

Improving engineering education by investigating students' perceptions and approaches towards learning

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Abstract

A Mixed Methods research methodology is suggested in this paper as a suitable model for the process of evaluating teaching and learning. The aim of this paper is to introduce some findings which have been obtained from research into teaching and learning within engineering at a UK Higher Education Institution.

Students' approaches, and the effects their perceptions have in determining their approaches to learning, have been explored. The data gathered highlighted some issues with regard to teaching and learning that are relevant to a range of courses and that can inform the quality enhancement of teaching provision. It is suggested that a mixed methods evaluation has advantages over standard institutional teaching and learning evaluations in allowing a greater understanding of the learning situations students encounter, how these situations are perceived, and how they affect students' learning behaviour.

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Amongst the issues raised by the research is the notion that students have definite ideas, expectations and opinions about their learning contexts. The concept of importance emerged to show that students were identifying perceptions and approaches to learning based on their importance rating of a subject. Patterns in students' questioning behaviour were also identified, highlighting possible limitations to students' academic development within lectures.

Keywords: Approaches, Perceptions. Students, Mixed Methods,

Introduction

It is widely acknowledged that, if we want to improve education, we need to take into account the views and experiences of students. Informally, this is part of good teaching and takes place through interaction and dialogue between staff and students. More formally, quality enhancement is defined by Biggs (2003) as being "about the continuing improvement of teaching in the institution" (p.269). Higher education practitioners concerned with quality of teaching and learning should be looking at employing methods to understand and evaluate teaching and learning effectively and to consider how we can further enhance teaching quality. Within higher education, collecting feedback from students on their experiences of teaching and learning has become "one of the central pillars of the quality process" (Williams & Cappuccini-Ansfield, 2007, p.159). However, the main tools used within quality processes are standardised, structured questionnaires. In this paper we review the use of these methods and present a detailed example of an alternative approach to gathering data from students. We suggest that the type of mixed method approach presented provides much richer and more reliable evidence to inform teaching and learning enhancements and is a suitable and adaptable model for the process of evaluating teaching and learning.

Students' approaches, and the effects that their perceptions have in determining their approaches to learning, were explored using qualitative and quantitative data collection methods within engineering at a UK Higher Education institution. The data gathered highlighted some issues regarding teaching and learning that are relevant to a range of courses and that can inform the quality enhancement of teaching provision. The work presented here was undertaken during the first stage of an ongoing project which is

investigating students' perceptions and approaches within an undergraduate mechanical engineering programme. It is also significant to note that these issues would not normally have been uncovered during the course of teaching sessions or during the "normal" institutional course evaluation and Quality Assurance procedures.

Context of the Research Project

Within the field of engineering education, existing studies have tended to consider teaching and learning in two ways; in a generic module/programme evaluation sense using pre-defined questionnaires, or with respect to evaluation of small-scale teaching innovations. There are examples of in-depth context-specific investigations in electrical engineering (Entwistle, Nisbet & Bromage, 2005) and chemical engineering (Case, 2000). There is less evidence, however, of published information which evaluates students' experiences in mechanical engineering. Whilst there can be assumed to be similarities between the speciality engineering disciplines, there is a wide diversity of subject areas within the discipline of engineering (Baillie, Lamb & Bramhall, 2001) and therefore it should not be assumed that students within the specialities regard teaching and learning in the same way. This paper presents and discusses the research findings to date for a context-specific evaluation of teaching and learning in mechanical engineering.

The purpose of the investigation discussed in this paper (and as the first stage in an ongoing project) was to investigate the perceptions and approaches of students in a second year undergraduate mechanical engineering cohort. The research was carried out to determine how students were conducting their learning and also to understand what students perceived to be important to their learning and to their success in the programme. The research was also designed to investigate how students perceived the context which surrounded their learning including: specifics of the curriculum; relationships with staff; classroom environment; teaching delivery; and assessment.

In the programme of study selected for this research, students experience weekly lectures supported by weekly tutorials and a programme of practical laboratories. The tutorials generally allow the concepts that were introduced in the lecture to be discussed

by students and staff in smaller groups and also allow students an opportunity to work through some example problems and gain feedback on their progress. Engineering courses traditionally have a pattern of several fundamental engineering theory modules in each year of study; Maths, Mechanics and Thermodynamics/Fluid Mechanics. These classes are often assessed by small amounts of coursework (lab work, assignments, in-class tests), with a large weighting given to an end of year exam. The remainder of the taught time then often consists of more discipline-specific classes which may, or may not, reoccur in further years of study.

Evaluating Teaching and Learning

Jones, Siraj-Blatchford and Ashcroft (1997) explain how evaluation of courses can provide useful data for informing institutional direction and curriculum development. Green (1994, p.100 as cited in Haselgrove, 1994) reports that students, as “consumers” of higher education are now expected to have views about the quality of the services offered to them. Student feedback is often collected through use of course evaluation surveys, student satisfaction surveys, or nationally in the UK, through the National Student Survey. All of these tools explore, in some way, students’ perceptions and experiences of teaching and learning. Feedback can be collected from students on a range of issues such as individual course components, the learning experience, personal study environment and the outcomes achieved (Kember, Leung & Kwan, 2002). Many universities make use of student feedback questionnaires near the end of each semester with Kember et al. (2002) suggesting that “they must be the most widely used form of teaching evaluation in higher education” (p.411)

The structured evaluation questionnaires that are used in institutions tend to be part of a long review cycle; they are usually the same set of generic questions asked each year of the student cohort. When these questionnaires are used, the aspects of teaching and learning which can be evaluated are ultimately defined by the focus of the questionnaire. The generic institutional questionnaires are often worded so that they can be used across departments. This may therefore mean that a teacher using less traditional or more innovative approaches to teaching may score low on a standard questionnaire, even though high quality learning may have been achieved by the students (Biggs, 2003). Questionnaire evaluations may also be rushed at the end of the

course, which in itself can lead to tutors obtaining feedback which is disappointing (Jones et al., 1997). Jones et al. give an example of a course evaluation which makes use of a “structured list of questions” to encourage constructive criticism to take place. Example questions used in the evaluation discussed by Jones et al. are “To what extent do you think the objectives of the course have been addressed? Which elements of the course have you (a) enjoyed, (b) found useful? Do you have any suggestions for next year?”

A number of institutions have introduced a degree of standardisation to their questionnaires, while still allowing faculties and departments the opportunity to add to, or modify, questionnaire content. The most common focus of evaluation questionnaires is the individual module, although the majority of institutions also gather feedback data at other levels (Brennan et al., 2003). The format of student experience/evaluation questionnaires, and the effort required from students to complete them, can vary. In general students are asked to rank variables on scales which are considered to be essential to teaching and learning, although formats might also include ‘tick-box’ forms or contain spaces for qualitative comments to be provided by students (Johnson, 2000). Mathias (as cited in Aylett & Gregory, 1996) provides an example of an institution which suggests two options for faculties carrying out evaluation; that they make use of a standard student questionnaire which can be modified if required, or staff can devise their own questionnaire as long as it contains two compulsory questions to allow summative comparison over courses and teachers. The two compulsory questions are overall (a) how would you rate this course, and (b) how would you rate the lecturer?

Several of the studies investigating students’ experiences discuss the Course Experience Questionnaire (CEQ), as developed by Ramsden (as cited in Lizzio, Wilson & Simons 2002., Broomfield & Bligh, 1998). The CEQ is concerned with teaching (good teaching, clear goals, appropriate assessment and appropriate workload), overall quality and the acquisition of generic skills for the workforce (McInnis, Griffin, James & Coates, 2001). The questionnaire asks students to agree or disagree (on a five point scale) with statements about their perceptions and experiences during their course. A question is also included which asks students about their satisfaction with the overall quality of the course, as customer/consumer satisfaction in a higher education institution is considered to be the “proxy assessment of quality” (Mazelan et al., as cited in Harvey &

Green, 1993). Satisfaction can also be considered as the extent to which the “product” (in this case the student experience) is consistent with expectations (Harvey & Green, 1993).

Biggs (2003) suggests that questionnaires which are used to give feedback regarding teaching and learning actually make much more sense when questions are tailored to courses and situations, and where the questions can give feedback which is specific. Williams and Cappuccini-Ansfield (2007) explain that one of the more popular approaches to collecting feedback from students within individual institutions is the Student Satisfaction Approach and a number of institutions, both in the UK and overseas, have adopted the Student Satisfaction Approach as a central tool in their quality management processes. Williams and Cappuccini-Ansfield (2007) discuss the differences between student satisfaction surveys and the National Student Survey (NSS).

They explain that student satisfaction surveys aim to measure satisfaction with all aspects of the student experience and are tailored to the needs of students at a particular institution, whilst the NSS aims to broadly measure the concept of quality using a single format that can be used at all higher education institutions. In a study undertaken on behalf of the Higher Education Academy (Machell & Saunders, 2007), it emerged that the results of the NSS were being used (or intended to be used) alongside institutions’ own quality assurance processes, such as student evaluation questionnaires, to identify weaker areas within institutions. Unfortunately, although the NSS does include some questions which may indicate why the students’ experiences may be rated as low during some part of their total period of study, the survey does not provide the opportunity to really explore the complex reasons behind poor student experiences. It also does not allow institutional/course specific issues to be investigated.

Much student time is taken up by questionnaires and surveys. If Lecturers and Institutions in general wish to get useful data from the questionnaires given to students, they need to consider the frequency and also the design of the specific instruments which they use. Brennan et al. (2003) recognised that “perhaps the most serious limitation” of the instruments that focus upon students’ evaluations of particular modules or course units is that they provide little information about students’ experiences of their programmes or their institutions as a whole. Students receive institutional

questionnaires as well as questionnaires from their departments of study, student union etc. and may be faced with more than 20 questionnaires per year. Whilst acknowledging the advantages of questionnaires in that they are quick, anonymous and amenable to statistical analysis, Race (2006) discusses the “Ticky Box Syndrome”, where people who encounter excessive use of questionnaires become likely to make instant responses to questions, with responses made using surface level thinking rather than as a result of reflection and critical thinking. The use of quantitative inventories to obtain student feedback is considered by Brennan et al. (2003) to be dictated by purely organisational constraints, such as increasing size of classes in higher education. However Brennan et al. recognise that standard instruments do have advantages; they can provide opportunities to obtain feedback and to document the experiences of the student population.

Students Approaches and Perceptions

When considering course or programme evaluation from a scholarship of teaching and learning perspective, it can prove invaluable to be aware of the perceptions students have of their learning and to understand how these have influenced students' approaches to studying/learning. Being aware of students' perceptions and approaches can be useful to staff for reflecting on their teaching practices, and in the design or implementation of modifications to teaching methods or activities.

Another approach to teaching and learning evaluation, in addition to considering students' evaluations of their experiences, is to consider the quality of learning achieved by students. “Quality of learning” is recognised as a complex phenomenon and it is, therefore, problematic to define and measure. A more tangible concept to identify is the underlying approach or approaches to learning that students have taken. If a deep approach has been taken by a student then the assumption can be made that higher quality learning outcomes will be achieved (Prosser & Trigwell, 2001). The terms “deep learning” and “surface learning” were originally used to describe the qualitatively different levels of processes or approaches that students took to any learning situation (Marton & Säljö, 1984). Positive correlations between the quality of outcomes of students' learning and the approaches they take were identified by Svensson (1984).

Students' approaches to learning can change during a programme of study; they are influenced by students' perceptions of their learning environment (Bloxham & Boyd, 2007) and can also be affected by students' expectations within a programme (Harvey & Knight, 1996).

"Student learning is a result of an interaction between a student and the learning situation, and this is unique for every student in every different learning context" (Bloxham & Boyd, 2007, p.69). With the previous statement in mind, it is suggested that for staff "one of the most important criteria for determining the effectiveness of a particular teaching style is how the students respond and learn in the environment you have created" (Jones et al, 1997, p.91). Useful indications of effectiveness and quality of teaching can therefore be achieved through consideration of what students say they do in a particular context; both in terms of their approach towards their studies (engaging in surface or deep learning approaches) but also in their wider behaviours (motivation, interest, attendance etc.) at particular stages during a course. As the context of higher education is changing (Fry, Ketteridge & Marshall, 2009) it is suggested that, when examining relationships between research and teaching, the changing context must be considered (Brew, 1999). Benson and Samarawickrema (2007, p.61) explain that context may include a "range of factors in its definition, from the specific characteristics of the learning and teaching environment, to disciplinary, institutional and systematic variables, and beyond that to broad social influences and personal issues affecting students' lives".

The breadth and complexity of the factors we seek to evaluate are also demonstrated by Entwistle (2008), who identified that students' perceptions of the teaching and learning environment essentially affect their learning approaches more than the actual teaching/learning environment provided. Taylor and Hyde (2000), meanwhile, discuss that research has in fact shown a chain of relationships linking students' concepts of learning, perceptions of teaching and learning, approaches to learning, and quality of learning outcomes. Students, for example, will not necessarily tackle assessment tasks in the ways staff may expect because they may have a different perception of the meaning of the task (Laurillard, 2002). To really understand how students view and experience teaching and learning, it is therefore proposed that evaluations should focus on what students perceive to be "key aspects of teaching" (Brennan et al., 2003, p.33).

Studies in the USA, investigating the relationship between certain out-of-class activities and the quality of student learning outcomes, have suggested that there will be many factors associated with learning that lie outside the control of the individual academic or department (Erwin & Knight, as cited in Harvey & Knight, 1996). Murray (as cited in Harvey & Knight, p.148) explains, for example, that “the main factor determining student learning... is individual studying by students outside the classroom.” Based on this view, the evaluation of teaching and learning should therefore also consider what work students have been encouraged to do in their own time. The way students evaluate and consider a module may also be related to the different types of student; there are those who are motivated with “clear academic or career plans” and there may also be others who are there to “get qualifications for jobs” (Biggs, 2003, p.3). This would support the notion of an evaluation method which would allow some of the background of the individual students to be understood to assist in the interpretation of the data.

Taking into account the literature presented thus far, it is suggested that evaluation of quality and effectiveness in teaching and learning should not be over-simplified to a situation which only allows for ratings and responses to be obtained through standard course evaluation questionnaires. Evaluation must allow for information to be gathered on how students have carried out their learning and to allow any influential factors specific to a particular teaching and learning context to be considered. This study describes an approach to evaluation which provides a more holistic view of students' evaluation of teaching and learning; it allows the practical element of how students approach their learning to be explored, it explores students' perceptions, and it investigates how students may be influenced by their teaching and learning experiences.

A context based approach to evaluating teaching and learning

As Biggs (2003, p.2) identifies, what works in teaching is “a complex resolution between us and the system that operates in the particular institution in which we are working.” We have to adjust teaching within the context in which we are working; including its relationship to subject matter, resources, students, and our own strengths and weaknesses. As we have to adjust our teaching, we also need to consider our

evaluations in the same manner to ensure that they are the most appropriate for what we are trying to find out. Making use of a mixed methods strategy for evaluation allows for rich and valid data to be obtained through a more research focused technique, rather than through a normal institutional evaluation or review.

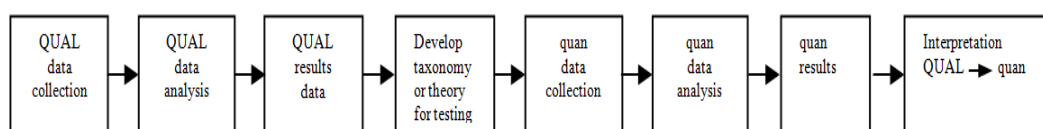
Jones et al. (1997) suggest that staff should run an evaluation session with students towards the end of a course where students are asked to identify aspects of the course which they think should be included in an evaluation sheet. An evaluation sheet can then be produced which focuses on these points, as well as including aspects of the course that the member of staff wishes to evaluate. Race (2006) suggests a similar method for teaching review, where he introduces the possibility of using preliminary interviews with a representative selection of students to establish the agenda for feedback questionnaires. This method is reflected in the student satisfaction surveys undertaken at the University of Central England (Harvey & Knight, 1996) which show a context specific approach to evaluation. These surveys focus on the total student experience and highlight key issues in students' perceptions of quality (Green, 1994, as cited in Haselgrove, 1994). The surveys include a set of "satisfaction" items which are identified by student focus groups (Williams, 2002). Completion of the survey by a larger sample of students allows the importance of the items to be determined.

Mixed Method Evaluation Research Design

The evaluation method applied in this project is based on a sequential exploratory mixed methods research methodology, where both qualitative and quantitative data are used to give a better understanding of the phenomenon under study. This paper discusses the first phase of the design, where qualitative data was used initially to gain an understanding of the situation. This exploratory design "is characterized by an initial phase of qualitative data collection and analysis, followed by a phase of quantitative data collection and analysis" (Creswell, 2003. p.215) with priority given to the qualitative aspects of the study. The information gathered during the qualitative stage will be used to develop a theory regarding the teaching and learning experiences of students. A context specific quantitative instrument will then be designed which can be used to gather data and explore the theory with a wider sample. It is this form of mixed method design that is suggested as a suitable method for evaluation of teaching and learning.

Figure 1 shows the detail of the sequential stages undertaken during this project to develop a theory to understand students' perceptions and approaches to learning within a given context. The notation of 'QUAL' is used to represent the dominant qualitative source and 'QUAN' to show the less dominant quantitative source used for validation purposes (Morse, 1991).

Figure 1. Exploratory Sequential Design Detail (Creswell & Plano-Clark, 2007, p.58)



In this study the qualitative data was obtained through interviews and observations, and the quantitative data will be gained through completion of a likert-type rating scale questionnaire developed following analysis of the qualitative data. This method of developing and administering a questionnaire based on previous findings allows the qualitative data to be verified against a larger sample. It also reduces the likelihood of bias which may occur through only gathering qualitative data from a small sample of students.

The full cohort was 51 and from those a sample of 6 students, made up of both part time and full time students (4 full time and 2 part time, which was similar to the full time to part time ratio in the class) were interviewed during this stage of the research. A semi-structured interview format was used to allow students' perceptions of their learning contexts and their approaches towards learning to be explored. Classes were observed to allow the schedule of interview questions to be informed and therefore questions specific to the context to be prepared.

When discussing student evaluations of teaching, Onwuegbuzie, Daniel and Collins (2008) recommend that that mixed methodological approaches should be used to obtain a more comprehensive picture of teachers' instructional effectiveness. In this study the qualitative phase of data collection completed to date has already provided a rich source of information to inform individual teaching staff about the way students perceive and approach their subject. The qualitative data collected to date has allowed a range

of issues beyond the normal course evaluation to be explored, providing a much richer source of feedback on students' experiences of the teaching and learning environment. These issues can be further explored in the quantitative stage of the project to investigate whether these views are a valid representation of the whole cohort.

Results

The following section outlines some of the findings from the qualitative phase and also introduces some more general questions arising from analysis of the data which the writers feel deserve further exploration and should be of interest to the wider HE community. NVivo software was used to support the analysis of the qualitative data. The selected findings are presented here as an example of the range of information which can be obtained through use of semi-structured interviews to explore experiences of teaching and learning.

Of particular interest was that the data gathered to date highlighted some issues which would not be uncovered by the course evaluations used at the institution in which this study was based, or through the use of the NSS. Five themes have been drawn from the data to provide examples of this. Data emerged which provided an insight into how students' expectations were related to their perceptions and also how students' approaches were influenced by the perceived teaching quality and the value placed on individual components of study. Data also emerged regarding students' uses of strategies within their learning, such as peer studying and questioning.

Students' expectations

A clear theme emerging from the interviews was that students have very specific expectations as to what staff should do and how they should use their contact time with students. One student quoted that one member of staff was the only one who "actually uses the seminars properly."

Kember and Wong (2000) identified that, when students complete course evaluations, they rate according to their own conceptions of teaching and may therefore poorly rate teachers who use methods differing from those conceptions. Where student

evaluations are used by an institution to evaluate teaching and learning, attention should be given to understanding students' expectations; time should be taken to explore student expectations of how contact time should be used, to discuss how these perceptions are formed, how they differ amongst students and in what ways students are evaluating their course experience against these expectations.

Students' approaches may be affected by the importance of a subject

In exploring students' opinions of the individual modules studied, it was found that students identified their Fluid Mechanics/Thermodynamics subject as being important. For example, "it's so much of the bread and butter of what we want to do as mechanical engineers" and students explained that they made an effort to attend sessions because "...it's an important subject." It is noted that a standard course evaluation would not allow for modules or subjects to be considered in terms of how important they were perceived to be by individuals and with respect to the other aspects of a programme of study.

It is suggested that if approaches to learning and studying are affected by perception, and in this case by "perception of importance", then those individuals involved in designing courses and delivering teaching material should aim to understand students' perceptions of subjects. If students are prioritising "important" modules over others then this may need to be considered in course design. Assumptions regarding student study hours are often made based on module credit size but this concept of "importance" may also need to be considered to explore students' "actual" effort, what share of their time they devote to a subject, and how their view of importance is determined.

Effect of a "good" lecturer on student approaches.

Students discussed a module that they were "happy" with, saying that the lecturer was vital in helping their learning: "I think [Lecturer] is definitely helping, it helps having a good lecturer. Definitely." Another student gave an example from one module: "[Lecturer] is just so enthusiastic and I think it's great...he's got a passion for the subject that's passed on to us."

During this discussion students were asked about studying during their own time, since there is an expectation in higher education that students will carry out independent study. Most students agreed that they had completed some of the tutorial questions (questions provided by the staff to offer directed independent study) but one student said “I have done a couple of questions at home” and when asked if he felt he needed to do those questions to help him learn he said “I think [Lecturer] does more than plenty to get you on with.” Jones et al., (1997, p.108) explain that some students entering higher education believe that their “lecturer has all of the knowledge that they require and that their task is to assimilate it directly”. This finding possibly suggests that we may need to question whether the high opinion of the lecturer in this case could be counter-productive. If students think that the lecturer “does enough” and that working through only some of the tutorial problems the lecturer sets is enough, are we in some way removing the need to develop self motivation and also the full range of academic skills such as enquiry and information seeking?

When discussing further reading for a subject during the interviews one student stated that they “haven’t really needed to [read]”. This may also be linked to the perceptions that the students hold regarding the quality of teaching and the quality rating of the lecturer. Do these perceptions encourage the students to think the lecturer will cover enough in their classes to enable them to develop the level of knowledge and understanding required of them at the undergraduate level? A standard evaluation questionnaire may ask about quality of teaching, or about time given to independent study. It would not, however, provide the additional information which has allowed the inferences here to be made.

Use of informal peer study groups within the discipline

During the interviews the theme of how students approached their work was discussed. A standard evaluation questionnaire may explore this, asking for example: “Was the amount of independent study required what you expected?” or “Were you organised in your study?” This study aimed to gather more specific information about how students approached their studies at different times during their course.

When exploring the concept of independent study in interviews it became apparent that students appear to have established informal peer groups for studying in their own time.

One student confirmed “I had ad-hoc study groups that were in the course, a few of us in our spare time would go and do some questions before a seminar” and another student said “we worked in a big group”. This finding suggests that several study groups may exist amongst a cohort of students. Within engineering degrees small groups are often established for lab work, but may not be established in fundamental subjects for seminar work or within lectures. Assessed work in these subjects is usually of an individual nature so, under normal course circumstances and standard evaluation practices, teaching staff would be unaware of this informal peer work taking place outside of the class time. These study groups may suggest some students have a mature and focused approach to their studies; selecting to work in groups with others who share common problems, to allow them all to deepen their knowledge within an area. It may also be that students are pragmatic in their participation in study groups, taking part in those groups in areas where they feel less able, with the aim of gaining support from other students.

Boud (1981, p.14) acknowledges that “students can learn as much, or even more, from their peers as from their teachers, but the help students can give to each other is a severely under-utilised resource in higher education.” It would seem reasonable for further investigation to take place to identify the scale to which these study groups exist, and the influence they have on students’ approaches to their learning. It may also be interesting to consider the place of these small study groups within the formal system at the University: for example, should participation be acknowledged on submitted work, should participation be encouraged for informal tutorial work, and do those without a study group fail to benefit in some way?

Students’ questioning behaviour

When the level of peer working amongst students was explored further during the interviews, a taxonomy of student behaviour with regard to asking questions in lectures became apparent. With respect to evaluating teaching and learning experiences, it is interesting to explore the concept of questioning in much more detail than a standard question, such as “Were there opportunities to discuss questions with staff?” More detail and depth can be gathered through exploring student engagement in questioning. For example: when are students encouraged to ask questions? What type of questions

are students asking? Who do students chose to ask questions too? How has questioning supported/furthered learning?

Throughout the interviews, students appeared to categorise their decisions about when and how to engage in questioning. Table 1 provides a summary of the categories of problems discussed by students and their associated responses. One student explained that if they are unsure of something there is a “set system,” stating “You look over your mates shoulder and see if he’s got it... If he hasn’t got it then... I’d imagine other guys didn’t have it as well and then I’ll ask.” Students considered that they would only ask the lecturer a question if they were unsure about a fundamental point or if their peer also did not understand/have the correct answer. For example, “I would stop the lecturer and ask them to go through it again if it’s something fundamental”.

Table 1. Categorisation of problems and responses by students.

Category of Problem	Response
Possibly just misheard	Ask peer during the class
Not understood but not fundamental	Not ask question at all, look over work in own time
Procedural problem	Ask peer during break in lecture
Fundamental point not understood	Ask peer first, if they also do not know then ask the lecturer

Biggs (2003, p.1) suggests that we could regard good teaching as “encouraging students to use the higher-order learning processes that ‘academic’ students use spontaneously”. If students’ opinions about when they should ask questions are preventing opportunities for discussion in lectures, and the opportunities for students to make use of higher order questioning skills are limited in some way by this, is it possible that in some way the academic behaviour of our students is limited and that “good teaching” as defined by Biggs might not be taking place?

These results suggest that further work should be carried out to explore what students consider to be fundamental points within their learning; if their understanding of what is fundamental is not correct then they may be letting their learning continue without addressing key issues. It would be interesting to explore whether this behaviour is apparent in other classes and to question whether this logic of students deciding what is fundamental is a positive experience; is it constructive that students choose carefully when to ask the lecturer questions or does this hold back some possibly fruitful class

discussions? It could be suggested that how students have engaged in, or been encouraged to make use of, higher level questioning skills should be included more often in the process of evaluation of teaching and learning.

Discussion of results

There seems to be a great deal about student perceptions, and approaches, which is generally not spoken about or not considered during normal teaching and learning evaluations. Students have definite ideas, expectations and opinions about their learning contexts, as well as their own studying and coping/managing strategies. The issues explored in the results raise several questions which now need to be explored through the questionnaire with the larger sample to understand whether these views, practices and approaches are consistent amongst the cohort.

To enable staff in higher education to understand how they are contributing to students' learning, they need to be more aware of students' perceptions and of their actual approaches to learning and studying. Students' perceptions were explored and data emerged showing perceptions of the teaching and learning context, and satisfaction within it, to be linked to expectations. It is suggested that students' perceptions may need further exploration to understand how the value students place on individual components of a course affects their approaches to study. A greater understanding of students' expectations within higher education would also allow perception ratings to be interpreted in ways which are more useful to teaching staff.

This study allowed students' perceptions of lecturing staff to be explored and to consider how these perceptions related to students' approaches to study. It was interesting to note that the value students placed on having "Good lecturers" may have had a negative impact in relation to students developing their own sense of enquiry.

Peer groups were discussed by most students within the study. This provided an example of students' approaches to study which were in some cases quite structured in terms of when peer study would take place. A normal teaching evaluation would not provide the opportunity to explore the extent of peer working within a course. Hence

these findings suggest that evaluations of teaching and learning should consider the extent to which peer work may be influencing students' approaches to studying, their perceptions of the total experience, and their overall learning.

An interesting finding on the theme of students' questioning behaviour emerged in the interviews. This allowed a previously unexplored view to be highlighted. Students explained their logic about how they decide when to ask questions in lectures and suggested that they make conscious decisions about engaging in questioning. Questioning can be considered as a form of discussion or interaction in classes and can encourage students to engage in learning activities and therefore support high quality learning (Chickering & Gamson, 1987). Standard evaluation of teaching and learning experiences may ask students about the opportunities to ask questions and about support given in response to questions. They would not, however, allow the motivation behind questioning to emerge (as it has done here) as an important factor in questioning behaviour.

Implications for using mixed methods in teaching and learning evaluations

This mixed method strategy for evaluation is considered to be of use to those interested in the process of evaluating teaching and learning from a scholarship perspective and from a programme or institutional review perspective. The qualitative stage alone of this strategy has produced findings which are grounded in the local context, and are therefore directly related to local teaching and learning practices. It is considered that these are useful data which can now be used to understand the complexities of teaching and learning from a student perspective.

Standard structured module review questionnaires, by the nature of their design, can ask basic (or generic) questions and allow students to rate experiences. This paper, however, suggests they act only as an introduction to the evaluation of teaching and learning. The data they provide is not rich enough, or in enough depth, to be useful in course design, in determining teaching strategies or, in fact, evaluating the teaching and learning experience as a whole. As teaching and learning is so context bound, the standard evaluations can only ever brush the surface. They cannot ask the questions

which are needed to really understand students' experiences and the decisions students make within their own specific learning contexts.

The mixed method evaluation design allows staff to explore and understand students' views with respect to small elements of study or in whole modules or programmes. It also allows individual modules to be considered in relation to other modules so that differences in perceptions and approaches can be identified. The method allows perceptions to be understood in relation to expectations and provides an opportunity to begin a dialogue to discuss reasonable and realistic expectations with students.

The first stage of this mixed method design allowed an in-depth exploration of learning and teaching from the perspective of a small sample of students. The second stage will allow a questionnaire to be produced, to include items which are relevant to the student cohort and which focus on the key aspects of students' experiences identified in the interviews. Administering the questionnaire to the larger cohort will ensure views are considered other than those of students who self-selected to be interviewed.

The real benefit of this method for practitioners in higher education is that the quantitative data produced following the second stage will be specific enough to be relevant and useful. The qualitative data gathered in the first stage can also be used to help in the interpretation of the quantitative data and to enable inferences to be made.

Conclusion

With limitations in the student time available to gather feedback, mixed methods offer a solution to allow specific and relevant feedback to be obtained without the initial need for full cohort data collection. A small sample of students can be interviewed or can participate in a focus group to allow initial data to be gained before using the data to produce much more targeted and specific larger scale quantitative data collection.

Standard generic module or course evaluations completed by students can only ever give a small amount of information, but great weight is placed upon them within institutional Quality Assurance. The data collected by questionnaires cannot give the full picture of student views and in the eyes of the authors may not be the best source of

data on its own for implementing changes and making decisions to enhance the student experience at an institutional level. As professionals and academics we understand the need for accuracy and high quality information in our own research and we should be aiming to collect information of the highest possible quality so that we can be informed by accurate data and make informed decisions with regard to teaching and learning practice.

The data collected during the first stage of this research lead the authors to consider the role of, and the greater possibilities for, using mixed methods in course evaluations. The paper proposes that these results could not have been gathered using a “standard” class evaluation form and that they may actually be more useful in understanding the wider picture of students’ experiences and therefore in informing teaching practice in a more relevant way. Whilst accepting the operational issues of why generic course evaluation forms are used, this mixed method data collection and analysis process has identified some valid issues, student practices, and perceptions, which would not normally have been seen.

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