

# **First year civil engineering degree students: motivated, disengaged or both?**

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## **Abstract**

The engagement of an undergraduate student with their university is an important factor in the quality of their learning experience. The central question of this paper is how to understand the apparent disengagement of a cohort of first year civil engineering students. A questionnaire was used to investigate the motivation and barriers to learning of the students. The results suggest that students may be highly motivated and may also severely restrict contact with their university. In conclusion, implications for the academic management of courses are considered.

## **1. Introduction**

This study investigates the apparent disengagement of first year civil engineering degree students at the University of Bolton. Two aspects of their experience were investigated: firstly, their perceptions of their motivation to study civil engineering and secondly their perceptions of external barriers to study in the form of work, family and money (or lack of it).

In their first year at the university, the students were presented with two new learning opportunities (outside normal lecture times) to help to improve their understanding of two structural engineering modules (which previous cohorts of students have found difficult): construction site visits and peer led tutorials. The student response was to largely ignore these learning opportunities. The research in this study was carried out in order to learn more about this apparently self-defeating behaviour.

The results of the study show the students' perception that they are well motivated in a number of ways. The results also show that for many students there are significant barriers to learning. In the light of the results, some suggestions on course management are discussed. Finally, the conclusions of the study relate to the ways in which motivation, engagement and barriers to learning can be managed.

## **2. Introductory discussion**

### **2.1 Motivation**

The poor attendance of students at extracurricular events was initially thought to signify low levels of both motivation and engagement. Before investigating motivation, it was necessary to choose which of its meanings to use, as the term motivation has more than one meaning.

Firstly, motivation can be used to denote the enthusiasm one has to do something. The illustrative sentence given in one dictionary (CUP, 2011) is in this respect telling: *“He’s a bright enough student – he just lacks motivation.”*

The measure of this motivation is not straightforward. It is a commonplace conception that bright students who fail to do well academically are likely to lack motivation. They simply lack enthusiasm for the subject. How enthusiastic are you to learn for instance structural analysis and design? This question can be answered at different levels; over different time periods; at different times of the day and in relation to different topics. It is a difficult concept to define and a subjective and imprecise one to measure. Bearing in mind the small scope of this research it was decided not to try to investigate this aspect of motivation.

Secondly, motivation can also denote the need or reason to do something. The illustrative sentence in the same dictionary (CUP, 2011) this time is: *“What was the motivation for the attack?”* Why are you studying civil engineering? Why are you prepared to devote such a lot of time and effort to gain a degree in civil engineering?

With regard to the motivation of the students, Ryan and Deci (2000) analysed this type of motivation using six categories ranging from amotivation to intrinsic motivation. The six categories are summarised in Table 1. Potentially this is a useful analysis tool which could be used to predict, for instance, levels of perseverance and retention of students (Ryan and Deci, 2000). It was used in this study to create a framework within which the motivation of the students was assessed.

Description	Commentary (paraphrasing Ryan and Deci (2000))
<b>Amotivation</b>	Not wanting to act, feeling incompetent, believing that acting will not achieve what is required, which in any case is irrelevant
<b>External regulation</b>	Complying with others to avoid punishment or to gain reward. The carrot and stick rationale (animal training)
<b>Introjection</b>	Acting under pressure from others to gain approval from others or to avoid feelings of guilt and anxiety. This helps to maintain self esteem
<b>Identification</b>	Doing something uninteresting to achieve a larger personal goal. Memorising a formula to become a civil engineer (valuing the activity in relation to personal goals)
<b>Integration</b>	Acting to achieve a desired goal, having internalized the reasons to act. Similar to intrinsic motivation (as it is volitional with no internal conflict) but different (as the act is not just for its own sake)
<b>Intrinsic motivation</b>	Acting just for the positive experience (satisfying the needs of competence and autonomy). Just for the interest, novelty, fun or challenge – no external pushes are needed

Table 1 Six stages of students' motivation

## 2.2 Attendance and engagement

Student engagement is defined by Krause (2005) as the “time, energy and resources students devote to activities designed to enhance learning at university” and engagement is strongly linked to positive outcomes for students (Carini, Kuh and Klein, 2006). Krause and Coates (2008) discuss several ways in which students can engage with a university: through class contact, through study, using the internet, through a feeling of belonging, through peers and academic staff. Thus a student's attendance at a university is only one of many ways of engaging with the university.

Currently, the engagement of students at the University of Bolton is not systematically monitored. Attendance registers are completed for each lecture but from the above paragraph it is seen that this provides only limited information to assess the rich variety of ways that students engage with the university. Signing the register shows that you are present (“in body” at least). What you do in the lecture period (and outside the lecture period) is an entirely different matter.

Nevertheless, class contact and study times are important indicators of engagement. Several studies (in Australia, the USA and the UK) show that the length of time that students spend studying is severely limited. Lingard's (2007) study of over 100 students at Melbourne University found that students have substantial time commitments to paid work and typically spend more time in paid work than they do studying. She also noted that students “*spend no more time at university than that required for timetabled lectures and tutorials*” adding that the students prefer to minimise their time on campus “*so that they can engage in uninterrupted paid work*”. To compound this, Lingard (2007) also found that students valued their time spent working more highly than time spent at university. On average, they spend just 12.5 hours a week attending lectures and studying at their university.

A recent study by Arum and Roksa (2011) of several thousand American higher education students found that the average amount of student preparation time for classes is between 12 and 13 hours per week and that 36% of students reported studying alone less than five hours per week. Between 1961 and 2003, the average time studying fell from 25 hours a week to 13 hours a week. Over the slightly longer period from 1961 to 2010, the percentage of students studying more than 20 hours a week fell from 67% to just 20%. The number of hours spent studying by students is steadily reducing over time. Thus Arum and Roksa's figures show an all time low.

Rolfe's (2002) limited study highlighted university lecturer's perceptions that students minimise the time they spend on campus. The NUS/HSBC Student Experience Report (2011) shows that, on average, UK students receive 13.4 contact hours a week and undertake 15 hours of private study. This adds up to a total of 28.4 hours studying a

week. This is less than last year (NUS, 2011). The picture is of most students significantly limiting their academic time (class contact and private study).

Jacobs (2011) points out that the word “school” derives from *scholia*, meaning leisure and that when “*we say that education is a leisure activity, we simply mean that you can only pursue education if you are temporarily freed from the responsibility of providing yourself with food and shelter.*” Thus, time is needed to really study and learn well. Without time you can learn nothing. Jacobs’ (2011) goes on to discuss how pressure of time affects the quality of the reader’s experience. In a parallel way, when study time is restricted not only will this similarly restrict learning but it will also affect the way that learning takes place. Time limited reading necessarily involves a greater proportion of skimming and a lesser proportion of reading in depth and time limited studying: more surface learning and less deep learning.

One common aim of university degree courses is for students to undertake deeper learning and to develop critical thinking skills, what Moon (2005) describes as “contextual knowing”. Yet this is a skill that is not consistently developed by undergraduates. Moon refers to previous studies that suggest that few students reach this stage before graduating. Arum and Roksa (2010) found that after two years in higher education almost half of the students in their study showed no evidence of improvement in this skill.

### 2.3 Barriers to learning for non-traditional students: family, money and work

At the University of Bolton, there are many non-traditional students and the institutional strategy favours widening participation (University of Bolton, 2010). Non-traditional students have several defining characteristics: from an ethnic minority group, with a long term disability, with non-standard qualifications, over 25 years of age on entry, from a lower socio-economic group (HEFCE, 1997). It was not appropriate to investigate all of these aspects in this study using a questionnaire in a semi public setting (i.e. in the classroom where passing students could possibly glance at each other’s answers). Nevertheless, a number of the markers identified by HEFCE are included.

In much literature relating to non-traditional students, the idea of fitting in the studying around a busy home life is common. Three common themes affecting non-traditional students presented themselves during the literature review:

- the impact of money or rather the lack of money, requiring students to work for money while studying at university (Thomas and Yorke, 2003, Leathwood and O’Connell, 2003)
- the responsibilities of family life, particularly caring for children (in sickness and in health), dealing with nurseries and schools; also caring for older family members and the routine family chores of shopping, cooking, cleaning etc. (Piette, 2002, Cecil, 2010, Marandet, Elodie and Wainwright, 2010 and Wain, 2009)

- the difficulties of studying in an unfamiliar environment and attendant personal issues such as, feeling isolated and unwelcomed; lacking confidence (Mann, 2010, SOMUL, 2009).

Recent studies show that non-traditional students are less likely than traditional students to engage with their universities. The SOMUL study (2009) identifies a group of students who have demanding outside commitments which could be home or work related (non-traditional students). Their time for study is limited and so too is their time for other aspects of university life. They experience university as individuals, limiting their time on campus and focussing on study and qualifications; not friendship and personal growth.

It is not possible to group all non-traditional students together as each student faces barriers to learning that are particular to them and no matter how extensive the literature search, on its own, it could never be sufficient to understand the situation of a particular student. For that matter, neither could the questionnaire used in this study. However, two of the three themes noted above have a similar effect on students, that is, to take away the free time of the students.

#### 2.4 Background to the study

For many years, the civil engineering department has provided a route for working engineers to study on a part time degree course with cohorts comprising predominantly part time students attending one day a week over a period of four years. More recently, the number of full time students has grown to approximately equal the numbers of part time students. Typically, full time students attend the university two or three days a week over a period of three years.

The University of Bolton recruits a high proportion of working class students (Davis, 2010) and its institutional strategy favours widening participation (University of Bolton, 2010). Thus many of our civil engineering students bring to their studies an experience of life that differs significantly from the experience of a traditional single 19-year-old white middle class student with no family responsibilities.

The civil engineering degree course necessarily is a practical one and site experience is immensely beneficial to students. Arrangements were therefore made to allow all forty first year students to visit an adjacent construction site on a number of Wednesday mornings (this is a day when no classes for first year students are scheduled). The site visits were run for two weeks and then stopped due to lack of interest. At that point only six first year students had benefited from the experience.

In the same semester, additional tuition from second year students (trained to act as mentors) was set up for the first year students. This was scheduled again on Wednesdays, this time during the afternoons. The peer mentoring sessions were strongly recommended to all students as being directly useful for their understanding,

their assignments and their exams. For the three sessions held, the maximum attendance was six students.

### **3. Methodology**

The data for this paper have been collected from first year civil engineering students at the University of Bolton using a questionnaire administered to 40 students comprising 21 full time and 19 part time students. The questionnaire was completed anonymously and returned by the students in a way that prevented their identification. The questionnaire contains 48 questions on motivation, engagement and barriers to learning (including family, money and work).

Family, money and work issues are sensitive and private subjects. A balance was sought when designing the questionnaire between soliciting useful data from the students and avoiding prying into their personal lives. This was of particular importance given the power imbalance between the insider researcher (their lecturer) and the students.

The questionnaire includes 13 questions on family, money and work; their impact on studying (particularly the time available for studying). Although the literature revealed other significant obstacles to successful study for non-traditional students, the small scale research of this paper is restricted to those listed above. The questionnaire includes 17 questions investigating the motivation of the students.

The students' responses to the questions relating to their motivation are based on their perceptions of themselves and others. The students' responses relating to their barriers to learning are based on their perceptions of difficulties (e.g. "My family responsibilities prevent me from studying.") and their perceptions of time (e.g. in a typical week: "How much time do you spend studying?"). Bearing in mind the above and the relatively small sample size (only 40 completed questionnaires) it is considered that applying a statistical analysis to the data could give a spurious and undeserved impression that the results are somehow more than the impressions of a single cohort of first year students.

### **4. Results**

#### **4.1 Motivation**

With regard to the questionnaire's measurement of motivation of all of the students, there were few and minor differences between the full time and part time students and so generally the 40 students will be treated together.

A Likert scale was used for each of the 16 questions relating to motivation. The responses (strongly agree, agree, undecided, disagree, strongly disagree) were coded with numbers: 4 indicates that a response is a strongly positive one and 0 indicates that

a response is a strongly negative one. This allows mean scores to be calculated. Mean scores of between 3 and 4 indicate a positive response from the students surveyed.

For instance, Question 5 of the questionnaire was used to investigate the students' intrinsic motivation: "I find it interesting to understand a new concept." If all of the students strongly agree with this statement the mean score would be 4.0. If half of them strongly agree and the other half just agree, then the mean score would be 3.5. The combined scores for each motivation category are shown in Table 2.

Description of motivation	Mean score
Amotivation	0.8
External regulation	3.2
Introjection	3.2
Identification	3.2
Integration	3.5
Intrinsic motivation	3.3

Table 2 Summary of students' perceptions of their university course (in relation to their motivation)

In presenting the results of the questionnaire, a positive response is considered to be either *agree* or *strongly agree* and is described simply as "agree". Similarly, both *disagree* and *strongly disagree* are generally categorised together as simply "disagree". Numbers of respondents are described as for example 37/39. This indicates that there were 39 useful responses and of these 37 of them were positive. The students' perceptions of their university course are described below in relation to the six stages of motivation investigated:

#### Amotivation

All but one of the students (39/40) believe that they are able to do the work required on the course. 37/39 believe the work is relevant to them. 31/39 students are confident that they will do well (only 1 student disagrees on this point, and 7 students are undecided). 32/38 students disagree that they want to drop out of the course, leaving 6 students who are undecided or want to drop out. The responses show that the students feel competent to do their work, which they also see as being relevant to them. Thus it is seen that all but one or two of the students do not suffer from amotivation.

#### External motivation

Surprisingly, 2 students agree that if it were their choice, they would not be studying this course. 4 are undecided. Of these 6 students, 4 of them are full time students. The majority (34/40) disagree with the statement, indicating that they are content with their course of study. Only a few students (3/40) disagree that the most important reason for their studies is the degree qualification. Therefore, as they work to gain the carrot of the degree qualification, external regulation can be seen to be a part of the motivation of the students. Other responses to the questionnaire indicate that they are not foolish enough

to believe that the degree qualification is all they need. They put time and effort into learning and understanding to become engineers and they enjoy at least part of this process.

#### Introjection

Of the 16 students who agree that they feel guilty or anxious when they do not understand, 12 of them are full time students. The majority of the part time students (13/19) disagree with the statement. All but 1 of the students agree that they feel better about themselves when they work well. This is unsurprising, but shows that the self esteem of the students is linked to the quality of their work as students. Acting to avoid pressure from others (guilt or anxiety) indicates some degree of introjection.

#### Identification

Most of the students (36/40) believe that they study hard because eventually it will help them to be civil engineers. Most of the students (33/39) also believe that they put a lot of effort into trying to understand structural analysis. The students are prepared to do something difficult or of limited interest to achieve a larger personal goal. Thus the majority of the students display identification.

#### Integration

The three questions investigating integration received the most positive responses from the students. This is illustrated by the mean score in Table 2. A large score of 26/40 students strongly agreed that it is "important to understand... as it will be useful for my future work". This is the most positive response all the questions on motivation. A further 11 students agree with the same statement bringing to total to 37/40 who agree or strongly agree that their learning is important to them as it will be useful in their future work. Thus they have internalized the reasons for studying civil engineering and made them personal; this is integration. The link to future work is important.

#### Intrinsic motivation

In relation to their civil engineering degree course, the majority of the students find it satisfying to understand new concepts (38/40) and enjoy the challenge of solving problems (36/40). All respondents are interested in civil engineering (with 24/38 strongly agreeing with this statement). The students find their studies enjoyable and satisfying for their own sake; this indicates intrinsic motivation.

The responses to the questionnaire indicate that the majority of the students do not suffer from amotivation and display external regulation to a limited degree. Introjection, identification, integration and intrinsic motivation are all displayed. This illustrates the complex, overlapping nature of motivation for studying; particularly in relation to the civil engineering degree which is an extensive course of work comprising a wide variety of challenges. Although the responses do not indicate a simple answer, they do illustrate the overwhelmingly positive motivations of the students.

#### 4.2 Barriers to learning: family, money and work.



The students were asked questions directly related to the effects of family, work and money on their studies.

- Around one third (11/35) of students disagreed that their job is flexible and allows them to study.
- Two students agreed that family responsibilities prevent them from studying.
- Eight students disagreed that money problems do not get in the way of their studying.

Overall, 21 responses indicated that money, work or family were adversely affecting the students' studies. Allowing for some students being affected by both money and work problems, it can be seen that 18 out of 40 students are adversely affected by money, work, money and work or family issues.

Students were asked to estimate the length of time spent on the four categories of family, work, study and fun during a "typical" term time week at university. Table 3 shows three categories of full time students and their perceptions of a "typical" term time week. Table 4 does the same, but for part time students.

Hours/week	Students with no children (18)	Students with children (3)	All students (21)	All students as a percentage (%)
Family	9	32	13	19
Work	17	8	16	24
Study	23	28	24	37
Fun	14	8	13	20
Total	63	76	66	100

Table 3. How full time students perceive that they spend their time during a "typical" term time week

Hours/week	Students with no children (15)	Students with children (4)	All students (19)	All students as a percentage (%)
Family	10	30	14	17
Work	37	40	38	44
Study	16	15	16	18
Fun	20	10	18	21
Total	83	95	86	100

Table 4. How part time students perceive that they spend their time during a "typical" term time week

The part time students spend most time working and the least time studying. It also shows that having dependent children is linked with a large reduction in free time. The

students with children spend around 30 hours discharging their family responsibilities. On average, the full time students with children spend around 8 hours working and their part time counterparts almost 40 hours.

The part time students perceive their “typical” week to be 21 hours longer than the full time students. By converting the hours spent on each of the different activities to percentages, it becomes easier to compare the time allocation of the full time and part time students. This is illustrated in Figures 1 and 2.

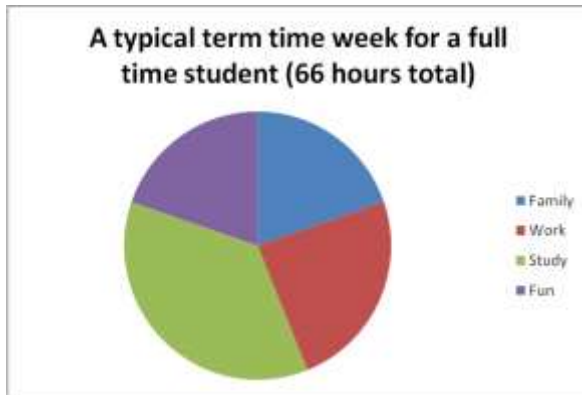


Figure 1. Pie chart showing how full time students divide their time while attending university

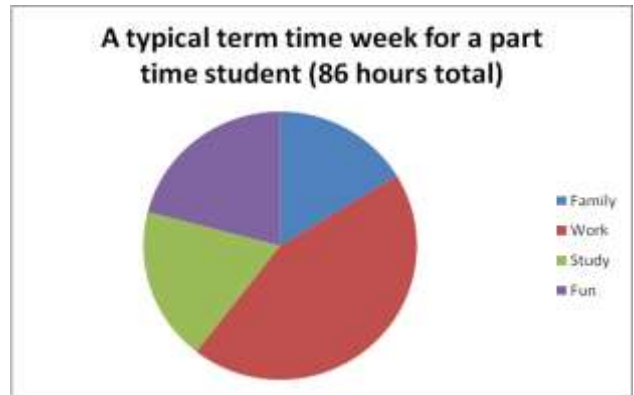


Figure 2. Pie chart showing how part time students divide their time while attending university

Overall, both full time and part time students allocate around 60% of their “typical” week to work and study activities. The full time students achieve this with work 24% and study 37%. The part time students necessarily spend more time at work and they achieve this with 44% work and 18% study. Thus full time students spend around twice as much time on study (37%) as a proportion of their week compared to part time students (18%).

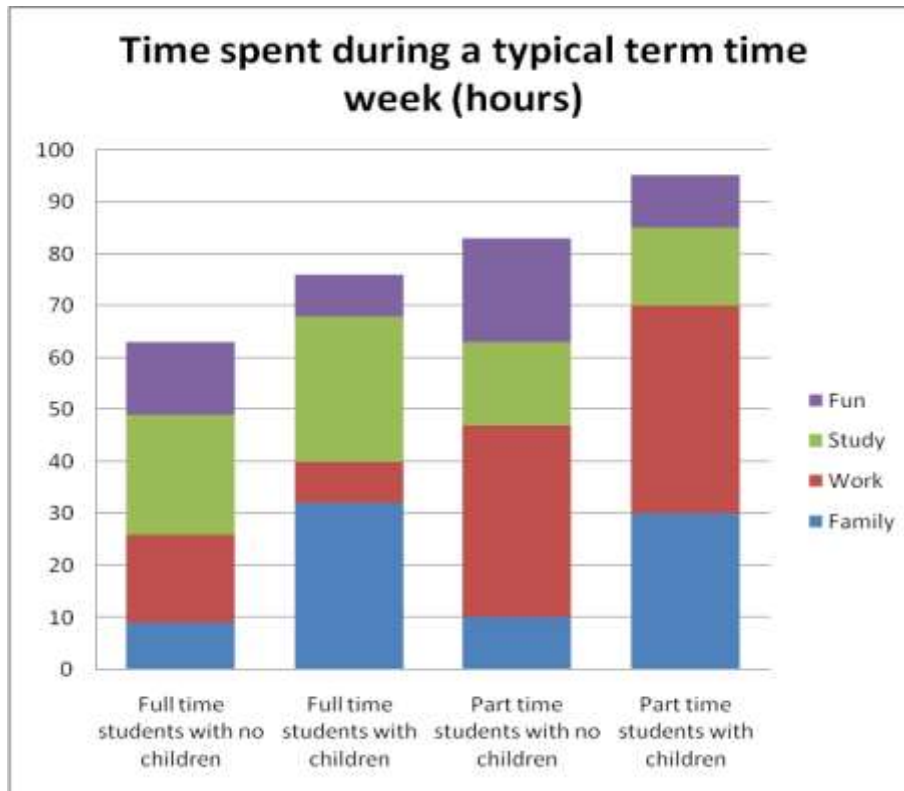


Figure 3. Chart showing the varying week lengths for different students while attending university

Students with children perceive that their “typical” week is longer than students without children. Part time students who are in full time employment perceive that their “typical” week is longer than the full time students. The longest week of all therefore belongs to the part time students with children who perceive their “typical” week (96 hours) to be almost 50% longer than the full time students with no children (63 hours). The part time students with children spend 85 hours a week on family, work and study.

## 5. Discussion

### 5.1 Motivation

The study shows that the students are motivated in a number of ways to take on the challenge of becoming civil engineers. They show the kinds of motivation that are linked with high quality learning, persistence, involvement and performance (Ryan and Deci, 2000). Their motivation (or lack of it) therefore does not explain their avoidance of the additional learning opportunities presented to them.

The students’ dominant form of motivation is integration. This shows that they have integrated the requirements of their chosen profession and identify with the larger goal of becoming a civil engineer. Students showing this form of motivation should be well

placed to tackle those parts of the degree course that unfortunately but inevitably are neither inherently interesting nor enjoyable.

This form of motivation can be utilised in the planning of teaching and learning activities by aligning the students' learning activities with their perceived future world of work. Their motivation is already aligned with their perceptions of their future professional work. By aligning their academic work in a similar way, the students' engagement with it will be strengthened. This idea correlates well with a previous focus group study at the same university, which found that students had a "strong preference for their learning to be directly related to the real world of civil engineering work..." (Bather, 2011).

## 5.2 Barriers to learning

This study has found that almost half (18/40) of the students are adversely affected by money, work and/or family issues. Often an important effect of these issues is to take valuable time from the student.

Apart from pressures of time, other factors tend to prevent non-traditional students from engaging with their universities, with their fellow students and joining or forming learning communities. Fitting in and feeling accepted is more difficult for those who feel different for whatever reason (such as being poorer, disabled or from an ethnic minority).

Tackling academic challenges is more difficult if you have not recently had practise of producing academic work (this affects students with non-standard qualifications and older, returning students). Devoting yourself to your studies is not possible when you have family and work responsibilities (students with children and who are in work).

These important factors lie outside the scope of this small study, which focuses mainly on motivation and time.

## 5.3 Lack of time and learning

Based on the perceptions of the students near the end of their first term at university, overall, the full time students spend around 24 hours a week studying and the part time students spend around 16 hours a week. This difference is partly explained by the full time students taking additional modules each year. On a pro rata basis, this should increase the hours of the full time students by around 33% (not 50%).

Based on the number of modules being studied (60 credits), the full time students should notch up around 600 hours of study over a 14 week long semester. A simple division sum suggests that these students should theoretically be studying around 43 hours a week (attending lectures, laboratories etc, preparing for classes and exams and working on assignments). This is not happening. Similarly, part time students are not achieving 32 hours a week study time to match their notional university workload. From other studies (Arum and Roksa, 2010, Lingard, 2007) it can be seen that this is a problem facing universities around the world and is not just a problem at Bolton.

So despite being well motivated, full time students are devoting insufficient time to their studies and part time students even less. Singh et al (2002) studied the effects of motivation, attitude and academic engagement of students studying science and maths in school in the USA. They found that by far the strongest effect on learning was academic time. Simply put: “students who spent more time on science homework had higher achievement in science.” Thus the students in this study are likely to be underachieving.

In this study, part time students reported an average 38 hour working week. Those students with children spend over 30 hours a week discharging their family responsibilities. Thus, for a given week, in terms of free time, a part time student with children is around 68 hours adrift from a full time student with no family responsibilities and no job. Lack of time is a significant negative factor affecting this student’s learning.

During the current economic downturn, many people find themselves working harder and for longer hours just to keep their jobs. This trend affects part time students and is illustrated by the length of time that they spend working each week. The idea of “day release” appears to have given way to “make your time up”.

It is not all bad news for part time students who work in the civil engineering industry as they are able to relate their studies to their work and thereby construct their understanding of new knowledge in a meaningful and complex way, directly related to the real world. The constructivist learning environment thus created potentially provides the part time students with a high quality learning experience.

Lucas and Tan (2007) note that the practical experience of working students can help them to develop in confidence and in critical thinking. This development in turn is helped or hindered by the quality of the work undertaken by the students and the manner in which a university helps a student to prepare for and reflect on their work experience. Unfortunately, Lingard’s study (2007) found that only around half of working students are working in their prospective professions.

The starting point of this study was the students’ poor attendance at additional learning activities arranged from them. These activities were potentially useful and were well aligned with the learning outcomes and assessments of the first year students’ modules. The well motivated students still avoided them by and large. Thus good motivation of the students and constructive alignment of the curriculum (Biggs, 2003) are not enough to get the students to devote adequate time to their studies. Something more is needed to better engage the students.

As this study found that the engagement of the students is not strongly linked to their motivation and Singh et al (2002) found that academic time has a much greater positive effect on learning than motivation, it is considered that helping the students to find time to study should benefit their learning more than devising strategies around their motivation.

## 5.4 Strategies for helping non-traditional students

The University of Bolton has experience of teaching part time students over several decades dating from its days as Bolton Institute of Higher Education and before that as a technical college. The Civil Engineering Department uses a number of strategies for helping time pressed students and four of these are presented below relating to planning and timetabling:

1. Plan for level effort from the students throughout the term time; avoid the bunching of assignments and exams. Naturally, most exams will be scheduled more or less at the same time at the end of a term or semester; however it may be possible to spread a student's exams over two weeks instead of just one. This would allow students more time to prepare better.
2. Schedule repeat exams and repeat assignments to minimise their impact on the overall workload of students and the limited time they have available for study. Many of the repeat students may suffer from significant time pressures from home or work. Shoe-horning the repeat work into an already full timetable during term time will put additional pressure on these students. Consider timetabling repeat exams and hand in dates for repeat assignments during the holidays.
3. Keep the student timetable stable throughout the academic year (e.g. Monday and Tuesday lectures and labs; free time Wednesday, Thursday and Friday). For students, this is likely to ease matters such as employment and childcare.
4. Have a system in place to accommodate occasional late submissions etc. If students are stretched almost to capacity during a normal term time week then minor (not major) mishaps can prevent their attendance or the submission of assignments on time. Assignment submission dates can be extended by five days at the discretion of the course leader and further extensions are available, using the university's procedures for mitigating circumstances (which are straightforward and readily available to students).

The author has experience of one side effect of condensing students' contact time with a university. At the end of a long day's studies, students struggle to apply themselves to their final lecture or tutorial class. They are tired; they have had enough. Their learning is hampered.

For the students, the above measures help to align their academic timetable with their work and family timetables. For some students, this alignment could allow them to spend a few extra hours each week studying. This could mean the difference between passing a module and failing (with the attendant additional work and time to be spent).

## 6. Conclusions

The students are well motivated to learn but still restrict their time spent studying, often due to significant external factors.

The students in this study are motivated to study civil engineering in a variety of ways ranging from external regulation to intrinsic motivation. The strongest form of motivation is integration, whereby the students have aligned the skills and values of the professional engineer with their own values. Thus they are motivated towards their future working lives and so learning activities and assignments can be planned to make use of this knowledge.

Almost half of the students in this study reported that money, work, family or a combination of two of these factors adversely affects their studies. During term time, part time students with children put in a long 85 hour week (time spent on family responsibilities, work and studying). In a typical week, part time students spend only 16 hours on their studying and full time students, 24 hours. Part time students typically put in a full working week and then fit their family and study responsibilities into the remaining available time.

Time is needed to study well and to learn deeply and this is not available equally to all students; especially those with family and work responsibilities. In short, most of the students in this study work and the work impacts on their studies. Several of the students have children and their family responsibilities also impact on their studies. What can be done about this?

Firstly, a university can help working students by adopting the suggestions outlined in the discussion:

- Plan for level effort from the students
- Schedule repeat work for students to have minimal impact on their normal academic workload
- Keep the students timetables stable
- Plan to accommodate late submissions and the like from students

Secondly, by directly addressing student engagement, universities can improve the quality of each student's experience and learning. Recognising the various ways that a student can engage with a university and measuring this engagement is a useful first step. The formation of learning communities in the classroom, the use of tutorial groups that meet regularly and purposefully and the presence of friendly and supportive academic staff will all help students to engage positively with their university studies and to strengthen their support network too.

Thirdly, as students' study time falls so far short of the required times for their modules, their learning and understanding will necessarily be significantly limited. This raises significant issues. Given the size of the disparity between actual and required study times, universities should consider fundamentally changing their degree programmes to better reflect reality. As a minimum, universities should consider changing the academic times given in their module specifications.

The aim of the suggestions discussed above is to provide a small measure of help to time pressed students. The suggestions do not address the larger question of how to ensure that graduates develop a critical understanding of their discipline whilst devoting only a very limited time to their studies? If current trends continue, this question will become ever more pertinent and more difficult to answer.

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