We must stop blaming students: an initiative to encourage engagement in learning

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WE MUST STOP BLAMING STUDENTS: 
AN INITIATIVE TO ENCOURAGE ENGAGEMENT IN LEARNING

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Abstract: The gulf between the educational methods in UK secondary and tertiary education has never been wider. Students are increasingly driven by marks and the expectation is of ‘teaching’ not ‘learning’. Even a mild spell of disengagement can quickly lead to a request for transfer. Twenty-first century students demand more than ever before: they expect courses to be entertaining as well as instructive and allow plenty of time for social interaction and revelry. This paper describes, in the form of a case study, how a university department is tackling the real difficulties that school leavers encounter in adapting to a demanding degree programme. Lecturers were initially keen to blame the problem on lethargic students but began to accept the need for appropriate training. A new ‘Professional Skills’ module is described, which sets out to ease the transition to university, improve metacognition and practical abilities, to encourage better contextual understanding and act as a motivator for better student engagement. The module sits alongside traditional didactic engineering science content in the first year of the degree and uses predominantly student-centred active learning and problem based methods.

This work is now the subject of a Higher Education Academy funded mini-project to evaluate its effectiveness and this paper reports the early findings from an online questionnaire, a third party student focus group and the first cohort’s formal module feedback. The verbatim responses from students reveal some of the perceptions and concerns of new students and lead the way to further enhancement for the future.

The ideas described here are founded in the widely known constructivist educational theory where learners are invited to construct knowledge for themselves, become actively involved and learn to learn while they learn.

Keywords: Engagement, Transition, Retention, Project Based Learning.

Introduction: Twenty-first century students expect courses to be fun to take part in and to allow plenty of time for social interaction and revelry; they are increasingly driven by marks and reading appears to be a dying art. The UK’s typical contemporary paying customer reacts to even a mild spell of disengagement by withdrawal or an unwelcome request for a course transfer. Clearly, this does not sit well alongside the lecturer’s need to convey large quantities of engineering science as the early building blocks of an engineering degree. Nor does it match the rose-tinted recollections of academics who cheerfully recall a mythical time when lecturers
would introduce a topic, students would copy large quantities of notes from the blackboard and work diligently through examples, then go home to read around the subject. When students fail to respond, traditionalists are tempted to blame the students' lack of dedication or ability. Ozga and Sukhnandan developed a model of non-completion and criticised many earlier attempts at explanatory models for focusing too much on the student; effectively seeking faults in the students' behaviour to explain their withdrawal.

It was the authors' realisation that young people are not the same and that universities need to adapt that drove the need for change here. Ideas founded in the widely known constructivist educational theory where learners are invited to construct knowledge for themselves, become actively involved and learn to learn while they learn are described here along with some of the successes and growing pains that have accompanied the experiment.

2. Teaching, Learning and Motivation
The transition to higher education is often difficult and it is known that “…effective transition can help to improve rates of retention and ongoing success.” A survey of first year students’ expectations by Cook and Lackey found that freshers generally expected their learning experience would not differ greatly from secondary school. Persisting expectations of ‘teaching’ rather than ‘learning’ in an environment that expects and requires learner autonomy can lead students to disengage with study and fall behind before that autonomy is fully developed. Couple this with uninspiring traditional delivery and we have a powerful recipe for failure or withdrawal.

To seasoned technicians, students entering university also appear massively short of practical skills and have little perception of how things work or what a career in engineering entails. As the world around us has changed, budding engineers no longer make their first associations with engineering at a young age by building models or repairing bicycles; processes that can help sow the seeds of an enquiring mind and enable students to understand the engineering world better. Shobrook provided an extensive summary of the reasons for withdrawal from engineering degrees. The list was long but focused largely on the fact that student’s pre-perceptions of engineering studies were not matched by the reality. She pointed out that most entered university having studied maths and physics but had little real knowledge of engineering applications. At Loughborough University, it was thought that this fundamental lack of direction and the associated deficiency in engineering vocabulary had also begun to inhibit the acquisition of higher level knowledge. Four years of work within the Wolfson School of Mechanical and Manufacturing Engineering, trialling a number of engagement initiatives, have resulted in significant changes to the first-year curriculum and the inclusion of a new ‘active learning’ module specifically designed to address issues of engagement.

The new developments sit alongside a largely unchanged engineering science curriculum and embrace the idea that the most effective learning takes place when students are motivated. In ‘When Teaching becomes Learning’, Sotto wrote that motivation is already present in learners but that it is a matter of creating situations that enable learners to become actively engaged and to use these experiences to
reinforce the necessary fundamental knowledge and skills to support the science. This is more easily said than done but it follows that an effective environment for learning is one where students are truly connected and having fun.

3. Module Description and Philosophy
The new module called ‘Engineering Principles and Professional Skills’ is delivered throughout the first academic year and accounts for 20 UK credits (10 ECTS). The stated aims of the module are:

[1] to promote engagement with the course and the profession;
[2] to enable students to become more successful learners.
[3] to encourage real understanding through the application of fundamental engineering science.
[4] to develop applicable practical & transferable skills including team-working, communication and problem solving abilities.

It is based around four varied student-centred assignments (Problem Based Learning-PBL) and a programme of appropriate skills workshops. There is also one lecture per week to provide connectivity and, in some cases, give information.

3.1 Introductory Skills Training
Skills training is provided in small group workshops with no more than 24 students. This means repeating each activity several times to cater for the whole intake of over 150 students but this is essential if students are to be active. There are six workshop topics in the first semester and a further one on the second. Topics include, effective study skills, library skills, learning styles, teambuilding and resource management, creativity, problem solving (robotics), workshop skills and engineering measurement. There is insufficient space in this paper to describe all these in detail but the essential element in each is ‘active learning’ where students are challenged with hands-on activity. For example, a 2-hour workshop on the process of learning uses an adaptation of materials from Honey and Mumford; the students are divided into teams to create and teach a ‘mini-lesson’ to the rest of the group using simple props. Afterwards, the audience discusses the ‘lesson’s’ effectiveness and the feedback is always enthusiastic. This is intended to be both instructive and fun.

3.2 Problem Based Learning Assignments
The PBL assignments are also highly active and the decision to incorporate competition, has been a large factor in the quest to establish a well motivated learning community. Assignments PBL1 and PBL2 are day-long exercises in teams of six during a new ‘project week’ when all lectures are cancelled: it was decided to introduce this break from normal delivery in the fifth week of the first semester to encourage and excite students who were settling to lectures but evidently starting to be de-motivated and uninspired. The assignments, which are each repeated on two days to cater for the numbers, are introduced early in the morning and delivered at the end of the day. One is a design-and-make exercise of a vehicle powered by a falling weight using simple materials. The second introduces an engineering business problem with a commercial business game, SimVenture. The relevant engineering and commercial principles behind the assignments are followed up as lecture topics during the subsequent week.
PBL3 and PBL4 are larger team exercises. The former takes place over 3 weeks and the latter over 12 weeks of the second semester. The (PBL3) ‘vehicle systems’ assignment starts immediately after the Christmas Vacation and by this time, the students are well rehearsed in working as a team and reporting to a ‘personal tutor’ associated with the team. This project was created in academic year 2008/9 and ran for a second time in 2009/10 with a little refinement.

The specific learning objectives for the PBL3 assignment were, to develop and apply engineering principles in a practical situation through strong examples and to develop learner autonomy through improved research, communication and team-working. The decision to focus this assignment on vehicle systems was an easy one; examples are plentiful and most Mechanical Engineering students are generally interested in this area. A list of distinct ‘topics’ were easily identified, such as emission control, power brakes, automatic gearbox and active suspension. A novel and apparently very successful approach to reporting was adopted which was described in detail at ISEE2010. Teams recorded and edited a 10-minute documentary video report and, apart from the benefits of speedy and painless assessment, this encouraged teams to work together and conduct the practical, visual investigations to bring the project alive. The video report also appears to be a strong motivator: the quality of the films and ingenuity shown by the teams over two years has greatly exceeded expectations.

The final, major assignment was carried over from the earlier course, where it had consistently received excellent student feedback. It was transplanted into the EPPS module as PBL4 and is a semester-long design-and-manufacture competition sponsored by industry. This was also described earlier at ICEER2007. Briefly, a mechanical handling problem is set which varies in detail each year; teams consider creative solutions, produce a portfolio of CAD drawings and then build their electrically powered device from engineering materials in the workshop. At the same time, they learn about design and manufacturing processes. The sponsors judge the best device at a frenetic end-of-year event where the devices are demonstrated in action. The aims of this assignment are to develop teamwork, creativity, problem solving and budgeting and to practice engineering drawing (CAD) and consolidate awareness of basic manufacturing methods.

4. Changing Attitudes
Strong anecdotal evidence suggests that the changes have had a positive effect on the attitudes of the student community within the school, exemplified by an active ‘student committee’ which resolves academic problems in cooperation with the staff, organises social events and takes a very active part in the induction of freshers. The new regime has also proved engaging to a number of staff who were initially reluctant but who now take a keen interest in their tutor group’s successes in the projects and competitions. The role of personal tutor has been extended through this and where personal tutors were only visited reluctantly in the past, many students now appear protective about their group and are much keener to seek their tutor’s advice.

5. Preliminary analysis of the effectiveness of change
A short funded research programme is now underway to evaluate the real effectiveness of the changes introduced through the EPPS module. So far,
quantitative and qualitative feedback has been gathered and analysed from three separate sources. Future analysis will include analysis of withdrawal rates over two years and interviews with staff to verify whether their own attitudes have changed. The three data sources for this preliminary analysis are described below and the results follow in section 6. There were few negative comments except those concerned the timing of the project or variations in facilitation across the several tutors, which suggest that some iterative improvements are required to maximise the benefits of the experience.

5.1 Formal Feedback – year end 2008/9
Feedback is routinely taken from students at the end of all modules using a standard optically read questionnaire. There are 18 stock questions relating to the conduct and organisation of the module, appropriateness of learning resources and the teaching staff. Of more interest, here is the free text feedback where students are invited to comment on the strengths and weaknesses of the module. Sixty-two completed questionnaires were received and there were a relatively large number of handwritten comments. Responses to "Describe how the module could be improved?" proved developmentally useful in identifying two less well received aspects of the 2008/9 module which were both changed the following year. The survey also identified some timetable or logistic issues.

5.2 Online Questionnaire - mid session 2009/10
The questionnaire targeted students immediately after the PBL3-Vehicle Systems project. Both qualitative and quantitative data were sought. Questions focused on team working practices, the interactions needed to complete the task, including those with their personal tutor and reflections on the experiences. Students responded individually to the questionnaire and the response rate for the questionnaire was 53% (76 students). Qualitative responses were analysed using thematic analysis.

5.3 Focus Group discussions – 75% through, 2009/10
The detailed discussions targeted 2009/10 students while they were completing their fourth and final PBL project. The interview used open questions focusing on students’ expectations of learning, how they approach learning at university, relationships with personal tutors, their level of engagement, and student perceptions of their chosen career. The discussions aimed to identify student perceptions of how the Engineering Principles and Professional Skills module has helped to shape their approach, if at all. An outside researcher conducted the study so that responses were not influenced by the presence of the module leader and all students were invited to participate in the interviews on a voluntary basis. The fact that the students were self-selecting in this way may mean that those with the strongest (positive or negative) feelings about the module skew the data.

6. Results of the studies
This report focuses thematically on the four aims of the module (section 3).

6.1 Promoting engagement with the course and the profession.
Free text comments from the 2008/9 module feedback survey showed a number of reoccurring positive themes: the most common being the “interest” brought by “real
experiences” in “areas not explored before” (11 students). Six students commented about the “enjoyable tasks”. The mid-session online questionnaire asked several questions about the level of engagement and motivation. 76% of the respondents reported they had enjoyed the current task (PBL3). A common theme in this qualitative text data was students’ appreciation for doing something different. Typical of the comments here were “It was just nice to do something different for a change” and “It was fun”.

The focus group took place during the major project and naturally, the responses tended to focus on this. The same positive perception was predominant. “It is nice to do something different”. “I’m really enjoying this module, in this project (PBL4)...you have to come up with an idea, work it though, trial and elimination, actually do some CAD to actually turn what we’d come up with into a physical thing - it’s quite exciting”. “I knew nothing about tapping, turning, milling…..”. “For me, it definitely working being thrown in at the deep end with this module. I enjoyed that”. The discussions went on to target more widely the other activities of the module. Again, responses suggested strong engagement with this module. However, students admitted to being automatically focused on their other ‘mathematically based’ modules and being driven by marks, despite their realisation that this type of knowledge, although important, needs to be balanced with transferable or human skills for a successful engineering career.

Results from both questionnaire and focus groups suggests that the module is successful in connecting students with their personal tutors as it has helped to remove barriers between staff and students. Prior to this initiative, the longstanding personal tutoring scheme had been patchy at best. The module provides impetus for tutor meetings. The questionnaire enquired how helpful students had found their personal tutor for the PBL3 project: 72% of students responded positively, with 10% describing their personal tutor as ‘enthusiastically helpful’. Such contacts were not mandatory but just the result of informal meetings. In discussion groups, students were asked how they felt about approaching lecturers when they first started at university, they reported that they were, and still are, hesitant to approach their subject lecturers. “Although the lecturers say ‘if you get stuck, email me or come to my office’, it’s still a scary thought. You think they are too busy. They’ve got much too important things to worry about. I always feel reluctant to ask…I think it’s their status more than anything”. Though they were initially also nervous about approaching their personal tutors, this nervousness has diminished. “When I met him [personal tutor] at first, I was a bit nervous. Having regular slots has helped”. “I’m not afraid to ask my own personal tutor-I’m quite happy to go to his office”. “He certainly is approachable”.

6.2 Enabling students to become more successful learners.

Students were asked about their study habits in the focus group. They appear to know what they should do and many start the year putting this into practice. Good habits, however, such as tackling practice questions that are not assessed (a possible measure of engagement) get lost as pressure from coursework mounts. Prioritising assessed work may be more a reflection of what they feel they must do to pass rather than a lack of engagement with the course. The higher level activity of
knowledge reinforcement is thus lost through time constraints that are real or otherwise. Interestingly, the students suggested that some lecturers subconsciously reinforce the message that students need not tackle tutorial questions before attending their tutorials by their approach within the class; one student explicitly identified this as hampering their learning.

The focus group students were also asked for their perceptions of how learning in university compared to school or college. Responses suggest that the sampled students were aware of the different approaches between school and university and were comfortable in applying these within their own practice. “At uni it’s on you to do the work whereas at school it’s… just sit in the class and the teacher teaches you.” “At 6th form I was very laid back, I would just take things as they come. Whereas now at uni I have to look ahead and think, I have this coursework coming up so having to manage my own education”. “When you come to uni, don’t expect to come and be taught. You’ve definitely got to put some work in yourself”. And another interesting thought: “The purpose of a lecturer is to illustrate to you all the things you don’t know rather than to actually teach you anything”.

Students could not explicitly identify how the EPPS module had influenced their study behaviour, except for one instance where they described being shown a time plan (in the EPPS module) of what their 24-hour day should really look like, which they had found useful. Nevertheless, the fact that the sampled students demonstrate an understanding of what it means to learn at university is encouraging. Several positive comments were also received from the 2008/9 feedback survey about the time-management element of the module.

6.3 Encourage real understanding of fundamental engineering science.

The end-of-module questionnaire asked whether the module had “developed their understanding of the subject”. 70% of the respondents answered positively on a five-point scale while the remainder were neutral. This was further reinforced by eight freely given text comments on same theme. For example, “I liked the group projects in this module; they helped me to understand basic engineering principles.” Some wrote of consolidating of their knowledge “The Design and make competition tested a lot of what we had learnt in semester 1.” while others were more general “Vehicle systems was a good project – people learned a lot”.

Further text comments from the online questionnaire welcomed the EPPS module’s student centred approach; exemplified here with a positive comment about; “the opportunity to talk to experts…and the need to find our own props” This suggests a level of responsibility is embraced and an appreciation of not being ‘spoon fed’.

6.4 Develop applicable practical & transferable skills.

Focus group students articulated what skills they thought were relevant to their chosen career, highlighting those of ‘management’, ‘team’, ‘communication’ and ‘presentation’ skills and attributed the EPPS module with being the only source of developing those skills within the first year. Using the 5-point online survey scale, students were asked whether they thought the PBL 3 assignment was an effective learning tool for improving transferable skills. 80% agreed. Text comments from the
earlier feedback survey provided additional evidence with a total of 17 students commenting positively about the benefits of practical “real” experiences for team building and problem solving.

Working within tutor groups appears to help students bond with their fellow tutees in team situations. 84% of online survey respondents claimed to have met together as a team more than once each week during an assignment. Students reported that they appreciated being able to “work as a team” and that the projects had enabled them to “bond as a team”. One elaborated; “It allowed team dynamics to really flourish, highlighting everybody’s role in the team well, which should prepare us better for the major project [PBL4]”. Another respondent wrote about being taught to “work better as a team and become better friends as a result.”

6. Conclusions
Engineering is a difficult and demanding degree subject, EPPS seeks to inform and portray a positive image. The combined results from the three feedback mechanisms provide a useful insight into the perceptions of students. Students have certainly engaged well with the module and have gained skills from undertaking it that they utilise elsewhere in the degree. It is still not proven, however, whether the engagement in this practical module actually promotes better engagement and learning in other modules as hoped. A more reliable method of evaluating the module’s impact across the programme may be to look at performance and withdrawal rates over a number of years.

While the questionnaire and focused discussions are only a small part of an ongoing programme of evaluation, the early data suggests that students are developing appropriate expectations of how to approach learning at university. The introduction of project work into the first year has excited students and unhelpful barriers are being broken down by giving students a reason to work with their personal tutor. Whether the module is positively effecting student study engagement across the course remains to be proven, and this will form the focus of the next stage of the evaluation.

7. References