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Perceptions and their Influences on Approaches to Learning

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Abstract: *This paper aims to highlight the importance of considering students perceptions and approaches in undergraduate engineering education. Whilst considering techniques to retain engineering students it is suggested that understanding how students perceive their learning contexts at university is vital. It is also essential that we understand how these perceptions influence students' approaches to their studies.*

The paper builds on existing research which takes a discipline focus to a discussion of the relationships linking quality of learning with generic research into approaches and perceptions of teaching and learning.

This paper discusses an ongoing research project which is making use of a Mixed Methods research methodology to investigate the complex nature of students' perceptions and approaches. It is presented here that this methodology is valuable for Engineering Education researchers to adopt.

The design of this research is an exploratory sequential mixed methods design where the qualitative data is the dominant source of data. The use of this methodology will be evaluated once all data has been collected and analysed.

Initial analysis of the data collected during the pilot phase, supported by relevant literature, has been used to identify the areas of the learning context which appear to influence students' approaches on the engineering modules involved in the study. Some of the emerging themes will be discussed in this paper with consideration for the impact on the teaching of Engineering.

Introduction

Engineering today is more than an academic or technical discipline. As explained by the Engineering Council (1997) the engineering professions have to deal with, "scientific and technological matters, but increasingly also with economical and political matters as well as with ethical, societal and environmental aspects" (as cited in Maffioli & Augusti, 2003). Engineers today need to be able to work in permanently changing technological, social and working environments and therefore must be educated with this in mind. This overview of the engineering profession shows that in the work place a great mix of skills are required and that the education of today's engineers must reflect this.

As indicated by Jesiek *et al*., (2009) "Engineering education research is a relatively new field of activity..." The engineering education research community, whilst consisting of a large number of practitioners in teaching engineering is primarily concerned with the "field of engineering education research, not the practice of educating engineers" (Borrego, *et al.,* 2009, 53). However as the primary focus of the research is to understand engineering education process it therefore can not be considered in isolation from the practice of teaching and learning, and the students involved.

In Engineering Education research the concept of the context of teaching and learning, where context is defined as "the circumstances that form the setting for an event, statement, or idea" (Oxford Dictionary, 2010), is one which must be addressed. The complex nature of education means that no aspect can be considered in isolation; investigations in engineering education must consider the whole context. Tessmer & Richey (1997) explain that "context is not the additive influence of discrete entities but rather the simultaneous interaction of a number of mutually influential factors". They discuss how contextual elements can be engineered to facilitate learning and performance, and in fact in this sense "context is an element that surrounds its members as a continuous presence".

Aim of the Research

This paper aims to highlight the importance of considering students perceptions and approaches in undergraduate mechanical engineering education. Whilst considering course delivery techniques for engineering students it is suggested that understanding how students perceive their learning contexts at university is vital. It is also essential that we understand how these perceptions influence students' approaches to their studies. The paper builds on existing research which has discussed the relationships linking quality of learning with approaches and perceptions of teaching and learning.

This paper discusses an ongoing research project which is making use of a Mixed Methods research methodology to investigate the complex nature of students' perceptions and approaches within engineering, and it is presented here that Mixed Methods research is a valuable methodology for Engineering Education researchers to adopt.

Reasons for Considering Students' Perception

This work is examining student perceptions and approaches to learning at an intermediate stage of their course, an aspect which is reported far less than early stages of the learning cycle, which for example extensively reports perceptions at recruitment, their influence on early stage retention and learner identity.

Recruitment

Akam (2003) discusses the major decline, in most developed countries, of young people taking up science, engineering and technology subjects in later stages of education.

Akam refers to a public poll from some years ago which "found Britain's best known "engineer" was Kevin Webster, the car mechanic from Coronation Street". With views like this it is not surprising that young people do not consider careers in engineering. An accurate perception of engineering within the general public, including young people, teachers and parents must be encouraged to ensure perceptions "match the reality of a multi-skilled, dynamic and challenging profession that is vital to the UK Economy".

The Progress project (2004) again recognises the importance of students perception in recruiting students to engineering. "Given the image of engineering, particularly in Britain, it is hardly surprising that students' own expectations of their courses often differ significantly from reality". The project confirmed that many people do view engineering as highly analytical and recognise the amount of hard work that is required, however they conclude that "most people with this perception do not apply to study it."

The issue of perception affecting recruitment is also prevalent in the US where the need for engineering talent is said to be continuing to grow yet enrolment figures continue to decline (Loshbaugh and Claar, 2007). If we can understand how students perceive the teaching and learning environment and approach their studies then universities can considered making adjustments to encourage more student to enrol in engineering courses.

Retention

Retention in science, applied technology, engineering and mathematical courses is worse than in other subjects, for both full-time and part-time students (Committee of Public Accounts, 2008). Research has indicated that students are more likely to continue with higher education if they are engaged in their studies and have developed networks and relationships with their fellow students (Crosling, Thomas & Heagney, 2007). In aiming to increase student retention being aware of students' perceptions could therefore be crucial.

There is significant research evidence that learning and teaching environments are highly influential for students' retention and success. Jones (2008) explained that finance is important to students, but that relations with staff can be much more influential in students' decisions to remain in Higher Education. If we can understand how students perceive issues such as relationships with staff then we can act to support students to continue in their education.

The reasons for students' non-completion of courses in all disciplines have been explored in the National Audit Office report (2007). Commonly cited reasons for withdrawal are reported to be; personal reasons, lack of integration, dissatisfaction with course/institution, lack of preparedness, wrong choice of course, financial reasons and to take up a more attractive opportunity". University

staff engagement with students and discussions regarding their perception of their learning contexts and experiences could provide insight to students who feel that they may have reasons to withdraw. Early indication of issues such as perception of difficulty, isolation, incorrect choice of course, can allow universities to act on supporting students with their continued study.

A matter which effects retention and recruitment is that of inappropriate course choice. Hammoudah reports that across all universities inappropriate course selection is one of the most commonly given causes for early student withdrawal. As Moore, Diefes-Dux & Imbria (2007) identify "First year engineering students often lack comprehensive knowledge of the engineering field. This makes it difficult for them to appreciate why learning fundamentals is required." Understanding students' perceptions of engineering and their expectations of the course could help significantly with recruiting students, and helping students continue, on engineering courses.

Identity

Students can benefit from developing an identity with a programme or a profession during their studies. Through students' construction of their professional identities they "learn to situate their own knowledge, interests, and sense of self within the larger context of professional engineering" (Eliot *et al*., 2008). Construction of a professional identity can be a powerful influence upon student retention in engineering programs, students learning, and then their subsequent adjustment to the workplace. Understanding how students perceive themselves in terms of fitting into an engineering community and their learning within a professional context can allow universities to provide support to students in making the transition and developing professional identities.

Foor et al. (2007) suggest that factors such as gender, ethnicity and socio-economic status can provide challenges for students' in seeing themselves as part of an engineering community (as cited in Eliot *et al*., 2008). Being aware of students' perceptions of identity, and the factors causing barriers to them developing professional engineering identities, should be investigated within higher education settings so that strategies can be employed to help develop students' professional identities.

Learning

Ellis *et al*. (2008) explain that the activities undertaken by students which result in learning can be affected by beliefs about the demands of a course's assessment regime, by beliefs about the standards expected by a teacher or by what students perceive it is possible to learn in a specific situation. Cronje & Coll (2008) explored student perceptions in engineering and science based subjects within higher education. It was found that students expressed a need for 'well organized and planned lectures', seemed to favour 'having a variety of teaching approaches' and preferred teachers who could 'relate theory to practice'. Some students also preferred 'to have most materials available on-line for ease of reference during assignments'.

Research has shown that students' approaches to learning are related to the quality of their learning outcomes (Ellis *et al.*, 2008). Prosser and Trigwell (2001) clarify that students who adopt a surface approach to learning are more likely to achieve low-quality learning outcomes in contrast to students who adopt deep approaches and are likely to attain higher quality learning outcomes. In this research higher quality learning is considered through Entwistle's (2008, p4) definition that "high quality learning depends not just on pass or completion rates, but on the nature of the knowledge, skills and conceptual understanding that students have acquired during their degree course". Laird *et al.,* (2008) clarify that surface learning does tend to dominate in engineering.

Ellis *et al.,* (2008) discuss the work of Goodyear, Jones, et al. (2005) and Struyven et al. (2006) who also concluded that how students interpret and experience a course is more important than the course's underlying pedagogical intentions. If students sense that a course is badly implemented, that they are overloaded with work, that there are no clear goals and poor feedback then they are more likely to respond with surface than deep approaches, irrespective of the pedagogy or the technology being deployed by the teacher. Entwistle (2008, 13) carried out teaching and learning research in Electrical Engineering with higher education and concluded that 'it is not so much the teaching-learning environment we provide that affects the learning approaches of individual learners, as their perceptions of it'.

The diagram below shows a theoretical framework for this research. The five areas identified under context appear in several sources of literature as factors (some of which are discussed above) which affect students approaches to learning. As this research continues a more detailed theoretical

framework will be developed showing specifically the issues relevant to the engineering students involved in this project.

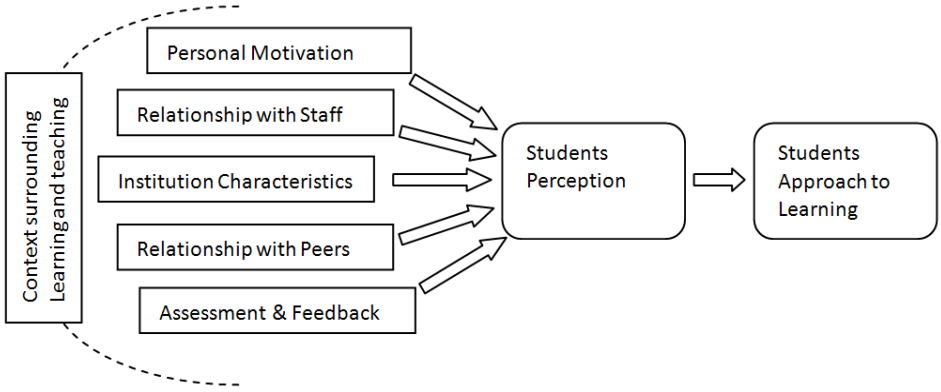

Figure 1: Theoretical Framework for considering students perceptions and approaches to learning

Methodology

This research is influenced by the pragmatic paradigm, where knowledge claims arise out of 'actions, situations, and consequences' where 'instead of methods being important, the problem is most important, and researchers use all approaches to understand the problem' (Creswell, 2003, 11). Borrego *et al.* (2009, 53) explain how they "expect that quantitative, qualitative, and mixed approaches will be essential in the future" within Engineering Education research. Bailie and Bernhard (2009) agree that it is "necessary in educational research and in engineering to use quantitative as well as qualitative approaches".

A Mixed Methods approach to data collection and analysis approach is being used in this project to enable data to be gathered on the current contexts surrounding student learning experiences and to determine what factors the students perceive as being important to them. The core assumption which forms the basis of the mixed methods research approach to enquiry is defined by Creswell and Garrett (2008, 322), 'when researchers bring together both quantitative and qualitative research, the strengths of both approaches are combined, leading, it can be assumed, to a better understanding of research problems than either approach alone.' The theoretical framework in Figure 1 shows the varied aspects of students' learning experiences which affect their perceptions and approaches to learning. The methodology has therefore been developed to allow the different elements of those factors affecting students to be fully explored.

The research involves two phases of data collection making using an exploratory sequential mixed method strategy with data analysis between stages. Figure 2 below shows the Mixed Methods notation of an exploratory sequential design. 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. The method chosen allows qualitative data to be gathered from a select sample first on the current contexts surrounding student learning experiences, and then a quantitative data to be gathered from a larger sample to validate the results. This practice of using unequal sample sizes, where one sample has a greater weighting place upon it, is normal within Mixed Method studies (Morse, 1991).

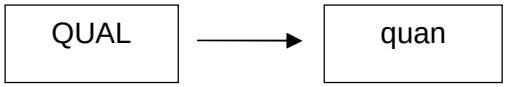

Figure 2: Exploratory Sequential Design (overview) (Creswell, 2003, p213)

The research data is drawn from a Mechanical Engineering BEng (Hons) degree programme at a post-92 University. The study involves data collection over two academic years, making use of student volunteers in their second year of study. The reason for collecting qualitative data initially is that there is little known about students' perceptions in Mechanical Engineering. The initial qualitative stage therefore allows for data to be gathered, analysed and then the data can be used to produce a taxonomy which can be investigated further within the larger quantitative aspect of the study. Data is gathered through observations, semi-structured interviews and questionnaires to gather data from students. Both stages of the research will follow the process demonstrated in figure 3 below.

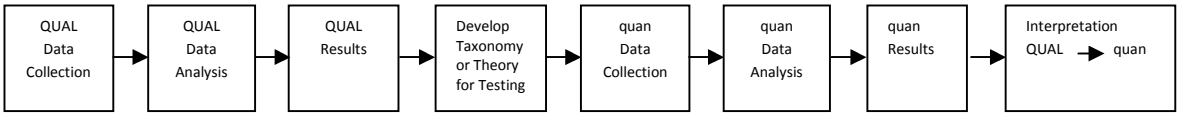

Figure 3: Exploratory Sequential Design (Creswell & Plano-Clark, 2007, 58)

Data Collection

Sampling for the interviews made use of stratified sampling to ensure that data was collected from part time and full time students, and was representative of the population (Creswell & Clark, 2008). Samples for the quantitative data collection, and for qualitative data in observations, will involve all those students who opt to be involved from the second year cohort. The sample sizes when interviewing will therefore be a different size to the other data collection methods used in this project. This method follows Creswell, Plano-Clark & Garrett's (2008, 75) example of sampling within mixed methods where unequal sample sizes are used 'in the quantitative and qualitative strands of a study for the purpose of providing a full picture of the situation.' The purpose of the observations was to act as an observer and a non-participant in classes to understand how students were behaving in classrooms and to understand the context of the classes to aid discussion in the interview process.

The individual semi-structured interviews took place with students at the start of Semester 2 to explore their experiences of semester one and to inform the design of the quantitative and qualitative questionnaire which was administered at the end of semester 2. The interviews were semi-structured so that a core of questions could be addressed whilst still allowing for flexibility to respond to, and explore further, issues arising during the interview. To date, 16 students have been interviewed with interviews lasting between 25 and 40 minutes in order to try and keep the time commitment from students to a minimum. The topics addressed in the student interviews were Opinions of the Modules, Approaches towards learning, Institutional Factors Affecting Learning, Subject Content and Assessment.

Before the interviews took place two informal meetings were held with students (8 part-time and 3 full-time) to have a general discussion about experiences of the module, this data was used to inform interview questions along with the already piloted Shortened Experiences of Teaching and Learning Questionnaire (SETLQ) (ETL-Project, 2005).

Questionnaires with a mix of closed Likert scale questions and open questions were given to the whole student cohort to ask them to self-report on which subject areas they find easiest/hardest, to discover which delivery and assessment strategies students felt helped them to understand the material and which factors they felt prevented or hindered their learning. The questions were informed by the Shortened Experiences of Teaching and Learning Questionnaire (ETL Project, 2005) in addition to the detailed information collected from the student interviews.

Results

The following section outlines some of the findings from the study and introduces some more general questions arising from the student interviews which the writers feel deserve further exploration and should be of interest to Engineering Education researchers and to the wider Higher Education community. The findings discussed here have been drawn together with respect to evaluating perceptions of teaching and learning and the range of information gained through a mixed methods approach.

Initial analysis of the data collected, supported by relevant literature, has been used identify the areas of context which appear to influence student learning. The contextual factors which appear to have most heavily influenced student experiences are summarised by figure 4. The figure shows that in addition to those factors outlined in the theoretical framework the students involved in this project were also influenced by items such as the 'demands of the subject' and the value placed on 'problem solving' activities. The following section gives more detail of the specific issues that students felt were influencing their learning in this context:-

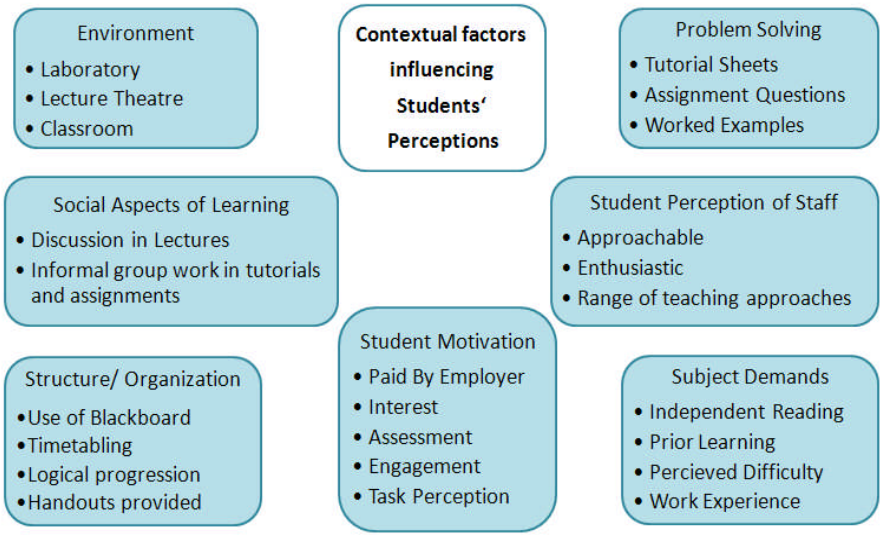

Figure 4: Summary of contextual factors influencing students' perceptions

Use of contact time

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.*" Students value seminars stating "… *the good point of some of it was the seminars, being able to go in and have a one to one.*"

Students ranked the factors relating to staff use of contact time which they felt have helped their learning. They ranked having the opportunity to complete 'worked examples' as most helpful to their learning followed by 'Lectures' and then they ranked being given 'Handouts' next most helpful alongside 'Lab sessions..

Students discussed a module that they were 'happy' with, saying that the lecturer was vital in helping their learning "I *think L is definitely helping, it helps having a good lecturer. Definitely*". Another student stated "*I do think the lecturer makes a big difference and the way he approaches the subject*" giving an example from one module "*L is just so enthusiastic and I think it's great…he's got a passion for the subject that's passed on to us.*"

Importance of a subject

In the classroom observations, and confirmed through the questionnaire, it was found that about 90% of the cohort regularly attended the sessions in Energy Studies. In exploring this during interviews it was found that students regard the subject as important, for example "*it's so much of the bread and butter of what we want to do as mechanical engineers*" and *"… that's because it's an important subject and also because the delivery is a lot better than other modules*."

Students did acknowledge that subjects do however have to have personal relevance to students to be important "*So it's a case of relevance to that person, what they might be doing in the future." Several students* felt that the core subjects were important and defined these as being Energy, Mechanics and Maths, and as one student explained "*to become an engineer you have to prove you can do this (set of subjects)*", and the other subjects studied are "*to make you a better engineer.*"

All agreed that they wanted to do well in the core subjects *"The subjects I'm going to pay most attention to again are the core subjects … I want to do well (in the core ones) …, just mainly because if I can get through them, then I know I'll certainly be able to get through the others…"*

Lecturer Support

Students did however acknowledge that there were sometimes difficulties in getting individual support from staff stating "*some of the lecturers didn't reply to emails."* This is interesting to consider, in a world where most students are very technically proficient and choose email as a convenient and

preferred form of contact, we may need to consider how staff view the use of email. Should there be standards, or systems set up to ensure all students receive prompt responses? Part time students found it difficult to see staff in person and they felt further use of email would help them receive help when they were back in their workplace "*[some lecturers' would say] 'Look, if you've got a problem then you need to come and see us' and it was kind of around dinnertime and you're having a full day of work and you need a break or you just don't concentrate on the afternoon. I found that a bit difficult as well. It would have been nice to just get a bit of feedback over the emails or Internet or somewhere."*

Other students valued staff that were able to respond to them in what they acknowledged to be busy working conditions giving the example of one member of staff "*I'm sure [lecturer] had people bombarding them with questions and [lecturer] actioned it… [lecturer] didn't forget to do something that they promised to do, which I think has more of an impact, you know, there's reliability.*"

Assessments

In the semi-structured interviews students discussed their experience of both closed and open book class tests, and how they did not find the class tests as useful in terms of helping them learn as they found coursework style assignments. Students admitted that in their first year they has crammed and just aimed to pass the class tests whereas the completion of assignments in second year had forced them to try and understand the material. In a positive respect one students explained the benefit he felt from a piece of feedback he received following a lab assignment "Actually, the first feedback I got from [lecture], and I used it for the rest of them, and I ended up getting 95% for the rest of them, so I would say it did me good."

Structure

Modules having clear teaching and assessment structures seemed to be important to most students and in cases where the structure wasn't clear students acknowledged that they did not see the point in the module. In one case students were given a multiple choice test which they viewed to be "*too easy*" and explained the "*multiple choice ones we did **..**, I didn't particularly like them because it just seemed a bit pointless really.*" In another cases students were unclear about weekly assessed work they were completing "*he gives us an assignment every week as well. So he gives us two or three questions a week that we've got to do and hand in and then he marks them. And apparently that's going to the grades.*" Students do however acknowledge that while lessons can be "good" and "fun" it doesn't mean they understand the reasons for learning that subject "*It was fun and I liked it but I didn't see the point in it… And then it wasn't really that organised as much as, say [other subject]...It was just basic, that's about it, and I didn't really see the point in it to be honest.*" The comment that a topic or subject was "basic" was reiterated by several students showing how important it can be to teach at the correct level, or maybe to explain to students why certain material is being covered in a particular way, in a case of managing students expectations.

It would be interesting to further explore the effect of unclear structure, for example a comment was made by one student that "*I don't know how the assessment worked. I think you winged it really,*" it would be interesting to see what approach to learning was taken in this module. One student who had industrial experience recognised the need for structure and questioned in one case why there wasn't quality control to ensure all classes were structured, again communicating and discussing structure with students could be important in cases such as this.

Staff consistency, reliability and professionalism

Students have expectations about how staff should behave and act. One student felt that "*Lecturers, have to have a sort of higher standard, professional attitude which is fair enough because other people are here to try and get a career.*"

Students indicated that they didn't mind arrangements changing as long as they could see the benefit for themselves, and that changes were done in advance "*I think originally we had one one-hour lecture on a Wednesday, which was, I think it was 11 until 12 or something, which seemed a bit pointless*". "*I think that was shoved onto the Friday morning or something, which worked out a lot better, having the whole day off.*" Students were unhappy when things were changed with little notice, "*I remember coming in a few times and no one being there and stuff like that and them being cancelled, or you got an email in the morning saying it was cancelled, but then you don't sometimes check your emails in the morning so…"*

Students had all used the electronic learning platform (eLP) at some point throughout their first year and although not all used it regularly. One student felt quite strongly that staff should adhere to the minimum standards set out by the Institution saying "*I don't like the lecturers that don't put anything on it because I just feel that you should do really. At least then it's there."* Several students explained that although they were happy to use the eLP they did not feel as comfortable or that it was as appropriate to be referred to Lecturers personal webpages. They seemed to prefer the professionalism and formality of the eLP (even after acknowledgement that the eLP had difficulties of it's own such as negotiation) rather than personal webpages where hobbies or holidays etc may be discussed on pages alongside pages discussing engineering theory; one example was given "*he put links to his own family web pages on there. (Laughter). And that was completely pointless, a waste of my time; although I looked at it, which is even worse!"*

Benefit of Peer Learning

During the interviews the theme of how students approach their work was discussed. Student's approaches towards assessed work were discussed in addition to their approach to individual study and their completion of tutorial problem sheets. There is an expectation amongst many teaching staff that in addition to students completing classroom tasks and assessed work they will carry out independent study. For example, this is often assumed to be done through directed reading or encouraged through the completion of a tutorial sheet which is generally a series of questions related to specific topics of study. These tutorial sheets can then be discussed in tutorial sessions for students to obtain feedback on their progress in a topic or for them to identify any areas causing them difficulty. This line of questioning showed that students appear to have established informal peer groups for studying in their own time, for example, 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 saying "*we worked in a big group.*"

Within Engineering degrees small peer groups are often established in fundamental engineering subjects for lab work but not necessarily established for seminar work or assignments. Assessed work in these subjects is usually of an individual nature so under a normal course circumstances teaching staff would be unaware of this informal peer work taking place outside of the class time.

Observations in the class also saw that peer networks were present in the classroom with small groups of two, three or four occasionally discussing problems during the session, but more often during breaks in teaching. Students also explained that when they have been busy they use technology to allow them to work with their peers "*But sometimes when I've been busy, I just do it from home and it's text messaging, mobile, you know, scanning bits of work in… So it's done in various ways. But there's generally a shared kind of ethic there, I suppose; we share everything. I certainly wouldn't have managed to do things if that wasn't an option. It's definitely a better way of working.*"

Discussion

It can be seen from the literature discussed here that students' perception contributes widely to multiple aspects of their experiences in Higher Education.

From the quotes provided it can be seen that students' perceptions are linked closely with their expectations. It may be that in respect of encouraging students' engagement with their learning in favour of deep approaches to learning that we should be discussing students' expectations more. Being better aware of students expectations throughout a programme may help us better understand their perceptions and subsequent approaches to their learning.

In discussing with students the aspects of the teaching and learning context which have influenced them the following topics were raised:

- Assessments,
- Structured Delivery,
- Organisation of Timetables and Lecturer,
- Staff Use of Contact Time,
- Interactions with Staff,
- Personal Relevance and Importance of a Subject,
- Peer Learning.

The issues raised by the research are also ones which are generally considered when addressing the student experience. Considering these same issues now with respect to students expectations/perceptions and their approaches to learning may provide far richer quality data and more useful understanding of the student experience in terms of 'learning and teaching'. Consideration of students' perceptions and approaches could be integrated with work focusing on improving the student experience. As research by Entwistle (2008) shows students' perception of context affects the approaches they take to learning and then therefore the subsequent quality of the learning achieved (Ellis *et al.,* 2008). It is suggested that the contextual factors which score low on instruments such as the National Student Survey should be considered with respect to 'teaching and learning'. These factors should be addressed in a way which will enable students to perceive their learning contexts in a more positive manner therefore improving their experience but also encouraging deep approaches to learning to be undertaken.

As the study progresses further there will be another round of interviews before the quantitative instrument is developed. During this time the following points from the research data will be explored:

Importance:

- Does students 'importance ranking' of a subject change throughout a year of study? Does this affect the approach towards learning in that subject?
- Why do students perceive the energy studies module as an important subject? How do students determine the importance of a subject; is it connected to personal relevance or implicit information passed on through the institutional structure such as timetabling and modularization.
- Does the delivery style of a module (e.g. traditional lectures, informal group work) affect students' perception of the importance of a module?

Assessment

- What impact have different forms of assessments had on students approach to learning? Staff should make an effort to explore the effect that different assessment methods have on their students. Looking not just at the marks obtained but actually how different students have responded to their assessments (time spent, approach taken etc) and how they have perceived them in terms of developing their own learning.

Contact Time/Staff Support

- Students' value contact with staff but as this is currently under pressure other delivery modes are being used throughout Higher Education Institutions which may not provide the same learning experiences as face-to-face contact with staff members. For the newer technologies and alternative delivery modes to be used effectively they need to be thoroughly supported. The difficulty is that these new delivery methods need academic development time to ensure they are implemented in a structured way from which students will see the real benefit. This creates a large time overhead and becomes difficult for academics to initiate. There is therefore a risk that the much valued contact hours are replaced by poorly implemented technology for which academics are ill-prepared to the eventual dissatisfaction of students. It would be interesting to explore what would happen if these technologies were removed and their associated cost saved so that more time could be given to student/staff dialogue? This could allow academics further opportunity to be aware of, and respond to, students' expectations and perceptions.

Peer Learning

- It would seem reasonable for further investigation to take place to identify the scale on which these informal study groups exist and the influence they have on students' approaches towards their learning. It may also be interesting to consider the place of these small study groups within the formal system of a University. Some emerging questions are whether participation in informal study groups should be acknowledged on submitted work, should participation be encouraged for informal tutorial work and are those who do not work within a study group disadvantaged in any way? Boud (1981, p14) 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."

Conclusion

The research presented here has outlined why we need to better understand our students' perceptions. We have observed the strength of perception in guiding how students approach their learning. We have also observed that perception has a much wider role, influencing the complex nature of the student experience and in this case the students' perception of what subjects and behaviours are important to becoming an engineer. It is evident that students' have clear expectations; we therefore need to encourage communication between staff and students to allow expectations to be discussed. Through dialogue it will be possible to explore expectation; to discuss how realistic these may be and how such expectations can be met. Communication will also allow for any limitations to be acknowledged which may not allow a students' expectation to be fully achievable.

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