial response. The use of focus groups to ‘help determine whether students are interpreting the items in the intended manner’ has been explicitly recommended by NSSE (NSSE, 2010). Focus group sizes varied between 3 and 8 participants, largely dictated by the availability of students and staff at the time at which the focus groups were conducted. These numbers are in line with recommendations regarding focus group sizes of between 3-5 (NSSE, 2010) and 4-11 people (Morgan, 1988). All student participants were

in their final year of an undergraduate course of study within the Department of Science. Details of each focus group, including coded focus group names to be used henceforth are outlined in Table 1.

Lack of experience of the moderator in conducting focus groups has been recognised as problematic in educational research, to this end, advice was sought from a member of staff experienced in conducting focus groups in market research and by constructing a guide containing salient points as recommended for focus groups on survey data (NSSE, 2010). This ensured that the moderator asked each group the same questions, and kept conversation moving along as recommended in the literature (Cohen et al., 2007; Williams & Katz, 2001). Each focus group lasted between 40 to 55 minutes in length.

Table 3.1 Details of focus groups conducted with final year undergraduate students and staff of the Department of Science for the study.

Focus group code	Date conducted	Programme of study	Number in group	Number of males	Number of females
BS1	6 th May, 2016	BSc Bioscience	8	3	5
BA1	2 nd June, 2016	BSc (Hons) Bioanalytical	6	2	4
BA2	2 nd June, 2016	BSc (Hons) Bioanalytical	6	1	5
BA3	2 nd June, 2016	BSc (Hons) Bioanalytical	3	1	2
FS1	3 rd June, 2016	BSc (Hons) Food Science & Technology	6	1	5
FS2	3 rd June, 2016	BSc (Hons) Food Science & Technology	4	0	4

3.3.1 Ethical aspects

Prior to carrying out any research using focus groups, ethical considerations were fully articulated and approval was sought and granted by the Ethics Committee at LYIT (Appendix B).

Before commencing each focus group, participants were given an information sheet and informed consent form (Appendix C) and it was made clear to them that their participation and the inclusion of their responses in the study were voluntary. They were given the opportunity to ask questions about the study and their permission to record the focus group obtained.

Many of the students involved in focus groups continue to attend LYIT and their comments may end up being disseminated to the staff of the Department of Science and the wider community of the institute. To ensure confidentiality and anonymity, when focus groups are made reference to throughout the text a code is used for each group (Table 3.1) and respondents names have been changed where direct quotations have been used and in the sample transcription in Appendix F.

3.3.2 Focus groups with students

Six focus groups were conducted involving a total of 33 science students at LYIT, 14 males and 19 females. These involved both level 8 offerings in science within the Department of Science at LYIT and 1 of the level 7 offerings. Of the classes involved, 8 of the total of 20 students in the BSc Bioscience students were involved in the focus groups, 15 of 20 students in the BSc Bioanalytical science class, and 18 of the 22 students in the BSc Food Science and Technology class. Data captured can therefore be considered numerically representative of the final year students of science programmes at LYIT.

Focus groups were moderated by the author, who is also involved in teaching these students. This raised an issue of power balance between the subjects and the moderator which is recognised to be an issue in these situations (Atkins & Wallace, 2012). To redress this, focus groups were all conducted within a month, at the end of the semester, when teaching contact with the students had finished, and 5 of the 6 focus groups were undertaken after students had completed their examinations. Steps were taken to put students at ease within the group by arranging seats in a circle including the moderator (Atkins & Wallace, 2012). In addition, the moderator attempted to create an atmosphere of informality, by putting students at ease with a few convivial questions before starting the discussion, and during the discussion attempting to

ensure that participants to felt they had something to say felt that they could do so (Cohen *et al.*, 2007).

Before group discussion, participants were given paper copies of the ISSE questions of interest used between 2013 – 2015 (Appendix D) and then the revised question used in 2016 (Appendix E). They were given as long as required to respond to these. Questions were administered prior to discussion to eliminate ‘groupthink’ or the reinforcement of bias when working with groups (Panyan *et al.*, 1997).

Student responses to the questions formed the basis of initial discussion, as well as allowing quantification of their responses. The first focus group (Table 1; BS 1) involved a comparatively large number of students and it was the author’s first experience of chairing a focus group. After answering the ISSE questions on paper the group as a whole was asked what their response had been and why. Unfortunately, some members of the group then took over the conversation, and although a useful discussion resulted, some students did not speak.

The approach used during subsequent focus groups was refined such that after answering ISSE questions, students were individually asked about their responses and probed as to why they responded in the way they did. Because they had their answers on paper in front of them this encouraged honesty in their responses.

Focus group conversations were then allowed to progress in an open-ended nature only when conversation had halted or veered off topic did the moderator intervene. If students had not already done so, they were then probed regarding their interpretation of the ISSE items, specifically their interpretation of the words ‘assignment’ and ‘project’ and whether or not they had considered laboratory practical sessions when answering the questions. Themes that emerged from the initial focus group were also included in subsequent focus groups discussions, for instance the interpretation of the word ‘class’ in the ISSE questions used from 2013 - 2015 (Appendix D).

3.3.3 Focus group with staff

A single focus group with staff of the Department of Science was conducted on the 15th June, 2016 with 8 staff members, 3 male and 5 female.

The focus group proceeded in the same manner as with student focus groups which had been held previous to this, i.e., informed consent was granted by staff (Appendix C) and the ISSE

items of interest (Appendix D and E) were administered. Staff were also given a copy of the discipline specific data in Appendix A and probed regarding their opinions on this.

3.3.4 Analysis of focus groups

Focus group audio recordings were transcribed by the author in the final week of June 2016 once all focus groups had been conducted to ensure consistency. Guidelines in several publications regarding the transcription processes informed how this was carried out. For instance, the tone of voice, and strength of response were noted, as well as the words actually as suggested by Cohen *et al.* (2007). Pauses in speech, interruptions and instances where several people spoke at once or spoke over one another have also been recorded as faithfully as possible. Names in the transcripts were changed to ensure anonymity. An example of a transcript is given in Appendix F.

It has been suggested elsewhere that the presence of an observer or 2nd moderator to note body language and non-verbal cues and emotions can be of use in focus groups but this was not considered necessary given topic under study (Panyan *et al.*, 1997; Cohen *et al.*, 2007). Although bias due to the position of the moderator could not be completely eliminated, upon review of audio recordings, the impression is that students felt as though they could speak freely.

Focus group transcripts were analysed following the stages suggested by Huberman (1994), i.e. by noting themes and patterns within group discussions. In each focus group, students were asked their interpretation of items in the ISSE. Responses that were similar have been grouped, based on the author's interpretation of meaning from students. Points that students felt strongly have been noted, even if these only occurred once. Where many students agreed on a point, this has also been considered of significance. This approach to analysis follows a positivistic model. Although Cohen and colleagues (2007) warn against losing the 'holism' of the discussion during analysis, in this study a quantitative approach gave robustness to the focus group data that permitted triangulation with the quantitative data from national and LYIT based ISSE responses.

This chapter presents the findings from the analysis of ISSE data generated locally at LYIT interpreted in the context of national ISSE data. Data from the science discipline is contrasted with that from all disciplines and the findings of student and staff focus groups are also presented.

4.1 Active learning: LYIT data in comparison with national data

Data generated by LYIT students from 2013 until 2015 in response to the ISSE items regarding collaborative learning within the ‘Active learning’ index are presented in Table 4.1. Also shown is the ISSE data from 2015 generated using the first version of the survey (ISSE, 2015). Data is also interpreted in the context of composite national ISSE data for all institutions from 2013 – 2015, available as Appendix A. This data was used as a comparator in the discipline specific workshop run by ISSE, attended by the author (Section 1.1) and is used for the same purpose throughout this Chapter. Data corresponding to the revised survey question used in 2016 (Section 2.4.1) is presented in Table 4.2.

Although the responses of science students were of particular interest, it was not possible to isolate the responses of Science students from total LYIT responses. However, the LYIT general data is worthy of interpretation to allow contextualisation of other findings.

4.1.1 Active and collaborative learning in the classroom 2013 – 2015 data

Of note is the increase in reports by first year LYIT students that they are engaging in active learning in class as survey years have progressed; in 2013, 57% reported that they ‘never’ or ‘sometimes’ engaged worked with other students in class to prepare assignments, and this decreased to 54.5% in 2014 and further decreased quite significantly to 38.7% by 2015. The national figure for this in 2015 was 45.0%, and so LYIT compares favourably nationally and indicates that over 60% of LYIT first years report experiencing active, collaborative learning in the classroom in 2015.

This is even more positive when 2015 data for LYIT final year undergraduate students is examined, with 32.0% reporting ‘never’ or ‘sometimes’ for the same question. This equates to 68% of LYIT final year students having reported that they ‘often’ or ‘very often’ engaged in classroom based collaborative learning in 2015 which is very encouraging. This compares favourably with the national data in 2015 where 43.2% final year students reported to ‘never’ or ‘sometimes’ engage in classroom based learning in collaboration with other students.

Little in the way of a trend can be noted from postgraduate data although in the 2015 data 53.9% of postgraduates reported working together ‘often’ or ‘very often’ in the classroom to complete an assignment which is similar to the national figure of 50.1% (ISSE, 2015).

4.1.2 Active and collaborative learning outside of the classroom 2013 – 2015 data

This dataset also shows similar patterns to that seen in the classroom learning based data. The first year data for 2013 indicated that only 26.0% of first years either ‘often’ or ‘very often’ work with each other outside of class to prepare assignments which increased to 36% in 2014 and again to 41.8% in 2015 this is very similar to the comparable figure from ISSE national data of 42.5 in 2005 and composite national data for 2013 – 2015 which was 42.0% (Appendix A). This represents a significant increase from 26.0% to 41.8% in reported collaboration by LYIT first years and it would be interesting to explore the potential causes of the increases, however, this is outside the scope of this study.

In general, final year students at LYIT report a higher level of collaboration with students outside of the classroom than their first year counterparts. At first this may seem unsurprising given that these students will be much more familiar with their classmates than first years, but it is not something that is seen in the national data where first years and final year undergraduates collaborate in this way to a comparable level.

In fact LYIT score highly on this measure with 54.9% of final year students surveyed in 2015 reporting that they ‘often’ or ‘very often’ collaborated with other students on an assignment outside of class. This is particularly striking given the ISSE total of 47.6% who responded similarly to this question in 2015, and the composite figure of 48.2% for national data between 2013 -2015.

In line with their national counterparts, with a figure of 40.9%, postgraduates at LYIT in 2015 reported working together outside of class ‘often’ or ‘very often’ to the tune of 41.2%. This would perhaps suggest more individual work is happening on assignments at a postgraduate level.

Table 4.1 Responses (%) to ‘Action learning’ questions on collaborative learning by LYIT students for years 2013, 2014 and 2015 and total ISSE data for 2015.

LYIT data 2013		Undergraduate Year 1	Undergraduate Final Year	Postgraduate
Worked with other students inside class to prepare assignments (In your experience at your institution during the current academic year, about how often have you done each of the following?)	Never	16.1	3.4	16.7
	Sometimes	40.9	32.5	16.7
	Often	36.6	38.5	41.7
	Very Often	6.5	25.6	25.0
Worked with other students outside class to prepare assignments (In your experience at your institution during the current academic year, about how often have you done each of the following?)	Never	24.0	11.2	41.7
	Sometimes	50.0	37.9	25.0
	Often	20.8	25.9	16.7
	Very Often	5.2	25.0	16.7
LYIT data 2014		Undergraduate Year 1	Undergraduate Final Year	Postgraduate
Worked with other students inside class to prepare assignments (In your experience at your institution during the current academic year, about how often have you done each of the following?)	Never	11.7	6.1	22.0
	Sometimes	42.8	35.0	49.0
	Often	33.4	37.8	14.5
	Very Often	12.1	21.1	14.5
Worked with other students outside class to prepare assignments (In your experience at your institution during the current academic year, about how often have you done each of the following?)	Never	19.8	8.9	16.6
	Sometimes	44.2	34.2	59.7
	Often	24.2	37.8	0.0
	Very Often	11.7	19.0	23.7
LYIT data 2015		Undergraduate Year 1	Undergraduate Final Year	Postgraduate
Worked with other students inside class to prepare assignments (In your experience at your institution during the current academic year, about how often have you done each of the following?)	Never	5.6	3.6	15.4
	Sometimes	33.1	28.4	28.6
	Often	41.9	44.1	42.8
	Very Often	19.3	23.9	13.1
Worked with other students outside class to prepare assignments (In your experience at your institution during the current academic year, about how often have you done each of the following?)	Never	18.2	17.7	24.7
	Sometimes	40.0	27.5	34.1
	Often	29.9	34.0	26.4
	Very Often	11.9	20.9	14.8
ISSE data 2015		Undergraduate Year 1	Undergraduate Final Year	Postgraduate
Worked with other students inside class to prepare assignments (In your experience at your institution during the current academic year, about how often have you done each of the following?)	Never	11.0	11.8	16.8
	Sometimes	34.0	31.4	33.2
	Often	38.2	36.6	31.0
	Very Often	16.9	20.2	19.1
Worked with other students outside class to prepare assignments (In your experience at your institution during the current academic year, about how often have you done each of the following?)	Never	22.2	20.5	27.0
	Sometimes	35.3	32.0	32.1
	Often	29.9	29.5	24.2
	Very Often	12.6	18.1	16.7

4.1.3 Active and collaborative learning LYIT in comparison with national ISSE data, 2016

Data generated by the revised question on collaborative learning used in the ISSE in 2016 is presented in Table 4.2. If examined in the same manner as the 2013 – 2015 data (pooling ‘often’ and ‘very often’), the data suggests that LYIT students’ experiences of collaborative learning in 2016 were similar to those reported nationally (Table 4.3). Within the first year cohort at LYIT, 54.7% reported that they ‘often’ or ‘very often’ engaged in this type of learning, while nationally this is 52.9%. Using the same interpretation for final year undergraduates, LYIT students reported a score 66.0%, corresponding to a national figure of 60.8% while postgraduate students at LYIT generated a 58.1% with national data of 53.0%. This data is summarised in Table 4.3. As was the case for the data for years 2013 – 2015, final year undergraduates reported that they engaged in collaborative learning more frequently than first year students and postgraduates, and although the gap between LYIT and national data has closed slightly for this cohort from the 2015 data, when an overall score for all students is calculated, LYIT still compares favourably nationally (Table 4.3).

Table 4.2 Responses (%) to the ‘Active learning’ question on collaborative learning by LYIT students and national counterparts in 2016

LYIT data 2016		Undergraduate Year 1	Undergraduate Final Year	Postgraduate
Worked with other students on projects or assignments (In your experience at your institution during the current academic year, about how often have you done each of the following?)	Never	7.5	3.6	14.9
	Sometimes	37.8	30.4	27.0
	Often	34.8	40.3	44.1
	Very Often	19.9	25.7	14.0
ISSE national data 2016		Undergraduate Year 1	Undergraduate Final Year	Postgraduate
Worked with other students on projects or assignments (In your experience at your institution during the current academic year, about how often have you done each of the following?)	Never	11.2	9.3	15.3
	Sometimes	35.9	29.9	32.6
	Often	34.0	33.4	28.5
	Very Often	18.9	27.4	23.5

What is most interesting from examination of the 2016 data is that it that although the revised question used in this year is a composite of the two questions on collaborative learning used previously, the figures generated are 2016 is most similar to the scores for the question pertaining to collaborative learning experienced ‘inside’ class in 2015. The data is tabulated in Table 4.3 for ease of comparison.

Table 4.3 Data generated by pooling the % respondents who answered ‘often’ or ‘very often’ to the ‘Active learning’ questions on collaborative learning in the ISSE survey. LYIT and national responses for 2015 and the revised question used in 2016.

LYIT data 2016	All students	Undergraduate Year 1	Undergraduate Final Year	Postgraduate
Worked with other students on projects or assignments (In your experience at your institution during the current academic year, about how often have you done each of the following?)	60.1	54.7	66.0	58.1
ISSE national data 2016	All students	Undergraduate Year 1	Undergraduate Final Year	Postgraduate
Worked with other students on projects or assignments (In your experience at your institution during the current academic year, about how often have you done each of the following?)	55.6	52.9	60.8	53.0

LYIT data 2015	All students	Undergraduate Year 1	Undergraduate Final Year	Postgraduate
Worked with other students inside class to prepare assignments (In your experience at your institution during the current academic year, about how often have you done each of the following?)	64.0	61.2	68.0	56.0
Worked with other students outside class to prepare assignments (In your experience at your institution during the current academic year, about how often have you done each of the following?)	47.7	41.8	54.9	41.3
ISSE data 2015	All students	Undergraduate Year 1	Undergraduate Final Year	Postgraduate
Worked with other students inside class to prepare assignments (In your experience at your institution during the current academic year, about how often have you done each of the following?)	54.9	55.1	56.8	50.0
Worked with other students outside class to prepare assignments (In your experience at your institution during the current academic year, about how often have you done each of the following?)	44.1	42.5	47.5	40.9

For instance, 66.0% final year students at LYIT in 2016 reported working together either ‘often’ or ‘very’ often. Using the same data handling approach, this is more similar to the 2015 figure of 68.0% for LYIT final year students for the ‘inside’ class question, than to the corresponding figure of 54.9% for the ‘outside’ class question.

4.2 Student engagement at Institutes of Technology in comparison with the Universities

ISSE data for 2015 has been disseminated in the publication ‘Results from 2015’ which permits comparison between the IOT sector as a whole and the university sector (Figure 4.1).

The data has been scored by the authors such that comparisons can only be drawn between data in this Figure, as noted in the red circle. Comparisons cannot be drawn between the data in the publication and the data generated in the previous section (Section 4.1; Tables 4.1 – 4.3), nor the ISSE composite data for 2013 – 2015 (Appendix A).

3.3.1 Engagement - Institution Type

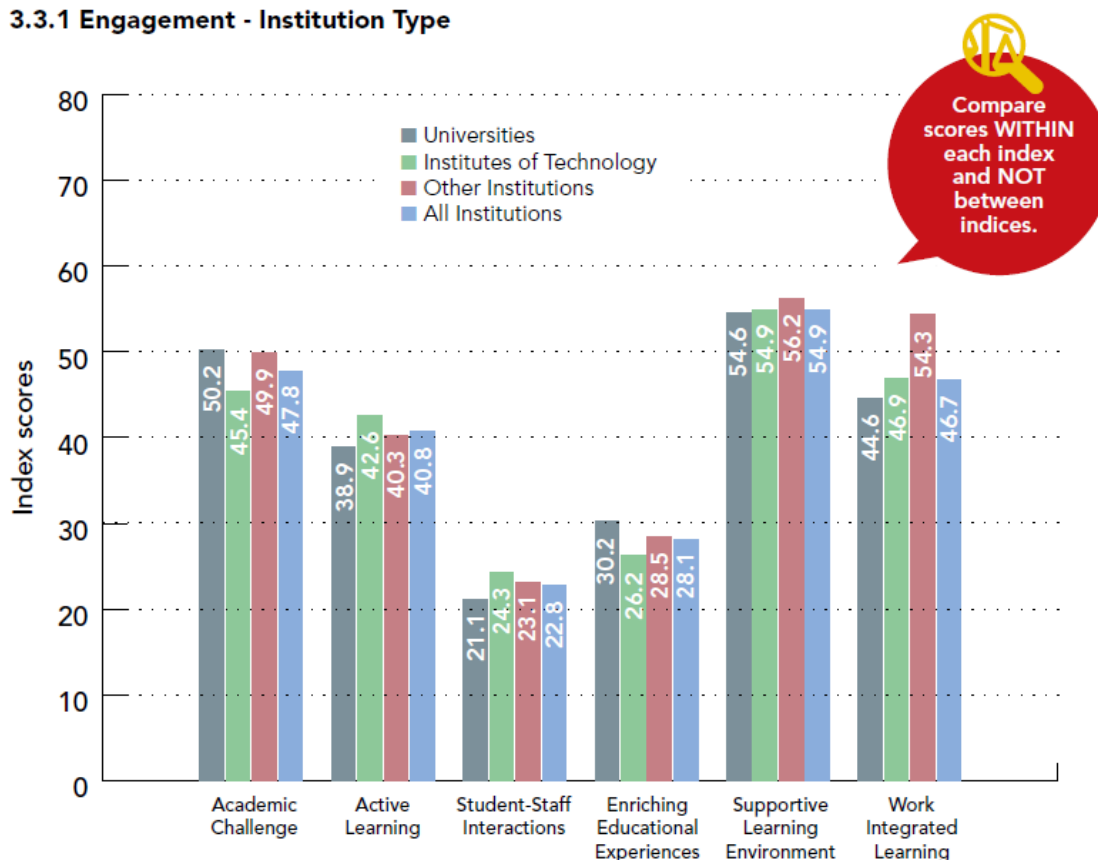


Figure 4.1 Scores for engagement indices for all students in each institution-type (reproduced from ISSE, 2015).

It is evident from Figure 4.1 that index scores are fairly similar for each institution type. In fact, the only indices in which the Institutes of Technology fare better than the Universities or ‘other institutions’ are in ‘Active learning’ and ‘Student-Staff interactions’. This is in concordance with the analysis of LYIT data in the context of ISSE national figures, although it is not possible to know how LYIT compares with other IOTs from the available data.

4.3 Science, Mathematics and Computing scores for active and collaborative learning nationally

The data available regarding responses generated by students studying Science, Mathematics and Computing (SMC) to Active learning questions in the ISSE is available in Appendix A, with the responses to questions on collaborative learning summarised in Table 4.4.

Table 4.4 Composite responses (%) from students studying SMC subjects and national data for years 2013 – 2015.

Science, Mathematics and Computing discipline		Undergraduate Year 1	Undergraduate Final Year	Postgraduate
Worked with other students inside class to prepare assignments (In your experience at your institution during the current academic year, about how often have you done each of the following?)	Never	11.3	13.1	16.2
	Sometimes	34.4	32.3	35.4
	Often	37.7	36.5	32.6
	Very Often	16.6	18.1	15.8
Worked with other students outside class to prepare assignments (In your experience at your institution during the current academic year, about how often have you done each of the following?)	Never	19.7	20.4	26.2
	Sometimes	37.3	32.5	35.0
	Often	30.4	30.9	24.7
	Very Often	12.6	16.2	14.1
ISSE total		Undergraduate Year 1	Undergraduate Final Year	Postgraduate
Worked with other students inside class to prepare assignments (In your experience at your institution during the current academic year, about how often have you done each of the following?)	Never	12.8	13.0	17.8
	Sometimes	35.2	32.8	33.7
	Often	36.5	35.1	30.4
	Very Often	15.4	19.1	18.2
Worked with other students outside class to prepare assignments (In your experience at your institution during the current academic year, about how often have you done each of the following?)	Never	22.3	19.2	25.2
	Sometimes	35.7	32.6	32.4
	Often	29.6	30.0	25.0
	Very Often	12.4	18.2	17.4

In Table 4.5 this data has been analysed such that responses of ‘often and ‘very often’ are pooled which allows comparison with LYIT data for the years 2013 – 2015 (Table 4.3).

Table 4.5 Data generated by pooling the % respondents studying within the discipline ‘Science, Mathematics and Computing’ who answered ‘often’ or ‘very often’ to the ‘Active learning’ questions on collaborative learning used in the ISSE survey from 2013 – 2015. Total ISSE responses also shown.

Science, Mathematics and Computing discipline	Undergraduate Year 1	Undergraduate Final Year	Postgraduate
Worked with other students inside class to prepare assignments (In your experience at your institution during the current academic year, about how often have you done each of the following?)	54.3	54.6	48.4
Worked with other students outside class to prepare assignments (In your experience at your institution during the current academic year, about how often have you done each of the following?)	42.9	47.1	38.8
ISSE total	Undergraduate Year 1	Undergraduate Final Year	Postgraduate
Worked with other students inside class to prepare assignments (In your experience at your institution during the current academic year, about how often have you done each of the following?)	52.0	54.2	48.5
Worked with other students outside class to prepare assignments (In your experience at your institution during the current academic year, about how often have you done each of the following?)	42.0	48.2	42.4

The data in Table 4.5 indicates that responses from students studying SMC subjects nationally are broadly comparable with national data on the survey items regarding collaborative learning within the ‘Active learning’ index. The 2015 data paints a slightly different picture however. Figure 4.2 shows the relative scoring of various engagement indices for different fields of study. It is important to note that these are not percentages and so cannot be compared with the data in Table 4.5. Also, comparison is impeded as the index takes into account all items in the ‘Active learning’ index which consists of a total of 7 questions (whereas data up to this point in this document has focussed on the 2 questions on collaborative learning). In the analysis presented in Figure 4.2, ISSE have separated the responses of Science, Maths and Statistics (SMS) students from those of the IT disciplines (a different analysis from their data presented in Appendix A which also compounds analysis). However, Figure 4.2 clearly shows that the score for Active learning is lowest in the Science Maths and Statistics field.

3.6.1 Engagement - Field of Study

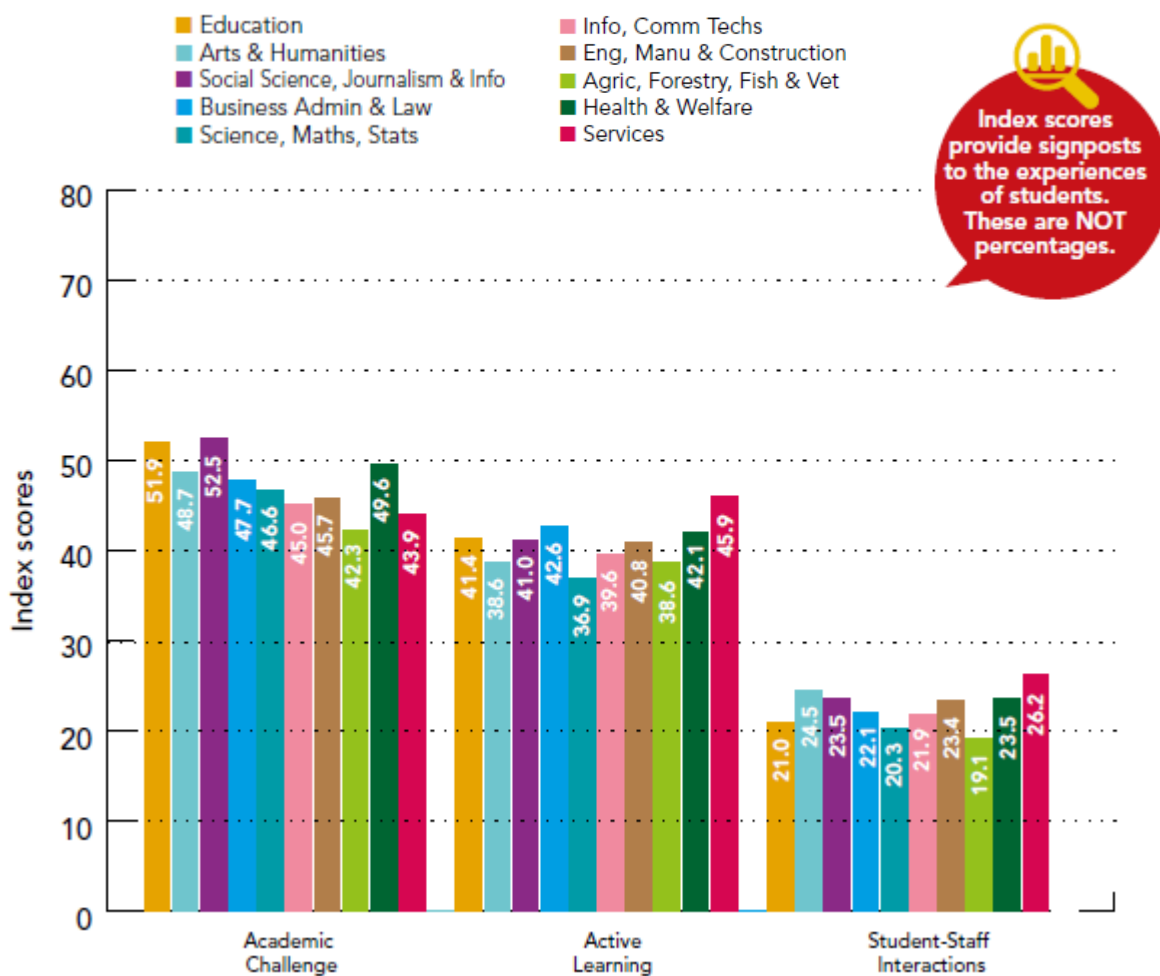


Figure 4.2 Scores for engagement indices for different fields of study (reproduced from ISSE, 2015)

4.4 Active and collaborative learning; responses of science students at LYIT

Data for the responses of science students at LYIT are not available for analysis and so to probe the national trend regarding active learning within the field of science further it was necessary to survey students within focus groups (Section 3.3). The questions on collaborative learning from the ‘Active learning’ index used in the ISSE survey from 2013 – 2015 and in 2016 were given to students and the results quantified and expressed as percentages. The raw data sets are available in Appendix G. The pooled % responses are sorted by class group and presented in Table 4.6.

Table 4.6 Focus group responses (%) to ISSE questions on collaborative learning sorted by class group.

Class group responses to 2013-2015 questions		BSc Bioscience	BSc Bioanalytical	BSc Food Science
Worked with other students inside class to prepare assignments (In your experience at your institution during the current academic year, about how often have you done each of the following?)	Never	0.0	0.0	0.0
	Sometimes	87.5	93.3	70.0
	Often	0.0	6.7	30.0
	Very Often	12.5	0.0	0.0
Worked with other students outside class to prepare assignments (In your experience at your institution during the current academic year, about how often have you done each of the following?)	Never	0.0	0.0	0.0
	Sometimes	75.0	46.7	40.0
	Often	12.5	53.3	40.0
	Very Often	12.5	0.0	20.0
Class group responses to the 2016 question		BSc Bioscience	BSc Bioanalytical	BSc Food Science
Worked with other students on projects or assignments (In your experience at your institution during the current academic year, about how often have you done each of the following?)	Never	0.0	0.0	0.0
	Sometimes	62.5	60.0	20.0
	Often	0.0	26.7	50.0
	Very Often	37.5	13.3	30.0

Given that this is a numerically representative snapshot of the responses of final year undergraduates studying science (Section 3.3.1), the results quite conclusively show that the majority of science students at LYIT reported that they only ‘sometimes’ work with another students in class to prepare assignments. A greater degree of collaboration would appear to occur outside of class for the three class groups surveyed.

From responses to the 2016 question generated in the focus groups, little collaboration was reported by the BSc Bioscience and the BSc Bioanalytical class groups. The change in wording results in a different response from the BSc Food Science cohort, however, with 80.0% reporting that they ‘often’ or ‘very often’ worked with other students. The interpretation of the questions by the students and their focus group responses contextualise this data and is presented later (Section 4.6).

4.4.1 Active and collaborative learning; responses of science students at LYIT in the context of ISSE responses nationally

Since all students surveyed in focus groups were final year of an undergraduate programme, their responses must be interpreted in the context of responses from final year students from other disciplines. To do so, focus group data was pooled, the responses of those who answered ‘often’ or ‘very often’ were pooled, as before and this information is presented in Table 4.7 alongside data from all final year students at LYIT and their national counterparts for the survey years 2015 and 2016.

Table 4.7 Data generated by pooling the % respondents from science student focus groups who answered ‘often’ or ‘very often’ to the ‘Active learning’ questions on collaborative learning in the ISSE survey. Responses for final year students at LYIT and final year students nationally also shown for aid of comparison.

2013-2015 question	Focus group students	Final Year Students LYIT 2015	Final Year Students All ISSE 2015	Final Year Students LYIT 2016	Final Year Students All ISSE 2016
Worked with other students inside class to prepare assignments (In your experience at your institution during the current academic year, about how often have you done each of the following?)	15.2	68.0	56.8	-	-
Worked with other students outside class to prepare assignments (In your experience at your institution during the current academic year, about how often have you done each of the following?)	48.5	54.9	47.5	-	-
2016 question	Focus group students	Final Year Students LYIT 2015	Final Year Students All ISSE 2015	Final Year Students LYIT 2016	Final Year Students All ISSE 2016
Worked with other students on projects or assignments (In your experience at your institution during the current academic year, about how often have you done each of the following?)	51.5	-	-	66.0	60.8

The data within Table 4.7 shows that final year science students at LYIT report much lower incidences of collaborative learning than their peers at LYIT or final year students nationally. Only the measure for collaboration outside of class is similar, but this is negated by the

rewording of the question in 2016. From the data in Table 4.7 it is evident that when examining the responses to the 2016 question, there is a disparity to the tune 10% between LYIT science students and that reported nationally, and almost a difference of 15% between science students and their peers at LYIT. This data mirrors the trend nationally and would go some way to explaining the lower scores for Active Learning nationally in the field of Science, Maths and Statistics in 2015 (Figure 4.2). It can be assumed the same trend will be evident in the 2016 data when it is disseminated nationally.

4.5 Active and collaborative learning; responses of staff within the Department of Science at LYIT

The questions on collaborative learning from the ‘Active learning’ index used in the ISSE survey from 2013 – 2015 and in 2016 were also given to staff members from the Department of Science during focus group and the results quantified and expressed as percentages. (The raw data set is available in Appendix G). Data generated by pooling the % respondents who answered ‘often’ or ‘very often’ is presented in Table 4.8 alongside student responses.

Table 4.8 Data generated by pooling the % respondents from focus groups conducted with final year science students who answered ‘often’ or ‘very often’ to the ‘Active learning’ questions on collaborative learning in the ISSE survey. Responses for staff members from focus groups also shown.

2013-2015 question	Focus group students	Focus group Staff
Worked with other students inside class to prepare assignments (In your experience at your institution during the current academic year, about how often have you done each of the following?)	15.2	50.0
Worked with other students outside class to prepare assignments (In your experience at your institution during the current academic year, about how often have you done each of the following?)	48.5	25.0
2016 question	Focus group students	Focus group Staff
Worked with other students on projects or assignments (In your experience at your institution during the current academic year, about how often have you done each of the following?)	51.5	62.5

It is obvious from Table 4.8 that there is considerable incongruity between how often final year students think they participate in collaborative learning and how often staff think that they do. The older version of the collaboration questions is of value here and illustrates that students think that they carry out most collaboration with other students outside of class time and that they work together in class very little, with only 15.2% reporting that they do this ‘often’ or ‘very often’. The reverse can be seen in the data generated by staff with 50.0% thinking that students work together ‘often’ or ‘very often’ in class and that they work together outside of class to a much lesser extent. As seen in earlier data, the 2016 question has created greater agreement between all parties by combining ‘in class’ and ‘outside class’ (Section 4.1.3). The reasoning behind these responses was explored in focus groups (Section 4.6).

4.6 Focus group analysis; student groups

As stated in Section 3.3.3, the comments made by participants of focus group were themed and grouped to allow interpretation of responses and to highlight any commonality between groups.

4.6.1 Working with other students; examples given

After answering the ISSE questions on active and collaborative learning, the thinking behind the responses was probed. Table 4.9 shows the responses given by participants when questioned regarding the examples they thought of when answering the ISSE questions on active and collaborative learning. Focus groups are separated here so that responses that were common for groups for the same class can be viewed.

Table 4.9 Examples of situation where focus group participants reported having ‘worked with another student to prepare assignments ‘in class’ and ‘outside class’ as per ISSE questions on active collaborative learning used between 2013-2015.

	Working with another student ‘in class’	Working with another student ‘outside class’
BS1	<ul style="list-style-type: none"> No examples given 	<ul style="list-style-type: none"> Preparation of laboratory reports Presentations
BA1	<ul style="list-style-type: none"> No examples given 	<ul style="list-style-type: none"> Preparation of laboratory reports Presentations Group assignments / essay Help with using software
BA2	<ul style="list-style-type: none"> Helping another students in the lab if they don’t understand something 	<ul style="list-style-type: none"> Preparation of laboratory reports Presentations Group assignments / essay Writing exam questions and swapping
BA3	<ul style="list-style-type: none"> No examples given 	<ul style="list-style-type: none"> Lab reports
FS1	<ul style="list-style-type: none"> Time allocated in class by lecturer for work on group assignment 	<ul style="list-style-type: none"> Group assignments / essay (a lot this year)
FS2	<ul style="list-style-type: none"> Time allocated in class by lecturer for work on group assignment 	<ul style="list-style-type: none"> Group assignments / essay (a lot this year)

It is clear from Table 4.9 that generally students could give many more examples of working together outside of class than they could for inside of class. In fact, participants in 3 of the 6 groups could not give any examples of ‘in class’ collaboration when asked.

In focus group BA2, one student stated that she ‘helped other students in the lab when they don’t understand something’ but was corrected by other members of the focus group who told her that doing that ‘*was not an assignment*’. What is very interesting is that 4 of the 6 groups commented that they work together a lot on lab reports outside of class but yet did not think of working together in the lab when they answered the question and did not give it as a suitable example for working together inside class. The focus of the students is very firmly on where the marks are assigned.

Only participants in the Food Science & Technology focus groups could readily give examples of working together during class time, and this was for one particular group assignment that they had in the year previous, although they emphasised that all their other continuous assessment work was done in groups. This explains the data in Table 4.6 regarding responses to the ISSE questions from this class group, 80% of whom reported that they ‘often’ or ‘very often’ worked with other students to prepare assignments or projects.

When asked if the change in questions between 2015 and 2016 change their thinking, a participant in the BA3 group noted that the 2016 question made her think of working with other students via email and facebook groups, which she didn't think of when answering the earlier questions due to the word 'prepare' being used in these.

An insightful comment regarding group work was made by a student in the FS2 group who said that she did not feel that group work being done by their class really was 'group work' with the comment '*I don't know if we're always working together though? Or if we're just put into groups together... everyone just does their own section of the group work*'. This is a common criticism of group work, where students can be said to work 'in a group' but not 'as a group' (Chiriac, 2014).

4.6.2 Student interpretations of 'assignment' and 'class'

Following student examples for working together, students were asked why they had not thought of their laboratory practical classes as an example of working together in class. The participants in both focus groups (FS1 and FS2) from the BSc Food Science & Technology class commented that they had not had a laboratory course in the last year.

Quite a few students in the other focus groups were taken aback by the question, as though they really should have thought of labs and in turn re-read the questions. The respondents from the focus groups involving the BSc Bioscience and BSc Bioanalytical science classes all agreed that the language in the question did not make them think of their laboratory courses with the operative words being; 'assignment', 'project' and 'class'. All four focus groups agreed that it was mainly the word 'assignment' that steered their thinking in a particular direction. The students' interpretation of these words was then probed. The information given is presented in Table 4.10.

Table 4.10 Student interpretations of the words ‘assignment’, ‘project’ and ‘class’ used in the ISSE questions on collaborative learning within the ‘Active learning’ index.

	Assignment	Class
BS1	<ul style="list-style-type: none"> • Worth substantial marks • Handed up and marked • Presentations 	<ul style="list-style-type: none"> • Class means in a classroom
BA1	<ul style="list-style-type: none"> • Essays • Presentations 	<ul style="list-style-type: none"> • Class means a lecture not a practical session
BA2	<ul style="list-style-type: none"> • Essays • Presentations 	<ul style="list-style-type: none"> • Class means a lecture not a practical session
BA3	<ul style="list-style-type: none"> • Essays • Presentations 	<ul style="list-style-type: none"> • Class means in a classroom • Class means a lecture not a practical session
FS1	<ul style="list-style-type: none"> • Not a week to week thing • Group projects 	<ul style="list-style-type: none"> • Class means a lecture not a practical session
FS2	<ul style="list-style-type: none"> • Group projects 	<ul style="list-style-type: none"> • Class means a lecture not a practical session

The consensus across groups was that assignments are thought of as larger and more substantial pieces of work that are worth a lot of marks towards a module’s overall grade. No mention was made of formative assignments or assessment used only for giving feedback. One student remarked that lab reports are no assignments because ‘*you do them every week and, like, they’re not big enough*’. Most students felt that they had to be written documents, although some focus groups agreed that presentations also constituted assignments. All students agreed that the word ‘class’ meant a physical classroom or lecture theatre and not a laboratory space. A very interesting comment came from a student in BS1 who said ‘*When I’m in class, I’m sitting down whereas in a lab that’s separate to that completely, I’m working.*’

4.6.3 Student opinions on laboratory session and laboratory reports

Students were asked to elaborate regarding how these words aligned to laboratory sessions and the resultant written work. Their responses give a great deal of understanding into how the students view laboratory work, what they are doing in the laboratory and how they are marked on this work. The comments do not lend themselves to tabulation and are more incisive when considered individually. However, some common themes did emerge, including the feeling that laboratory reports, which are submitted every week following a practical class are not ‘assignments’ as they are not big enough and that do not constitute enough marks to be viewed as an ‘assignment’.

One student in FS1 stated *'I suppose the lab reports are assignments, but you do them separately so they wouldn't be working with another student'*. When asked about the work that was done in groups in the lab to generate the data for the report, both she and the rest of the focus group they did not view this data generation as part of the 'assignment'.

There was a very interesting sense from the students that they view their laboratory courses as something 'other', i.e. that it is not the same as classes, assignments and they think of it in a very different way and that they recognise their importance and the value of them for their learning.

Several participants emerged in their respective focus groups to be thoughtful commentators on this theme. 'Sabrina' in BS1 made several comments on laboratory work including; *'we all learn a lot of stuff in the lab that we wouldn't understand from lectures'* and *'I do most of the learning in the labs, it's more hands on.'* In another focus group, when discussing why lab reports don't count as assignments, Marion in BA1 says *'I think because we have them every week, you know – it like they're so regularly you just put on a lab coat and you don't even think about it'* and Tony goes on to add *'they're just something that we do'*.

On the same theme in another focus group (Appendix F), Orla says *'I wouldn't have thought of (them) like that but now that you mention it, it is working with somebody in class, I think we've just done them for so long we don't even think about them in that way.'*, while her classmate added *'aye, but we enjoy the lab work, it's our relationship time during the day'* which elicited laughter and agreement from the rest of the group. This clearly illustrates the unique learning environment that is present within the undergraduate laboratory, whereby students are honing their interpersonal skills while consolidating their learning, which students are aware of, if not fully able to articulate.

When asked if they would draw on lab work as an example of 'working in a team' if asked in a job interview, most students acknowledged that they would although those in the BSc Food Science & Technology class who had done a lot of group projects felt these would be more relevant.

4.6.4 Student opinions on changing the ISSE question

It was clear from the focus group discussion that students acknowledge the uniqueness of the laboratory learning environment, including how much collaborative work they do together and were aware that this was not captured by the questions in the ISSE survey. Sabrina, in focus

group BS1 noted *'We essentially have 9 hours a week of timetabled work with other students'*. When asked what change could be made to the 2016 ISSE survey question to capture this working together two suggestions emerged from the focus groups; the first was the inclusion of the word 'practicals' in the question, and the second was to drop the words 'assignment' and 'project' such that the question asks 'Worked with other students on projects or assignments (In your experience at your institution during the current academic year, about how often have you done each of the following?)'

4.6.5 Other comments from students

Interspersed with comments on the issues addressed in Sections 4.6.1 – 4.6.4, several students made interesting comments on the ISSE survey and more general comments that were quite interesting.

In the BS1 focus group, James commented that *'I've done surveys but I find that the answers that you give, you know, 'often, very often' they're so vague. They should be 1-2 hours, 3-4 hours, 5-6 hours'*. This issue has also been raised by authors in the USA such as Porter (2011) and Jaschik (2009) who contend that one student's 'often' is another student's 'sometimes' and that this decreases the validity and value of the NSSE survey.

Some students found the questions on active learning hard to understand with Fiona from BA2 (Appendix F) remarking on the 2016 question 'I think it's really badly worded full stop' and 'yeah, I was sitting there, well, it might be just because - like it might just be me'. Porter (2011) argues that students' interpretations of the questions on the NSSE have not been investigated fully and any work in this area dates from the 1970s and 1980s.

Several students commented that they work together 'outside' of class using the media of 'facebook', email and 'whatsapp' messages for the exchange of work and ideas. A student in the FS2 group articulated the problems she had doing formal group work due to not living locally and having a family to balance along with her studies. This calls to mind criticisms of the surveys of student engagement put forward by Adrianna Kezar (Jaschik, 2009) in that they assume a stable college environment with resident students. In a comparatively rural college like LYIT with a significant population of mature learners, this is worth bearing in mind when interpreting survey findings, and when designing group work for students to engage with outside of scheduled class time. Particularly when engagement has been shown to be so crucial for underrepresented students (Wasley, 2006).

4.7 Focus group analysis; staff group

The focus group with staff also commenced with staff answering the ISSE questions on Active learning pertaining to student collaboration which served the dual purpose of generating data (Table 4.8) as well as allowing them to see the wording of the questions that students answer on the ISSE. Staff were also shown the data (Appendix A) generated nationally from students of SMC programmes as well as ISSE totals for 2013 – 2015 and the opinion of the author regarding the data was set out.

Upon examination of this data set, the consensus was that students were not viewing practicals as being relevant to the question in the ISSE survey, with 4 of the 8 participants immediately commenting that the word assignment would not be synonymous with lab work for a student. Staff member 'Deirdre' commented that *'....or even 'to prepare assignments' you know, doing a practical experiment from an English language point of view is not 'preparing an assignment'.* When asked if she would think of laboratory work as 'preparing an assignment' she said that she would, and commented that *'well yeah, it is, but students view the write up that they do as a result of that work is an assignment but they do that part individually'.* The group were then asked if the work in the lab itself counted as the assignment or if the assignment was the written reported generated at home by the student. Staff all agreed that the work itself was part of the assignment' with 'Theresa' commenting *'in my opinion they are working together to achieve something in a lab, so therefore they are working in groups or preparing work together.'* Many staff all agreed that they awarded marks based on how well students performed together in the lab to avoid one student in a group doing all the work while others did little. There were several staff members who did not mark labs in this way with Charmaine commenting *'it's not like I'm grade them for working in a group.'*

When asked for an alternative wording for the ISSE question that would capture this work, staff presented the same two options as the students had done in focus groups, i.e. either the addition of the word 'practicals' or the reduction of the question to the simple phrase 'worked with other students'. Martin also made the observation that *'we're responsible for putting across our view to the students as well, because, you show them the module descriptors and it says, students will be examined on CA, projects, practicals, so you know, we're splitting them up, so we're biasing them'.*

It's clear from the focus group with staff that there is variation in how staff approach the marking of laboratory exercises, and where marks, and value is being placed on team working

and interpersonal skills these are not being communicated effectively to student groups. However, many of the lecturers in the focus group do not teach final year students (the subjects of the student focus groups) and perhaps were referring to the way that they mark modules that are undertaken by students in the earlier years of a programme. It would be the expectation of the author that final year students can work together in a lab proficiently.

The purpose of this chapter is to interpret the analysis carried out on ISSE data in Chapter 4. Particular focus is paid to the findings from student focus group responses to ISSE questions and the interpretation of ISSE questions by students the limitations in making inferences using some of the data sets is also discussed. Other points of interest that emerged from focus groups are also further explored

5.1 LYIT institutional performance in the Active Learning index

The general trend evident from LYIT data is that reports of collaboration between students have steadily increased for each year of the survey. Using the data handling technique employed throughout this study (i.e. by pooling responses of ‘often’ and ‘very often’), it can be seen that LYIT has scored either comparably to the national data, or more highly for all years of the survey examined (2013 – 2016) (Table 4.3).

The trend is most pronounced in the responses from final year undergraduates and would suggest that as a student progress through a programme at LYIT, they are increasingly exposed to collaborative learning. Certainly it could be argued that smaller class sizes, commonly a feature of the upper years of a programme might lend themselves to more classroom based collaboration and this would explain the trend. On the other hand, it could also be argued that students become more familiar with terminology such as ‘assignment’ and ‘project’ used in the questions in the ISSE as they progress through their programmes and this explains the responses. Certainly, first years are less likely to be exposed to longitudinal ‘projects’ than final year students.

Final year students at LYIT also collaborate outside of class with other students more than their national counterparts (Table 4.3). While scoring highly in this type of scale goes towards a good score overall for the institute in the area of active learning, is it a possibility that this is not a positive outcome for our students? Could it mean that in some cases students are collaborating on work that is supposed to be done individually? Perhaps they are finding their assignments or difficult to understand the lecturer’s brief. Certainly responses final year science students in the focus groups would suggest that they are collaborating on work for which an individual mark is received and it was noted in several focus groups that they helped each other when they could not understand what the lecturer was asking, for instance Patrick in focus group BA3 remarked *‘whenever I realise that I actually didn’t understand what*

somebody said, I didn't realise when I was in the lab, its only maybe when I'm in the library that I realise I didn't pick up on it' (Section 4.6).

The level of collaboration is less evident at postgraduate level at LYIT while still being comparable to national rates. This would suggest more individual work is being completed on assignments, which is commensurate with submission of individual dissertations at this level and the higher order critical skills expected of postgraduates.

Until 2015, it was possible to distinguish between collaboration inside and outside of but the revised questionnaire used in 2016 means that these can no longer be discerned as separate scores, which is unfortunate as it yields less information but is a necessary evil if it leads to better responses rates to the survey.

5.2 Science students nationally on the 'Active learning' index

The data available from ISSE for responses by Science students to items within the 'Active Learning' index make it difficult to interpret the data. The main issue is that the data has been disseminated in different ways that does not lend itself to direct comparison. For instance, the composite 2013-2015 data presented in Appendix A which was obtained at a discipline specific workshop is grouped into 'Science, Mathematics and Computing' (SMC) responses. No overall total measure for the complete Active Learning index for SMC responses or ISSE total responses was supplied with this data. So a comparison between SMC and the ISSE total on the Active learning scale cannot be made. From this data, all that can be concluded is that SMC scores comparably to the national ISSE total on the items regarding collaborative learning for 2013 – 2015 (Table 4.5).

The data disseminated by ISSE for 2015 (Figure 4.2) shows how the Science field fares against other disciplines which was not available for the composite data (Appendix A). The measure used to calculate this score does not permit comparison with any other data set and to compound the issue, ISSE have pulled computing and science apart from each other here and Science subjects are presented as 'Science, Maths and Statistics' (SMS).

However, the 2015 data does clarify thing a little. It was the initial impression of this author when looking at the composite ISSE data for 2013 – 2015 that it was likely the computing disciplines that were 'bringing down' the active learning index within SMC grouping. Visions of the lone computer programmer, head deep in Java came to mind (perhaps unfairly). Indeed, in the focus group conducted with staff, others had the same interpretation of the data. Quite

the opposite, in fact seems to be the case, as it is apparent from Figure 4.2 that when Computing disciplines (Info, Comm Techs in the Figure) are analysed separately, they perform better than Science, Maths and Statistics in the Active Learning Index. It is therefore the case that Active learning is an issue within the field of Science nationally. This is significant given the larger response rate in 2015 (21.6%) in comparison to previous years, and even more so given that the highest response rate was from students within the SMS field, at 26.6% (ISSE, 2015).

It is of course possible that the other questions posed within the Active learning index that do not pertain to collaborative learning are where the SMS field falls down on this measure, but it is not possible to discern this from the data. It is, however, to make some inferences on the basis of the information gathered during focus groups with science students at LYIT.

5.3 Science students at LYIT and active, collaborative learning

The data generated in the focus groups by science students at LYIT sheds some light on the lower score from the 'Active learning' index for the SMS field nationally and would suggest that the collaborative learning questions have contributed significantly to this.

The responses to ISSE questions from science students in the focus group stand out in sharp relief against the responses from the responses that have been gathered from all LYIT students. The levels of collaboration reported by science students is well below that of their final year peers at LYIT and nationally. This was particularly stark in the reported levels of collaboration 'inside' of class (Table 4.7). In contrast to their counterparts at LYIT, when these students answered the revised question in 2016, their responses most closely matched their responses to the question about 'outside' class collaboration used in the previous iteration of the survey. If only the 2016 survey questions were used in the current study, this contrast would not have come to light, so this was a very useful approach. By conducting focus groups it was possible to tease out the reasons for these responses which clearly showed that students did not think of their laboratory courses when they read the ISSE questions.

In terms of their interpretation of the questions, several words in the items direct students away from thinking of their laboratory sessions and the 'write up' or 'report' that they do on the lab work. The words 'assignment', 'project' and 'class' were found to preclude their thinking about practical work. When the definition of each of these words was clarified with, it was evident that from the students point of view the question asked them about working in a classroom or lecture hall environment on a significant piece of assessment which is not done often and which is worth substantial marks – i.e. a *product*. This definition is almost exactly

that given by the University of Texas, discussed earlier in this document (Section 2.4.2). Even though students submit weekly reports for their laboratory course, they did not view these as assignments and saw these as something that they individually complete external to the laboratory session. It is as though students see the laboratory as where learning takes place but the report as where the marks are awarded.

The revision of the wording of the question in 2016 removed one of the words that directed students away from thinking about labs, i.e. 'class' but still did not make students think about their labs as it still contained the word 'assignment' with the addition of the word 'project'.

Students acknowledged that they work together extensively in labs and a very clear feeling of how much they enjoy these sessions was conveyed. Some very strong statements were made by students regarding laboratory sessions (Section 4.6.2). It is well understood by staff within the Department of Science at LYIT that many of our students much prefer lab sessions to lectures, where they get hands on with the subject, they consolidate information that they have received in classes with many of them only really grasp the meaning of the subject by actively discovering it in the laboratory environment. This information emerges during course boards, during informal chats with students and in QA1 forms and was echoed by 'Sabrina' in BS1.

There was also a very clear idea of students not really thinking about the labs as belonging in the same category as classes and assignments and they think of them as 'something else'. Simon Warren of NUI Galway, after observing a laboratory exercise in a pharmacology laboratory remarked that 'the students' knowing and learning was essentially mediated by and entangled with apparatus, technology and chemical compounds' and that he was 'intrigued about how knowledge and learning was embedded in and across the varied practices the students were engaged in' (Warren, 2015). The pedagogy of laboratory classes is difficult to get sense of from the literature, but surely this description can be classed as almost the very definition of active learning given by Prince (2004) as 'any instructional method that engages students in the learning process.'

That this rich learning environment where students regularly work in pairs or small teams to divide the labour of the experimental work, share equipment, ideas and data is not captured in the ISSE as collaborative learning within the 'Active learning' index represents a missed opportunity by ISSE. This underplays the unique pedagogy of laboratory based practical learning on a national stage.

5.4 Department of science staff at LYIT and active, collaborative learning

What is most interesting from the data generated from staff is the incongruity between the staff and student ideas of what a laboratory class is and how it is assessed. Staff felt that students of the Department of Science engage very regularly in active, collaborative learning, though it is clear that when answering the ISSE questions they did not get involved with the semantics of the question and interpreted ‘assignment’ as anything worth marks, including laboratory reports. Staff also acknowledged that the actual generation of data in the lab is part of the actual assignment as it goes to form part of the report. This was not raised during student focus groups. What was also of note is that many staff members marked students on their team working in the lab and so this skill set is marked and graded by the lecturers but this is not apparent to students in the focus groups. However, as stated earlier, it is possible that the lecturers were thinking of modules that students partake in earlier in their degree programmes. A drawback of the staff focus groups is that staff answered generally rather than thinking specifically about modules that final year students specifically study.

The aim of the following section is to summarise the findings from this case study with some conclusions and recommendations for various stakeholders involved in the area of 3rd level education, student engagement and the measurement thereof. For these recommendations to be of value, the limitations of the current study must be recognised and so the approach used in this study is also critiqued.

6.1 Critique of methodology

The case study approach used in this study proved to be very useful for consolidating information acquired from individual methods. By comparing national ISSE data to LYIT specific data, trends in active learning could be identified and following this data over several years substantiated the patterns. To generate further ISSE data in the area of the sciences, responses to ISSE questions by student gave further weight to national patterns that have emerged in Active learning in this discipline field. The quantitative data was substantiated by the response of students in focus groups, which proved to be an extremely valuable approach for triangulation of quantitative data. The use of focus groups to aid in the interpretation of quantitative data has been previously recommended by Krueger (1988) and more specifically for ascertaining students opinions of their courses (Panyan *et al.*, 1997) and for the interpretation of responses from students from the NSSE (NSSE, 2010).

The approach to handling the ISSE data by pooling responses ‘often’ and ‘very often’ proved to be very successful in allowing a generalised ‘yes’ response to be compared to a ‘no we don’t collaborate’ response and interpretation to be made thereof. This approach, to a point, can be regarded as having negated ‘central tendency’ bias that is evident in surveys that use the likert scale. The success of this approach was evident during focus groups in the discordance between the responses to ISSE questions by students and their verbal responses. For instance, when the ISSE responses from the Bioanalytical class group are examined (Table 4.6), it is evident that all of the students in this class answered ‘sometimes’ or ‘often’ to the question on collaboration inside class with other students. No-one in the class group answered ‘never’ to the question, yet when students were verbally asked for examples of collaboration in class, not could give any (Table 4.9). It could therefore be inferred that students who answered ‘sometimes’, and perhaps even some who answered ‘often’ did not answer honestly, or did not fully understand the question.

Although focus groups were initially used to find out students' interpretation of the ISSE questions, they also, unexpectedly, yielded a unique insight into the attitudes of students towards laboratory classes. In particular the idea that this is where they learn for instance the comment '*I do most of the learning in the labs, it's more hands on*' and are most active '*When I'm in class, I'm sitting down whereas in a lab that's separate to that completely, I'm working.*'

6.1.1 Critique of focus group approach

Conducting focus groups was a skill that was improved over the course of this study, and much was learned upon reflection after each session. It was also very useful to speak with a colleague who is experienced with the technique and who gave useful advice and feedback after each experience. Each subsequent session was conducted slightly differently, the technique was refined, with particular attention paid to keeping participants on point, and asking direct questions rather than allowing freeform discussion to take over. Use of a set of guidelines (Section 3.3) improved the reliability of the focus groups as each group was asked the same questions in the same order. In addition, this resulted in easier transcription and analysis of the later focus groups, and it was easier to identify themes from the responses. This does rather contradict the argument put forward for naturalistic interactions and open-ended style discussion that allow for group interactions to be determined (Cohen *et al.*, 1997) but group dynamic was not of concern in the current study. As use of the technique was refined, directly asking questions to each member of the focus group prevented dominance by some members of the group which had been a feature of the first focus group and is a recognised drawback of the technique (Williams and Katz 2001). Thought was given to the suggestions of Arksey and Knight (1999) regarding the behaviour of the interviewer and care was given not to prompt responses or give non-verbal cues.

The power bias between the moderator and the students could not be completely negated, the timing of the focus groups for the end of the semester was extremely important, as well as verbally putting the students at ease and reiterating the confidential nature of the focus group. It also helped to tell students the purpose of the study, about the ISSE, and that the survey is a potential means of feedback from them to the institute. Students were also empathetic to the study being part of a Master's degree dissertation for the moderator. Physical factors such as the set-up of the chairs in a circle with the moderator as part of that were also very important in the success of the focus groups considering the position of the moderator. In spite of this, however, the findings from the focus groups are of significance and value – students were asked

about topics that are regularly and freely discussed between lecturers and themselves and there is a clear impression, especially in the recordings, that students were able to speak their minds in the focus groups.

Although direct, individual responses to certain issues were sought in the focus groups, the group response was important in allowing students to formulate their ideas around what constitutes an 'assignment' and how they think of their laboratory work. The focus group was therefore a good approach for elucidation of the meaning and value that students place on practical work.

In contrast, work with staff could have benefitted from the use of interviews to permit staff to speak in more depth about their thoughts. Although valuable information was obtained from the staff focus groups, perhaps as much, or more could have been achieved via individual interviews. Also, at this point of the year staff were tired and increased participation and more meaningful exchange of ideas might have occurred at another point in the semester. Considering the timing, a focus group allowed the opinions of tired staff members to be captured in a single snapshot.

In hindsight, it would have been valuable to be able to exchange concepts from the staff focus groups with the students, particular staff opinions on the assessment of laboratory practicals as these were in such contrast to those of the students. It would have been really interesting to present to the students the incongruity between how they *are* assessed and how they *think* they are assessed.

6.2 Validity and dependability of the study

There are, of course issues regarding the validity and reliability of this study in the context of each of the techniques used and the value of the study as a whole. The approach to focus groups with students has been discussed at length above.

Focus groups also used to generate quantitative data for comparison to LYIT ISSE data and national ISSE data. A total of 33 students were surveyed in this regard which is numerically representative of the final year cohort at LYIT in 2016 as previously discussed (Section 3.3). In 2015, a total of 105 'science' students at LYIT were surveyed using the ISSE. This constitutes first year undergraduates, final year undergraduates and postgraduate students. The focus group number is therefore also similar to the number of final year science students surveyed in 2015 which increases the validity of the approach used.

Of course with all self-report surveys, there are issues with validity and bias, not limited to the biases in using the likert scale as well as issues with memory recall of the scenarios upon which questions are asked. Specific criticisms of surveys of student engagement, particularly the NSSE have been dealt with earlier (Section 2.3.4). Although an advantages of the ISSE is that it is based on the NSSE which has been extensively validated, psychometrically tested and studied in the USA, and to a lesser extent, in Australasia where it is used as the AUSSE (Section 2.3). The use of the ISSE in Ireland and in this small case study is validated by its extensive use previously.

As well as being representative of LYIT data, the numbers used in the current case study are also comparable with those used in focus groups for the validation and roll out of the University Experience Survey (UES) used in Australia to measure student engagement (Section 2.3.2). This involved 32 students, (of which only 8 were male) and a focus group involving staff in order to test the newly developed survey and to ascertain that the questions were understood and pitched at the right level (UES, 2011). Given that this approach was used prior to the roll out of a national survey that is now in its 2nd year, this would support the validity and reliability of the numbers and approach used in the current study and substantiate the findings from same.

6.3 Summary of findings

To summarise briefly, the research objectives outlined in Section 1.1 have been well achieved by the current study and some unexpected research findings have also been uncovered.

The origin of the questions on collaborative learning in the ‘Active learning’ index of ISSE has been well examined and explored (Section 2.4.1) which poses further questions surrounding interpretation of ISSE questions (Section 6.4). LYIT has been benchmarked nationally in the area of active, collaborative learning and this raises the potential for further study as to how to maintain and improve LYIT’s status as an institution that engages its students in learning of this nature (Section 4.1). Additionally, it has been shown that ‘Active learning’ is the particular forte of the IOT sector (Section 4.2), a characteristic that represents a unique selling point for this sector and one that perhaps is not marketed to the extent to which it could be.

It is clear from the data analysed in Section 4.3 that students within the field of science do not report active learning to the extent that students of other disciplines do, although their higher response rate to the ISSE in 2015 indicates that they are engaged students who wish to have their opinions heard.

The responses, in focus groups, of final year science students at LYIT to ISSE questions indicated that they are in line with the national trend for science students and represent a group of students that the ISSE measures as scoring low on the Active learning index within a Sector (and Institute) that are characterised at engaging students in this type of learning.

However, when student interpretations of the questions on active, collaborative learning were ascertained it was evident that students were being directed by the language in the questions towards answering about pieces of *assessment* rather than where active *learning* takes place for them (Section 4.6). Most surprisingly in this study, very rich information was obtained from students around their attitudes to their laboratory courses with students indicating high levels of enjoyment of this type of learning and the recognition that this is where they learn most. They recognise that the laboratory learning environment is unique and do not associate it with the words ‘class’ or the written work involved with the word ‘assignment’ or ‘project’.

In contrast, from the focus group, academic staff within in the Department of Science recognise that students do not see the labs as forms of assignments, and that the language used by staff to describe assessments may cause students to compartmentalise labs (Section 4.7). What was very significant was that there is incongruity between marking of labs by staff, with some staff members awarding marks for teamwork and others not. Students in the focus groups were not aware of the importance placed on teamwork by staff members however, with students placing emphasis on the completion of laboratory reports as where their efforts lie.

This leads into a broader narrative on graduate attributes and how these are embedded in programmes. Teamwork and interpersonal skills are hugely valued in by employers and it is therefore paramount that graduates are not only imbued with these skills but that they are aware of this and can evidence these skills. This will give them the language and confidence for interviews and entering the workplace and improve the reputation of the institute in producing market-ready graduates.

Both students and staff members agreed that active learning in the laboratory would be better captured by a change to the wording of the ISSE question on collaborative learning in the ‘Active learning’ index either by the addition of the word ‘practicals’ or removal of reference to pieces of assessment.

6.4 Further studies

As with all research, this study poses perhaps more questions than it addresses and so several areas for further study can be identified from the research findings.

It was evident that the ISSE questions investigated in this study did not capture the active learning components of science programmes. There are implications here for other disciplines in which students learn in a practical based environments such as sports science, culinary disciplines etc. It would be worth investigating the interpretation of the active, collaborative learning question by students of these fields or indeed science students at other institutions to form a larger data set. This type of investigations have been advocated by Porter (2011) who argues that the interpretation of questions on surveys of student engagement have been not been fully investigated and that questions may not actually be understood by many students, which is something that was evident from the focus groups in the current study.

The increase in active learning reported by LYIT students since 2013 until 2016 is also a subject worth of further investigation. It would be worthwhile to explore the potential causes of these yearly increases, to ascertain if they are perhaps due to increased student participation in the survey, changes in teaching practice at LYIT, or the effects of responses of students from a particularly programme or department. This also presents the opportunity to examine cause and effect going forward by using the survey to study the effects of implementing a change at the programme level or something that is more wide scale at the level of department, school or institute.

As outlined earlier (Section 4.6), students remarked on the challenges of balancing a family life and their full time studies at LYIT. Another student pointed out that much out of class collaboration takes place via online media. Given the diverse community of learners at LYIT, it is worth giving thought as to how to engage learners who are not resident locally, and perhaps have families or outside paid work to attend to in collaborative learning with other students. It should be borne in mind that while engagement benefits all students, this is particularly the case for underrepresented students.

6.5 Recommendations

In terms of recommendations from this study, they are many and varied. For clarity, they are presented according to the stakeholders that they are most relevant for

6.5.1 Policy makers

It is important that if a measurement is to become a metric for assessment of institutional quality and for the purposes of funding allocation then it must be fit for purpose. There is a very real danger that a survey originally designed for gathering information on students for the purposes of educational dialogue can become something much more powerful without the necessary research to underpin its validity for this task.

The ISSE should be used in conjunction with other data to evidence student engagement by institutions, but not as the only measure. However, that is not to downplay the usefulness of the ISSE as the current study would not exist without it, and so it has proved to be a valuable tool in providing the foundations for discussion in the area of student engagement which should continue to be encouraged.

6.5.2 The IOT sector and LYIT

Active learning is at the heart of what the IOT sector does well which is evident in surveys. This should be promoted and built upon by the sector. It is important that studies such as this one are carried out to ensure that students within this sector understand the questions on the ISSE so that that this learning is being measured and continues to feature as a strong characteristic of the sector in ISSE publications which will be disseminated by the press.

It is important that the opinions of students of LYIT are listened to and change is implemented on the basis of their responses. Particularly of interest are the open ended questions at the end of the ISSE survey. Where change has been made based on their feedback, it should be made clear to students that this has happened. This closes the feedback loop and increases buy-in from students. This will not only encourage future participation in the survey but increase the engagement of the students who have participated in the survey in the past by showing them that they are valued.

6.5.3 Educators in science and 3rd level educators generally

Educators within the 3rd level sector need to exercise care in communicating with students clearly about how and what is being assessed in a module of learning. A great deal of attention

is given by educators to writing module learning outcomes and assessment that are discipline specific and suitable for the level of study. It is possible that in discipline areas like science that while practical skills and ‘softer’ skills such as teamwork, communication and interpersonal skills are valued, these are not embedded in programme design, or if they are, are not being assessed and evidenced.

If these are being assessed this should be clear to learners who should be made aware why and how this is being done. Students focus their efforts on areas where marks are awarded so if marks are placed on teamwork and interpersonal skills then students will see value in the cultivation and development of these skills. For staff in science a marking matrix could be developed that includes marks allocated for the evidence of team working and interpersonal skills.

This is part of a broader discussion on evidencing graduate skills within programmes and giving students the confidence to talk about their skills and experiences outside of discipline specific knowledge.

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Table A1 Data presented during discipline specific ISSE workshop (Section 1) that was supplied to staff during focus groups (Section 3.3.2).

<i>(In general terms, to inform interpretation of data from multiple iterations of the survey, questions highlighted are retained in the revised ISSE, or may be related to a reworded question)</i>							
		Science, Mathematics and Computing			ISSE total		
		Y1	YF	PGT	Y1	YF	PGT
Asked questions or contributed to discussions in class, tutorials, labs or online	Never	11.3%	6.7%	3.8%	7.4%	5.2%	2.7%
	Sometimes	55.4%	44.0%	39.2%	48.6%	40.1%	29.8%
	Often	24.2%	30.5%	35.7%	28.3%	31.3%	32.5%
	Very often	9.1%	18.9%	21.3%	15.7%	23.4%	35.0%
Made a class or online presentation	Never	33.5%	16.4%	26.3%	27.7%	13.2%	19.1%
	Sometimes	49.2%	47.4%	41.6%	46.2%	43.8%	39.4%
	Often	14.0%	25.7%	20.7%	20.3%	28.7%	26.4%
	Very often	3.3%	10.4%	11.5%	5.7%	14.3%	15.2%
Worked with other students inside class to prepare assignments	Never	11.3%	13.1%	16.2%	12.8%	13.0%	17.8%
	Sometimes	34.4%	32.3%	35.4%	35.2%	32.8%	33.7%
	Often	37.7%	36.5%	32.6%	36.5%	35.1%	30.4%
	Very often	16.6%	18.1%	15.8%	15.4%	19.1%	18.2%
Worked with other students outside class to prepare assignments	Never	19.7%	20.4%	26.2%	22.3%	19.2%	25.2%
	Sometimes	37.3%	32.5%	35.0%	35.7%	32.6%	32.4%
	Often	30.4%	30.9%	24.7%	29.6%	30.0%	25.0%
	Very often	12.6%	16.2%	14.1%	12.4%	18.2%	17.4%
Tutored or taught other college students (paid or voluntary)	Never	63.4%	59.3%	63.1%	71.0%	64.6%	71.4%
	Sometimes	26.0%	28.3%	25.1%	20.7%	24.8%	18.5%
	Often	8.3%	8.6%	8.0%	6.2%	7.4%	6.4%
	Very often	2.3%	3.8%	3.8%	2.0%	3.2%	3.8%



LYIT APPLICATION FORM FOR ETHICAL APPROVAL

INSTRUCTIONS

1. No empirical research should be undertaken prior to ethical approval being granted.
2. Copies of proposed questionnaires or a list of questions to be included in any questionnaire should accompany this application form.
3. All fields should be completed. Where Not Applicable applies, please enter N/A.
4. All researchers must complete Section A and, where applicable, Section B and Section C.
5. Section D will be completed by the Institute Research Ethics Committee n (IREC).
6. Appeals of the Decision of the IREC should be completed in Section E
7. Please email completed form to Researchethics@lyit.ie .
8. **When submitting your form please ensure the Subject Line of your email contains the words “Ethics Application”, followed by your name.** |

SECTION A

Project Title The Irish Student Survey of Engagement (ISSE)– National and Regional responses of science students

Date of Submission 31st August 2016

Name of all person(s) submitting research proposal
Dr. Christina Forbes

Type of Research Taught Masters MSc by Research External Research Funding

Position Student Staff
If student, Student No. L00092293
Programme Title Master of Arts in Learning and Teaching
Name of supervisor Dr. Lynn Ramsey

Department/Centre Department of Law and Humanities

Email Address Christina.forbes@lyit.ie

Name of Principal Researcher (if different from above e.g., Student’s Supervisor)

Position Held

Pre-existing approval and Multi-agency research

Appendix B

1. If your research has pre-existing ethics approval please attach the approval and submit directly to researchethics@lyit.ie.
2. If your research is to be carried out across two or more research centres and ethics approval has already been granted by another agency/institution then please attach the approval and submit to researchethics@lyit.ie.

In both instances there is no requirement to complete the remainder of the application form.

SECTION B

1. Describe the purposes of the research proposed.

This research aims to examine the data surrounding engagement generated by science students in LYIT and national data in the ISSE and to query LYIT science staff regarding the responses therein.

2. Please complete the research ethics checklist below:

	YES	NO
a) Does the research involve human or animal participants? <input type="checkbox"/>	✓	
b) Does the research involve data of a personal or confidential nature? ✓		<input type="checkbox"/>
c) Does the study involve participants who are particularly vulnerable or unable to give informed consent e.g. people under 18, people with learning disabilities, older people, students? ✓		<input type="checkbox"/>
d) Will the study require the co-operation of a gatekeeper for access to participants? (e.g. teacher, local council) ✓		<input type="checkbox"/>
e) Will it be necessary for participants to take part in the study without their knowledge and consent at the time? (e.g. covert observation of people in non-public places) ✓		<input type="checkbox"/>
f) Will the study involve discussion of sensitive topics (e.g. sexual activity, drug use)? ✓		<input type="checkbox"/>
g) Are there issues of safety for the researchers or subjects, aside from those documented in Institute or Departmental Health and Safety procedures? ✓		<input type="checkbox"/>
h) Could the study induce psychological stress or anxiety or cause harm or negative consequences beyond the risks encountered in normal life? ✓		<input type="checkbox"/>
i) Will financial inducements (other than reasonable expenses and compensation for time) be offered to participants? ✓		<input type="checkbox"/>
j) Does the research involve a conflict of interests? ✓		<input type="checkbox"/>

If you have answered 'NO' to all of the questions above there is no requirement to complete the remainder of the form. Please submit to researchethics@lyit.ie

Appendix B

If you have answered 'yes' to questions (c) please continue and complete the remainder of the application form submit to researchethics@lyit.ie

SECTION C

3. Please give a summary of the design and methodology of the project. **Please note** that copies of proposed questionnaires or a list of questions that will be included in any questionnaire should accompany this application form (Compulsory not optional). Please also include in this section details of the proposed sample size, giving indications of the calculations used to determine the required sample size, including any assumptions you may have made. (If in doubt, please obtain statistical advice).

The methodology will involve analysis of the data in the ISSE. Statistical analysis will be used to determine the significance of differences between national data and data generated by LYIT. Staff members will be surveyed using semi-structured interviews.

4. Describe the research procedures as they affect the research subject and any other parties involved.

Staff members will take part in a semi-structured interview which will discuss their motivations for doctoral studies and their experience as a doctoral student. The interviews will be recorded, transcribed and anonymised.

5. What in your opinion are the ethical considerations involved in this proposal? (You may wish for example to comment on issues to do with consent, confidentiality, risk to subjects, etc.)

The proposal raises ethical considerations relating to consent and confidentiality. Participants must freely consent to participation in the research project and may withdraw consent at any time. Participants must fully understand the nature of the research project and the requirements of their participation. Participant interviews will be anonymised. There are no risks to subjects in this study.

6. Outline the reasons which lead you to be satisfied that the possible benefits to be gained from the project justify any risks or discomforts involved.

No risks or discomforts are anticipated.

Appendix B

7. Who are the investigators (including assistants) who will conduct the research and what are their qualifications and experience?

Christina Forbes BSc (NUIG), PhD (NUIG) is currently employed as a lecturer in the Department of Science, LYIT. Research experience in the area of microbiology including peer reviewed publications and presentations at national and international conferences.

8. Are arrangements for the provision of clinical facilities to handle emergencies necessary? If so, briefly describe the arrangements made.

No

9. In cases where subjects will be identified from information held by another party (for example, a doctor or hospital) describe the arrangements you intend to make to gain access to this information including, where appropriate, which Multi Centre Research Ethics Committee or Local Research Ethics Committee will be applied to.

N/A

10. Specify whether subjects will include students or others in a dependent relationship.

No

11. Specify whether the research will include children or people with mental illness, disability or handicap. If so, please explain the necessity of involving these individuals as research subjects.

Appendix B

No

12. Will payment or any other incentive, such as a gift or free services, be made to any research subject? If so, please specify and state the level of payment to be made and/or the source of the funds/gift/free service to be used. Please explain the justification for offering payment or other incentive.

No

Appendix B

13. Please give details of how consent is to be obtained. A copy of the proposed consent form, along with a separate information sheet, written in simple, non-technical language **MUST** accompany this form.

14. Comment on any cultural, social or gender-based characteristics of the subject which have affected the design of the project or which may affect its conduct.

A mixture of male and female subjects will be used for the study. Other criteria not applicable.

15. Please state who will have access to the data and what measures which will be adopted to maintain the confidentiality of the research subject and to comply with data protection requirements e.g. will the data be anonymised?

Interviews with staff will be conducted individually and data generated will be anonymised. Data will be securely stored in compliance with LYIT guidelines on data security

Identifying data (sex, age etc.) will not be included in the dissertation to avoid identification of the subjects or their opinions.

16. Will the intended group of research subjects, to your knowledge, be involved in other research? If so, please justify.

Not to the investigator's knowledge

17. Date on which the project will begin and end.

Appendix B

March 2016 – June 2016

Appendix B

18. Please state location(s) where the project will be carried out.

LYIT campus

19. Please state briefly any precautions being taken to protect the health and safety of researchers and others associated with the project (as distinct from the research subjects) e.g. where blood samples are being taken

N/A

20. Please specify how any data obtained during the course of the research will be stored and how long the data will be retained for.

The data will be anonymised and will be securely stored in compliance with LYIT guidelines on data security. The data will be retained for 5 years following the completion of the research project and then destroyed.

DECLARATION

Researcher

I confirm I will carry out the research as indicated in the above form



Research Supervisor

I confirm that this form gives an accurate account of the proposed research



SECTION D

For office use only

INSTITUTE RESEARCH ETHICS COMMITTEE

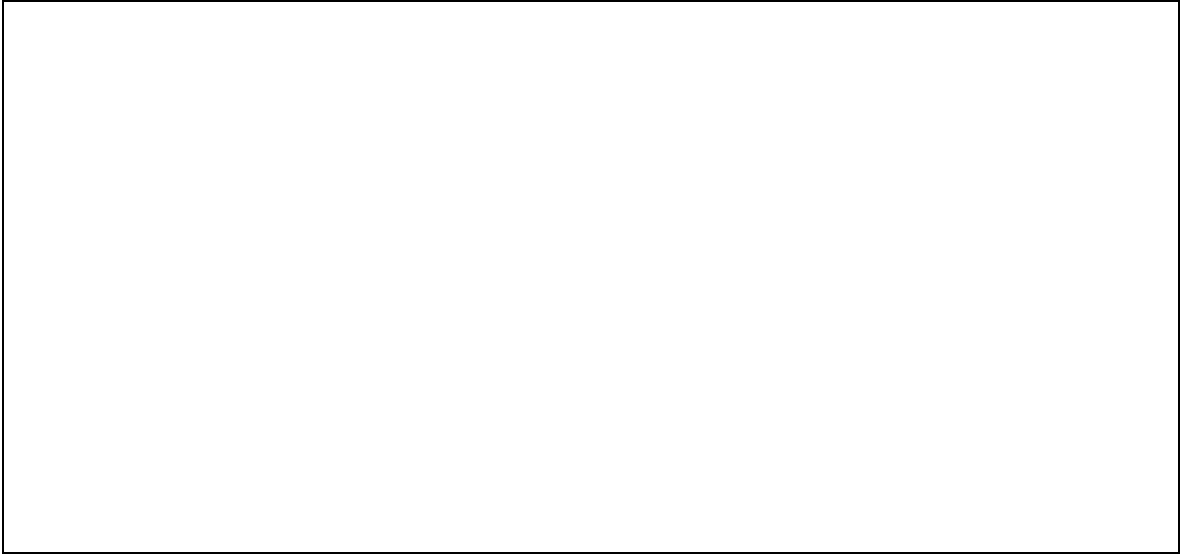
DATE:

DECISION

1. Approved without amendment
2. Approved subject to minor modifications
(No resubmission required, supervisor responsible for ensuring that modifications are implemented)
3. Modifications required. Complete modifications below and resubmit.
4. Additional information required.
5. Approval withheld. All conditions set by Institute Research Ethics Committee must be met.
6. Reject.

REASONS FOR DECISION

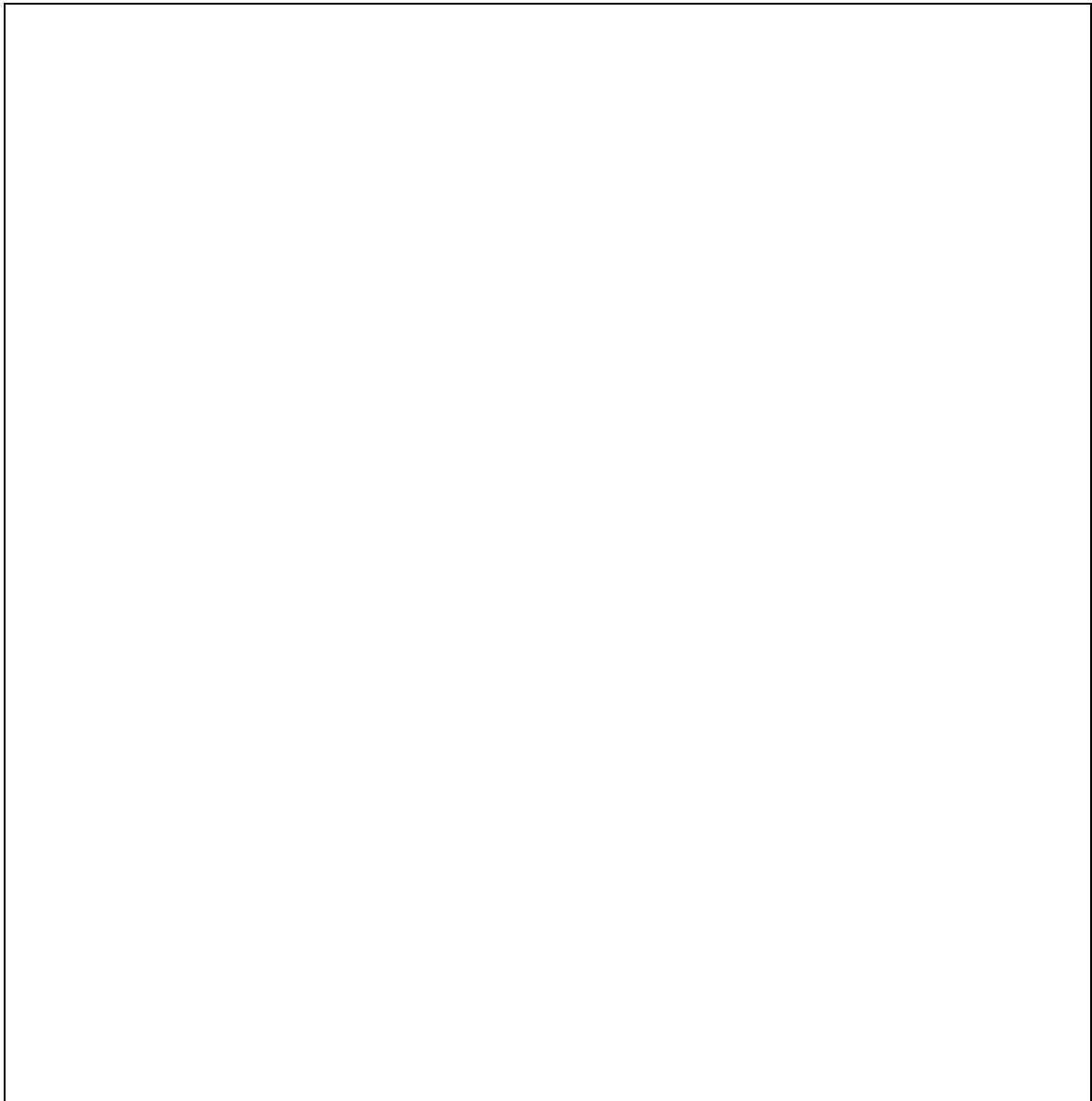
Appendix B



SECTION E

APPEAL

Please outline in detail the reasons why you are appealing the decision of the Institute Research Ethics Committee.

A large, empty rectangular box with a thin black border, intended for the user to write their appeal. It occupies the majority of the page's vertical space below the instructions.

Participant Information Sheet

Title: **The Irish Student Survey of Engagement (ISSE) – National and Regional responses of science students**

Researcher: Dr. Christina Forbes

Introduction

This study examines the data from the Irish Survey of Student Engagement conducted in 2013 which was the pilot of the survey, and in the following years upon full roll out of the survey. Specifically of interest are the responses from students who are completing science programmes. Data will be compared to that generated by science students nationally and the overall cohort of students in LYIT. The opinion of staff members of the Department of Science on the data will be sought.

What's involved?

I am particularly interested in the responses of science students to questions in the area of 'Active learning'. These data from these questions are out of synch with that from students of other disciplines. I intend to survey science students at LYIT to ask their interpretation of the questions. Staff from the department of science will also be surveyed to identify any similarities or, alternatively potential discord with student responses.

Participants will be invited to take part in a brief focus group. The interview will be recorded, transcribed and anonymised. Your opinions and responses are confidential and data will be stored securely.

What does this study hope to achieve?

The study aims to interpret the responses of LYIT science students to the survey of student engagement in a meaningful way. The study hopes to identify discrepancies between student and staff responses. Understanding these is key to successful and meaningful interpretation of ISSE data.

Results will be fed back to the Department of Science to inform staff regarding student engagement and used by the researcher to inform module design to improve student engagement.

Participant Consent Form

Project Title: **The Irish Student Survey of Engagement (ISSE) – National and local responses of science students**

Researcher: **Dr. Christina Forbes**

This study aims to engage with students and the lecturing staff within the Department of Science at LYIT regarding their interpretation of questions and data thereof from the ISSE and the LYIT data that fed into this survey.

Declaration:

I ----- (participant’s name), acknowledge that:

- I have been informed about the research and have had an opportunity to ask questions
- I consent to partake in this study
- My participation is voluntary
- I understand I can withdraw from this study at any time by e-mailing the researcher
- I consent to the potential publication of the data and results from this study in academic papers and at conferences.

Participant’s signature

ISSE 2013, 2014 and 2015 questions on Action Learning.

(In your experience at your institution during the current academic year, about how often have you done each of the following?)

1. Worked with other students inside class to prepare assignments

Never

Sometimes

Often

Very often

2. Worked with other students outside class to prepare assignments

Never

Sometimes

Often

Very often

ISSE 2016 question on Action Learning.

(In your experience at your institution during the current academic year, about how often have you done each of the following?)

1. Worked with other students on projects or assignments

- | | |
|------------|--------------------------|
| Never | <input type="checkbox"/> |
| Sometimes | <input type="checkbox"/> |
| Often | <input type="checkbox"/> |
| Very often | <input type="checkbox"/> |

Appendix F

Group; 4th Bioanalytical focus group 2

Members; Michelle , Fiona, Maeve, Davy, Orla, Martina

Date; 12.44pm, 2nd June, 2016.

Right ok we've started recording, would you mind stating your names first of all so I remember who is in the group whenever I go to write this out.

Orla; Orla

Michelle; Michelle

Davy; Davy

Maeve; Maeve

Fiona; Fiona

Martina; Martina

Ok so, I just want to ask you first of all about your responses to the first two questions. So these questions are those from 2013, 14 and 15, would you mind just reading out your answers for that and we'll start with you, Laura.

Martina; I worked with students inside class sometimes, to prepare powerpoints and things like that, and outside of class sometimes.

Fiona; First one was working with students inside class and I wrote sometimes and then outside sometimes as well

Maeve; I wrote sometimes as well and more often outside

Davy; Same as that, sometimes for the first one and often for the second one.

Ok, so sometimes inside class and often outside class for you, Michelle?

Michelle; Sometimes for inside class and sometimes for outside class.

Ok and Orla?

Orla; Sometimes for inside class and sometimes for outside class.

Ok, great, and uh, for the second set of questions then, the 2016 questions where we have combined inside and outside class, what was your response for that then?

Martina; I said often

Often, ok, thank you.

Appendix F

Fiona; Mine was the same it was sometimes

Maeve; Mine was often

Davy; Sometimes

Michelle; Sometimes

Orla; Sometimes

Ok so the general consensus from the first set of questions is it was often outside, sometimes inside and then the second set, there was a combination there of either often or sometimes. So there wasn't a never or a very often. Would you mind now giving me examples of times you have worked with students either inside or outside of class, or what you were thinking of when you answered the question. So I'll go around each of you and ask you that.

Laura; To prepare powerpoints, to perform group powerpoints that we would present to the rest of the class that we would work inside class on

Ok, and outside of class what would you work with people on?

Laura; I had a very similar project to another person in the class and we would work together to decide when, or how we would go about doing our project and stuff.

Alright. What I should say here actually if you had assignments that you were doing on your own or you were handing up on your own, if you're telling me here that you worked with other people on it, this is completely confidential and I'm not here to pass information back to anyone outside this room. I would like to get an honest response on where you think you've done this kind of work so please speak freely.

Fiona, what about yourself, what did you think of there?

Fiona; things like group and say if we were working in a lab we would interact with each other there to get results, we would interact. In the library if you were looking for notes we would always interact.

Ok, anybody else?

Maeve; Again group work, but a lot of that was done outside class because the lectures weren't long enough to let us work together on something

Ok so there was no time allocated in class for completing a task

Maeve; sometimes they might have said ok you can start now but most of the time not because they were only hour lectures

Sure

Davy; sometimes inside class and most of the time it was because we were instructed to, and outside was often because a few of us would get together and study together

Appendix F

Right, so a study group, or preparing presentations together is the most common way you work outside of class?

Michelle; Yeah it was pretty much the same for me, it would be inside class if we were assigned presentations and things like that and outside would be labs, or if you were assigned presentations to do

Orla; Outside was the same as everybody else really. I know what me and Aisling would have done anyway and a few other people for exam purposes we would have looked over exam papers and assigned questions and then shared questions together so it cut down the work that way that you didn't spend time looking for an answer when you could have been learning it. We would have done that probably since about 2nd or 3rd year.

So you would write out an answer to a question and share that around?

Orla; aye instead of repeating the same work we would cut it down that way

Sure, sure ok

Am, so, what I am noticing here is that you're talking about presentations and preparing lab reports and work outside of class. I think one of the biggest ways that you work with each other is in labs but i notice that you talked about writing lab reports, but you didn't really talk about working with other students in the lab. With the exception of Fiona's comment, very few of you mentioned that.

General mumbling, agreement

Is that a fair enough assessment that I'm making from what you're all saying do you think?

Michelle; yeah

Laura; yeah

Maeve; The issue is 'assignments' whereas the next set of questions also has 'projects'

Ok

Maeve; that would include lab work because 'projects'

Ok so for you Maeve then, the word 'assignment' wouldn't be synonymous with lab work?

Maeve; No, it would be everything outside of that

Orla; No I wouldn't have thought of that but now that you mention it, it is working with somebody in class, but because I suppose because we've done it for so long we don't even think about it, it's just another class.

Ok, so you think there's an idea that because you're so used to doing labs that you don't even think about it.

Maeve; No

Appendix F

Orla; No

And what about the phrase there 'class time'?

Davy; yeah there's no indication that it includes practicals

Ok, yeah, so for you in that question, class time means?

Orla, Laura, Michelle, Davy; a lecture / a class (speaking over each other)

So the lab is a particular environment that is not being hinted at in the question. An assignment also then is something that you didn't think was to do with labs either?

Maeve; yeah its powerpoints and posters and all that that we've done in the past?

So you mean a piece of continuous assessment that's handed up as marks towards the module rather than your regular lab reports?

Orla; mm hmm

Maeve; yeah

Michelle; What you're assigned to do, hence what we've taken from the worked assignment.

Aye ok, I get you, there's that. It's the definition of assignment here is really interesting - are you not assigned to do lab work either?

Fiona; aye but we all enjoy the lab work it's our relationship time during the day.

laughter (agreement)

Of course, and it's very obvious that you all enjoy the lab work and in the lab you're getting to do something which is the point of these questions in the ISSE survey, its active learning. So this is why I was curious to see your take on the questions because from what you're telling me, the survey isn't really picking up on lab work. What do you think?

Michelle; yeah

Fiona; mmm

Orla; This will impact on other people who have a practical aspect to their projects and courses, like if you think of people doing sports science or something like that too. You know they be out there doing a practical class or other people too you know it just kind of makes it closed when they ask just about class time.

So do you think a rewording of the question, such as changing the word 'class' there would be beneficial?

Orla; mmmmm

Appendix F

What would you suggest? Class or practical time or something like that?

Davy; I would think of assignments as separate to lab time as well

Michelle ; yeah

Davy; like when I read assignments I wouldn't immediately think of labs.

Ok so theres two words here that are influencing your thinking, so one is assignments?

Laura and Davy, you've both said that?

Maeve; yeah

Davy; yeah

and Orla you've said class.

Orla; mmm

and what you're saying here is exactly what the group earlier on that i spoke with said, they were also from your class and I also took 3rd year and they said the same thing, that it's those particular words that really make you hone in on the classroom environment and on something that is not a lab report.

So does an assignment have to be worth many marks?

Michelle, Laura, Orla, Fiona; yeah, mmm (over each other) in definite agreement.

So something more substantial than a lab report?

Yeah

The other question that i'll ask you just because it came up with another group is that the question is worded such that it says working with other students whereas when you work in labs you generally only work with one other student, so in pairs. So it doesn't necessarily have to be a big group. Do you think if there was a bracket around the final 's' in 'students'

Laura, Michelle; mmmm

Fiona; I think it's really badly worded full stop.

Do you think so?

Fiona; yeah, I was sitting there, well, it might be just because - like it might just be me.

No, not at all, this is designed for you to read and answer

Fiona; ah, I was just thinking what are they asking me?

Appendix F

So you found the questions unclear?

Fiona; yeah

Maeve; most surveys are the same and that's why I never do them. Well, I rarely do them. Like, the way that they word the questions you don't even know what they're looking for, you don't know how to answer it so you don't bother

Yeah, I can see what you're saying there. I think that these guys are trying to keep this fairly vague, you see that 2013, 14, 15, there were well over one hundred questions in that survey so I they changed it and they did get feedback, I'm not sure from whom and they put in the phrase 'assignment and project' and they combined the two previous. But I agree with what you're saying Orla, the questions are not picking up on the experience of sports students, yourselves

Maeve; and computers too, they would do a lot of labs

and would they work in groups?

Orla; yeah

Oh that's interesting to know. I would be interested in knowing what they do.

Martina; Yeah they would have group projects where they have to design robots and stuff

Maeve; or they would do them individually but because there's so much in it they all help each other out with it. Yeah, cos I know a lot of computers students and they all group together in the library and they do everything step by step together and then move on to the next part of it.

Ok, very interesting.

So if you were going to go for a job interview and they asked about working with other people, I suppose you know what I'm hinting at here, would you draw on group projects and things?

general mumbling agreement (not strong)

or would you think of lab work?

Michelle; no

Ok, that's more or less it. Is there anything else you want to add on the question? Do you think the question has improved in 2016.

Orla; No, I think it gives them less information, like you know from the previous questions if students are working together by choice, like out of class. Whereas the other ones they're both together.

Yeah, the data for this year isn't out yet but I think you're right, there'll be a difference in the response for these questions, maybe a rise. But I still think that the science lab element is not being capture.

Ok, has everyone said everything they think is important? Anyone want to add anything?

Appendix F

Pause.

That's it, that's all I wanted to get from you folks, thanks a mill.

Appendix G

Table G1 Raw data generated from Student and Staff Responses to ISSE questions on collaborative learning within the ‘Active learning’ index.

			3rd Bioscience Focus group	4th Bioanalytical Focus group 1	4th Bioanalytical Focus group 2	4th Bioanalytical Focus group 3	4th Food science & nutrition Focus group 1	4th Food science & nutrition Focus group 2	Staff focus group
2013-2015	Worked with other students inside class to prepare assignments	Never	0	0	0	0	0	0	1
		Sometimes	7	5	6	3	4	3	3
		Often	0	1	0	0	2	1	1
		Very often	1	0	0	0	0	0	3
2013-2015	Worked with other students outside class to prepare assignments	Never	0	0	0	0	0	0	1
		Sometimes	6	0	4	3	3	1	5
		Often	1	6	2	0	2	2	1
		Very often	1	0	0	0	1	1	1
2016	Worked with other students on projects or assignments	Never	0	0	0	0	0	0	0
		Sometimes	5	4	4	1	1	1	3
		Often	0	0	2	2	4	1	3
		Very often	3	2	0	0	1	2	2
			n = 8	n = 6	n = 6	n = 3	n = 6	n = 4	n = 8
			3 males	2 males	1 male	1 male	1 male	0 males	3 males
			5 females	4 females	5 females	2 females	5 females	4 females	5 females

Appendix G

Table G2; Data generated from Student and Staff Responses to ISSE questions on collaborative learning within the ‘Active learning’ index expressed as percentages.

			3rd Bioscience Focus group	4th Bioanalytical Focus group 1	4th Bioanalytical Focus group 2	4th Bioanalytical Focus group 3	4th Food science & nutrition Focus group 1	4th Food science & nutrition Focus group 2	Staff focus group
2013-2015	Worked with other students inside class to prepare assignments	Never	0.0	0.0	0.0	0.0	0.0	0.0	12.5
		Sometimes	87.5	83.3	100.0	100.0	66.7	75.0	37.5
		Often	0.0	16.7	0.0	0.0	33.3	25.0	12.5
		Very often	12.5	0.0	0.0	0.0	0.0	0.0	37.5
2013-2015	Worked with other students outside class to prepare assignments	Never	0.0	0.0	0.0	0.0	0.0	0.0	12.5
		Sometimes	75.0	0.0	66.7	100.0	50.0	25.0	62.5
		Often	12.5	100.0	33.3	0.0	33.3	50.0	12.5
		Very often	12.5	0.0	0.0	0.0	16.7	25.0	12.5
2016	Worked with other students on projects or assignments	Never	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Sometimes	62.5	66.7	66.7	33.3	16.7	25.0	37.5
		Often	0.0	0.0	33.3	66.7	66.7	25.0	37.5
		Very often	37.5	33.3	0.0	0.0	16.7	50.0	25.0
			n = 8	n = 6	n = 6	n = 3	n = 6	n = 4	n = 8
			3 males	2 males	1 male	1 male	1 male	0 males	3 males
			5 females	4 females	6 females	2 females	5 females	4 females	5 females

Appendix G

Table G3 Composite focus group data sorted by class groups and staff focus group

			3rd Bioscience Total sampled	4th Bioanalytical total sampled	4th Food science & nutrition Total sampled	Composite of all student responses	Staff focus group
2013- 2015	Worked with other students inside class to prepare assignments	Never	0	0	0	0	1
		Sometimes	7	14	7	28	3
		Often	0	1	3	4	1
		Very often	1	0	0	1	3
2013- 2015	Worked with other students outside class to prepare assignments	Never	0	0	0	0	1
		Sometimes	6	7	4	17	5
		Often	1	8	4	13	1
		Very often	1	0	2	3	1
2016	Worked with other students on projects or assignments	Never	0	0	0	0	0
		Sometimes	5	9	2	16	3
		Often	0	4	5	9	3
		Very often	3	2	3	8	2
			n = 8	n = 15	n = 10	n=33	n = 8
			3 males	4 males	4 males	n = 14	3 males
			5 females	11 females	14 females	n = 19	5 females

Appendix G

Table G4 Composite focus group data sorted by class groups and staff focus group, expressed as percentages

			3rd Bioscience Total sampled	4th Bioanalytical total sampled	4th Food science & nutrition Total sampled	Composite of all focus group student responses	Staff focus group
2013- 2015	Worked with other students inside class to prepare assignments	Never	0.0	0.0	0.0	0.0	12.5
		Sometimes	87.5	93.3	70.0	84.8	37.5
		Often	0.0	6.7	30.0	12.1	12.5
		Very often	12.5	0.0	0.0	3.0	37.5
2013- 2015	Worked with other students outside class to prepare assignments	Never	0.0	0.0	0.0	0.0	12.5
		Sometimes	75.0	46.7	40.0	51.5	62.5
		Often	12.5	53.3	40.0	39.4	12.5
		Very often	12.5	0.0	20.0	9.1	12.5
2016	Worked with other students on projects or assignments	Never	0.0	0.0	0.0	0.0	0.0
		Sometimes	62.5	60.0	20.0	48.5	37.5
		Often	0.0	26.7	50.0	27.3	37.5
		Very often	37.5	13.3	30.0	24.2	25.0
			n = 8	n = 15	n = 18	n=33	n = 8
			3 males	4 males	4 males	n = 14	3 males
			5 females	11 females	14 females	n = 19	5 females