

An Analysis of the Lifeloads of First Year Engineering Students

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Abstract

Professional degree programs, such as Engineering, are notorious for placing considerable demands upon their students. Balancing study and work is a challenge faced by an increasing number of undergraduate students. In order to assist students to manage this balance it is important to know how this compromise varies from student to student. This paper presents data gathered from first year engineering students regarding the hours they spend each week in study, paid employment and volunteer work. A substantial variation across the cohort is shown for all three factors. The data also shows variation in these factors with respect to the week of semester, with time commitments growing independently early in semester, and study somewhat taking the place of paid employment later in the semester.

Introduction

Professional degree programs, such as Engineering, are notorious for placing considerable demands upon their students. Engineering programs consistently average 10-20% lower on the Good Teaching Scale of the Course Experience Questionnaire (Graduate Careers Australia, 2006), suggesting that there is significant room for improvement in these programs. The contemporary student cohort faces an increasingly diverse range of non-academic demands upon their time, ranging from part time work to childcare demands to cultural obligations.

These competing demands challenge the students' abilities to manage their learning. The increasing diversity of the university cohort means that our teaching approaches can no longer be tailored solely for students whose only priority is their degree. Instead the impact of the students "lifeload" (McInnis, 2001) must be considered upon their ability to effectively study.

The concept of workload is potentially misleading as students' self-reporting of workload does not necessarily represent their ability to cope with their learning load. Jonkman et al (Jonkman, Boer, & Jagielski, 2006) showed students' perceptions of workload not being correlated to the amount of work that they do, but instead showing some correlation to the number of assignments that they are required to complete. Other studies have shown that the extent to which the work is perceived as meaningful impacts upon the students' ratings of workload (Kember, 2004; Marsh, 2001).

This paper deals with some of the outcomes of a study into the perceived workload of first year engineering students, with a particular focus upon the hours spent by students on study, paid employment and volunteer activities.

The survey

The students were asked to respond to a weekly survey containing a range of questions dealing with the nature of their workload. These questions included their perceptions of their workload and their stress levels, the factors affecting their workload, the strategies they were using to manage their workload. The data was gathered online, through the unit's WebCT interface. Students were given from the Thursday of the week until the Tuesday of the following week to complete the survey for that week. Completion of the survey was voluntary, but encouraged. This paper focuses upon the

students' responses for the number of hours they invested each week in paid employment, study, and volunteer week.

Overall there were a total of 1403 responses, however not all responses provided information for all questions. The dataset to be analysed was restricted to those responses for which useful information was given for all three time commitments (study, paid employment, volunteer work) and for all three perception factors (relative workload, relative stress, absolute stress).

Descriptive responses such as "lots of hours" were excluded from the dataset, and responses indicating a range (i.e. "5-10 hours") were treated as the midpoint to the range. Non-integer values were rounded up.

Overall this left a dataset with 1,110 responses. The overall response rates varied throughout the semester, with numbers dropping off towards the end of the semester and during the examination period (Figure 1). Presumably the drop-off rate is in some way influenced by the students' workloads; however there is no data available as to why the students did or did not participate in the survey.

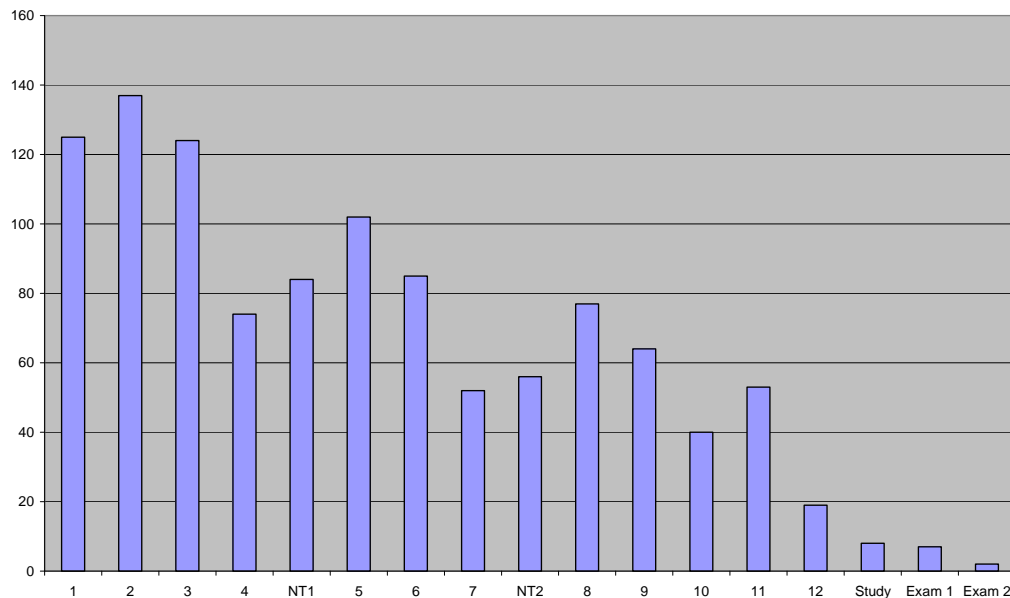


Figure 1: Number of Responses by Week

The overall data gathered from WebCT by the authors was anonymous – no individual student is identifiable. While this prevents the ability to follow a student longitudinally throughout the semester, it does promote honest and authentic engagement on the part of the students – they know that this cannot be used as an assessment tool. While specific conclusions regarding a particular student are not possible, this approach does allow generalisations to be made about the overall cohort.

The results

The survey responses showed significant variation for each of the response categories, and for the overall aggregated "lifeload" for each student. Each category is analysed separately in this section, followed by the aggregated lifeload. The week-by-week variation in responses throughout the semester is then presented.

Study Hours

There was significant variations in the responses from the students (Figure 2), with the lowest reported value being zero hours (29 responses), and the highest reported value being 60 hours in that week. The median response was 10 hours, with responses in the six- to ten-hour range being most common.

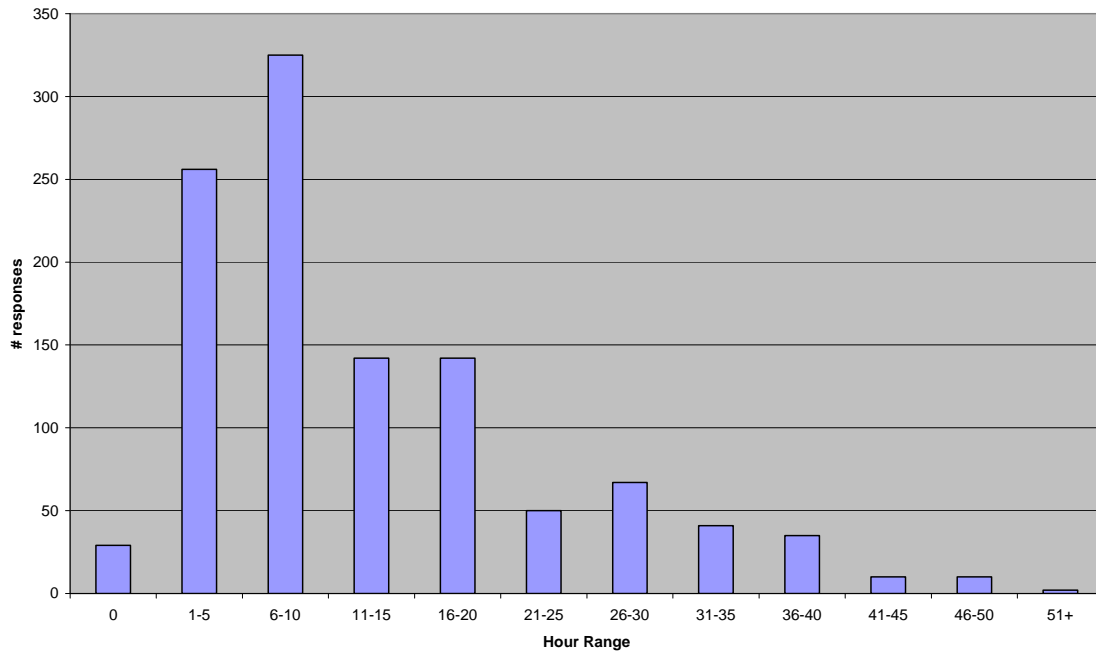


Figure 2: Hours of Study

The survey instrument does not require students to distinguish between contact-hours and non-contact hours; however the assumption is that the hours reported as study do not include contact time such as lectures and laboratories. The first year engineering program at Curtin includes 16 contact hours per week; Figure 2 illustrates that less than a third of the responses indicated that students were matching these contact hours with study.

Employment Hours

Students' responses for hours spent in paid employment also showed a significant variation, although not as significant as that for their time spent on study (Figure 3):

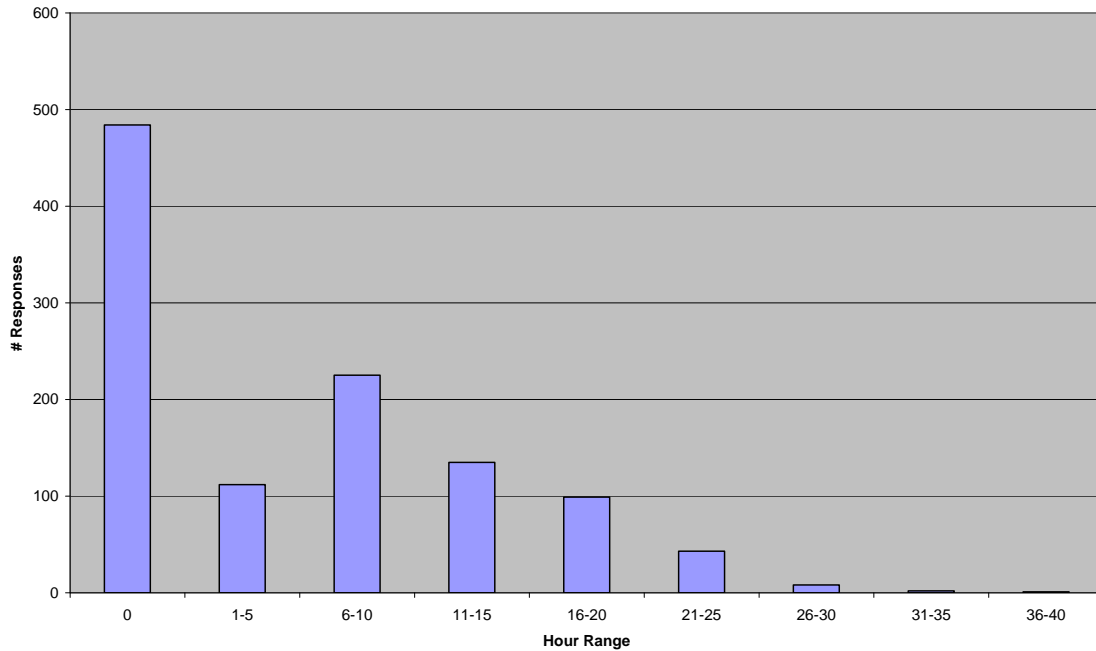


Figure 3: Employment Hours

The most significant feature of Figure 3 is the substantial proportion of students – 43% of all responses – who perform zero hours of paid employment. This bulk of zero responses significantly affects the median of the dataset – the overall median response was four hours of paid employment, however the median of the non-zero subset (i.e. those students who work) was ten hours in the week. The overall highest response was 36 hours of paid employment.

Hours volunteered

The students responses to their volunteer hours also had significant variation, however the dominant response (83.7% of all responses) was zero hours (Figure 4):

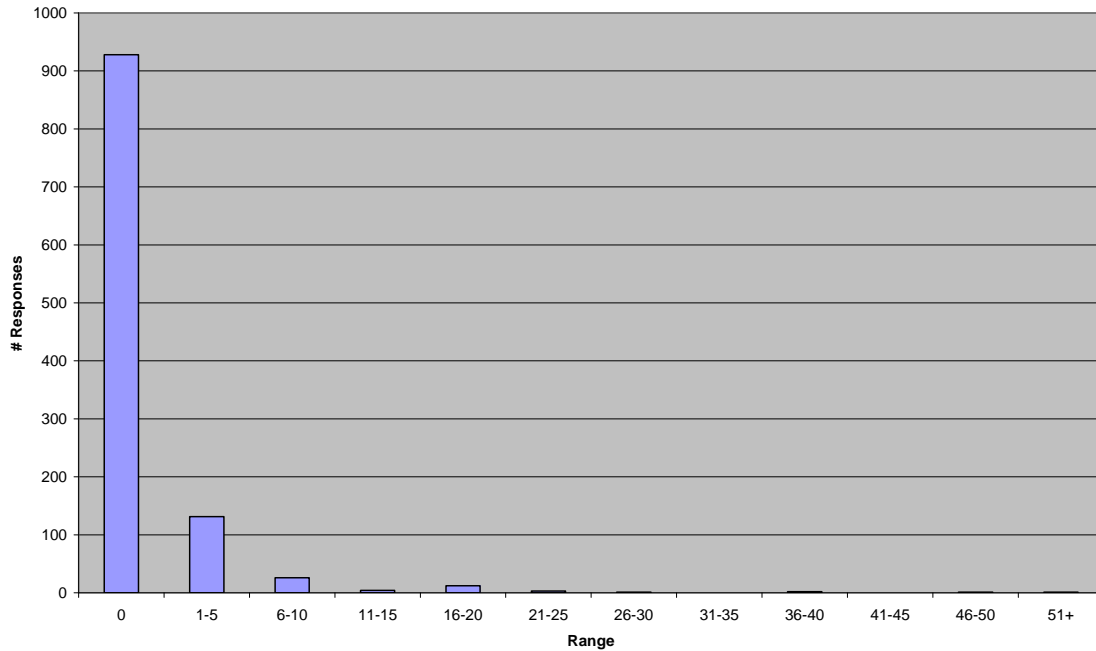


Figure 4: Volunteer Hours

The median response was zero hours; among the non-zero responses the median response was four hours in that week. The highest overall response was 60 hours of volunteer work; it is worth noting that this took place in a non-teaching break within the semester.

It is clear that for the vast majority of students, volunteer work does not contribute to their lifeload, however for a small minority it is a significant additional time commitment in their week.

Total Hours – The “Lifeload” of the student

There is substantial variation in the students’ responses to each of the three measured aspects of their time commitments. When considered alone, however, these measures do not give an indication of the total time commitment of the student – the student’s “Lifeload”. This measure is found by considering the total hours of their response (Figure 5):

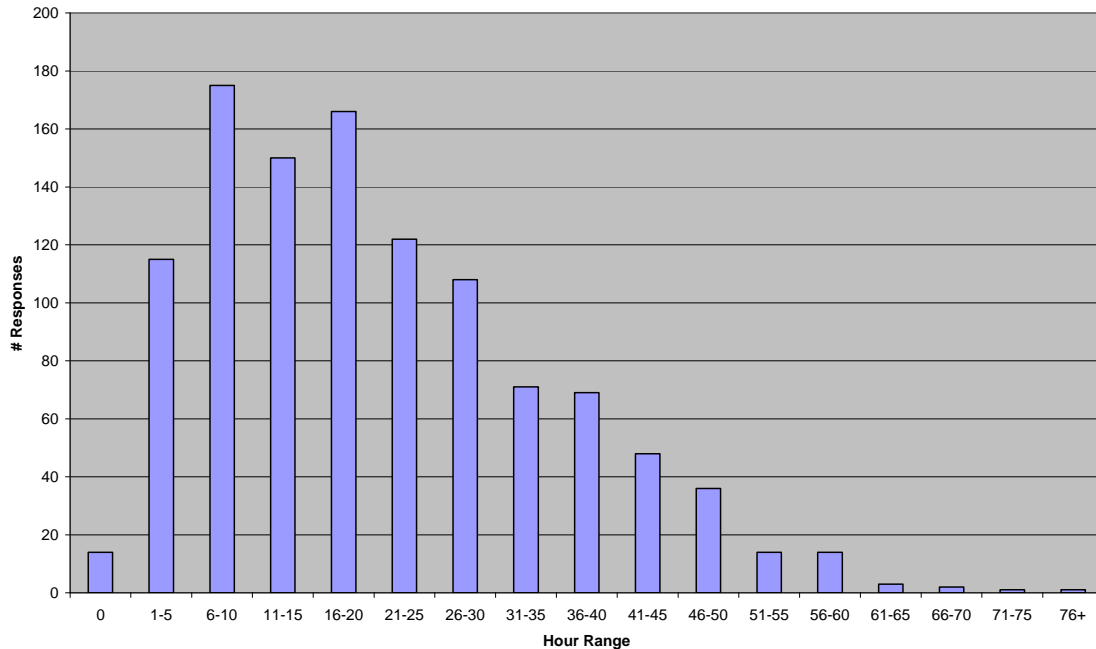


Figure 5: Student Lifeloads

As with the individual components that make up the lifeload, there is significant variation in the responses. The lowest response was zero hours – no study, no paid employment, and no volunteer work – which made up 1.3% of all responses. The highest response was 79 hours, and the median response was 20 hours.

A fine-grained analysis of how the overall lifeload is broken down indicates whether study replaces paid employment, or whether students do both or neither. There were very few responses in the >60 hours range – a total of seven of the 1,110 responses. As such the analysis of how the hours are distributed across all three categories excludes these outliers, to prevent a bias in the analysis of the overall data. Responses were aggregated within their total hour's ranges, and averages were calculated for each of the three activities in each of these categories. This data provides an illustration of the breakdown of the differing time commitments (Figure 6):

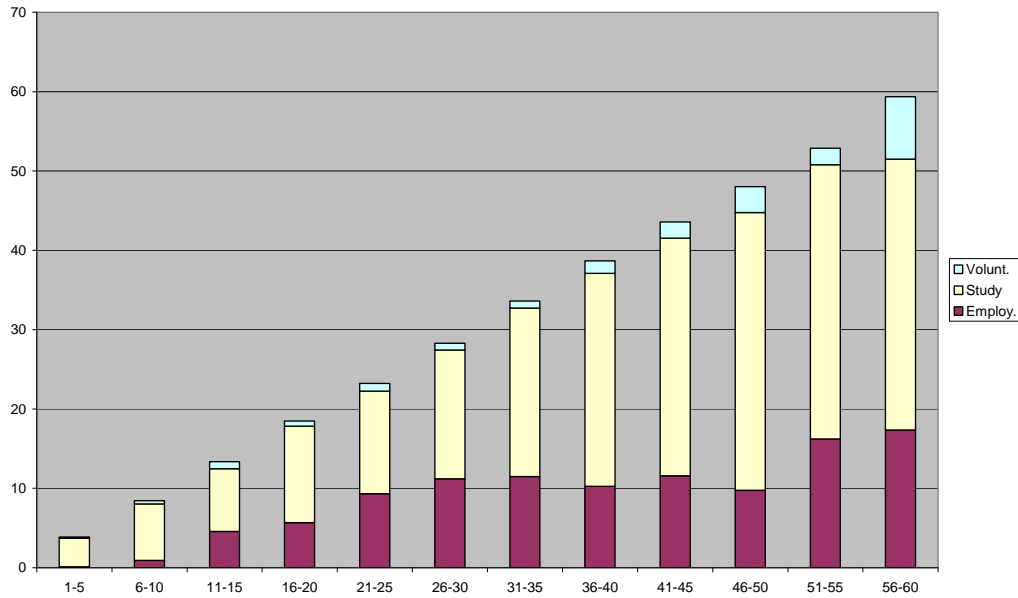


Figure 6: Hours broken down by category

Figure 6 shows that the dominant activity for the students is study – time spent study by far outweighs their time spent on paid employment and volunteering, regardless of how much overall time they spent.

There is also an interesting trend in how the students’ workloads expand from zero. Students who reported ten hours or less reported on average less than an hour’s paid employment, whereas students in the 11-15 hour range reported an average of 4.5 hours paid work. This suggests that on average, the shift from a 6-10 hour “lifeload” to an 11-15 hour “lifeload” is achieved through the addition of paid employment, rather than through additional study.

A similar effect occurs, this time with regard to study time, between the 11-15 and 16-20 hour “lifeloads”. Students in the 11-15 hour range report on average 7.93 hours of study, while those in the 16-20 hour range report 12.16 – a four hour increase. This suggests that the shift from 11-15 to 16-20 occurs primarily through more study.

From 16-20 to 21-25 again appears to be an employment-related shift, with the average reported paid employment time increasing from 5.7 hours to 9.3 hours – an increase of 3.6 hours for a 5 hour increase in total lifeload. Beyond this range the employment remains fairly stable around the 10 hours a week mark, with the increase in lifeload coming primarily through increased study time, although there is an increase in employment at the very high (50+ hours) lifeload range.

This suggests that students construct their basic lifeload in five hour blocks – five hours into study, then five hours into paid employment, then another five into study, then another five into work.

While Figure 6 illustrates the relationships between study and employment commitments, it does not investigate the way in which these commitments evolve over time. In order to do so, it is necessary to consider the data on a week-by-week basis.

By week – changes in distributions

The previous section showed how students’ lifeloads are distributed based upon an analysis of their responses, however it does not address when each of these responses occurred. To do this it is useful

to consider the distribution of responses across the weeks of the semester. This was done by taking an average response for each of the three lifeload types for each week (Figure 7):

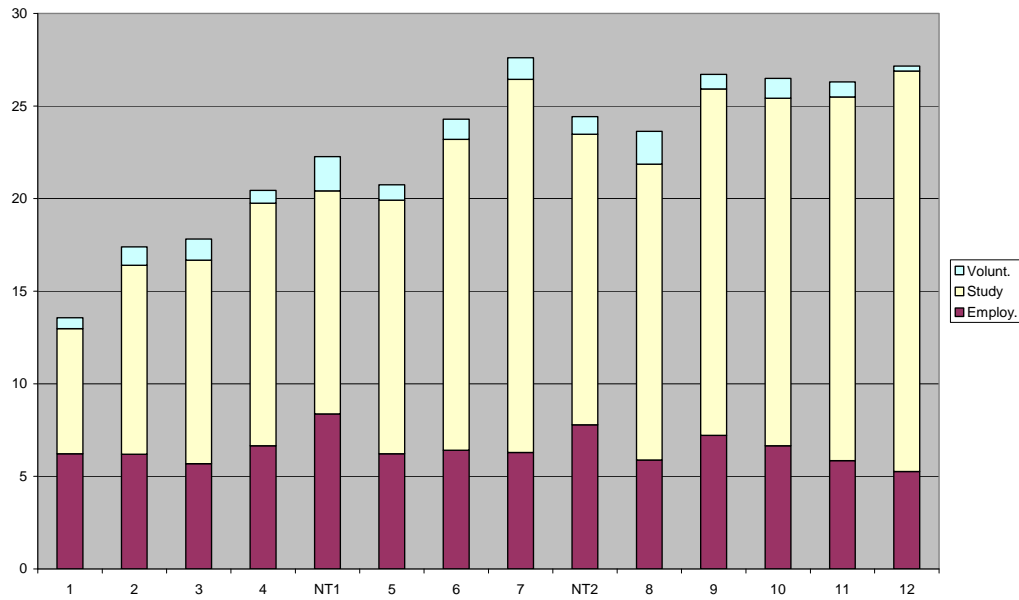


Figure 7: Lifeload distribution by week

Figure 7 shows that the lifeload is lowest at the beginning of semester, and that it grows fairly steadily until teaching week 7. It is interesting to note that the lifeload dips not in the first non teaching week, but rather in the week that follows. While the study load does go down, it is replaced by an increase in paid employment, and a (relative) spike in volunteer work. Students do more in the first non-teaching week while they have the chance.

Study also expands slowly over the last month of semester. Overall lifeload seems to average around 27 hours, but study forms an increasing proportion of the students' lifeload. This is illustrated in Figure 8:

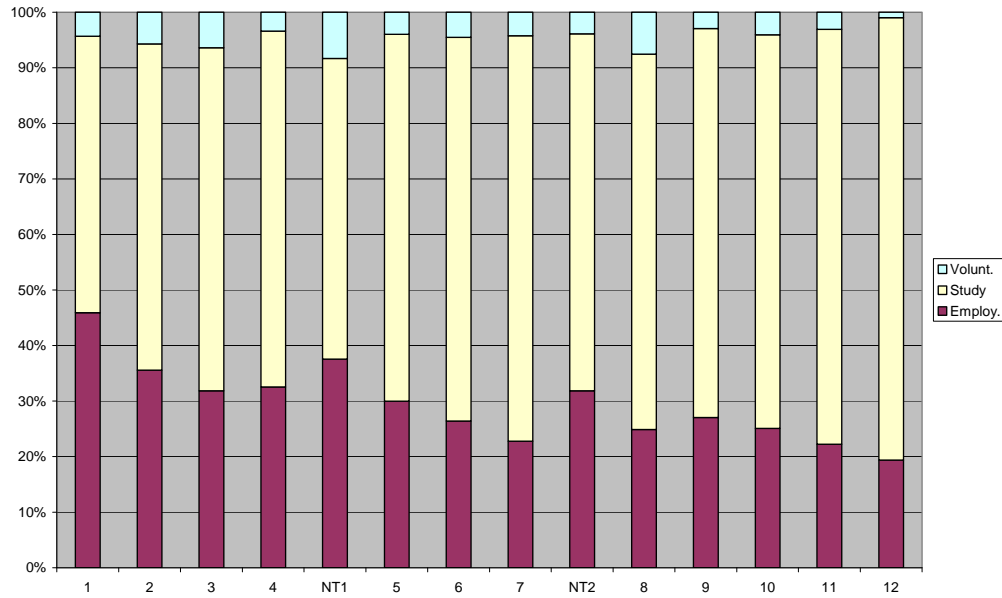


Figure 8: Weekly Breakdowns by proportion

Figure 8 shows that there is an overall general trend for study to form an increasingly large part of the student's lifeload each week. This trend is interrupted by the two non-teaching weeks, which reset the proportions away from study, and then study grows on a weekly basis.

In the early weeks this expansion is achieved by adding additional hours to the overall lifeload, while in later weeks this increase in study time is achieved at the expense of paid employment and volunteer work.

Conclusion

The students' responses show that there are significant variations within the cohort with regard to the amount of time spent on study, paid employment and volunteer work, with the median overall reported lifeload for a student being 20 hours per week.

A substantial proportion (43%) of all responses of all responses indicated that the student did not perform paid employment. For those that did perform paid employment, there was an observable interaction between hours of study and hours of work. The breakdown of responses suggest that students develop their lifeload in alternative five-hour blocks, beginning with study, then adding paid employment, then study then employment again. This suggests that there is a minimum quantum in which paid work can be undertaken – that students cannot simply engage in one or two hours a week of paid employment, but must instead take on shifts of approximately five hours.

As lifeloads increase, students tend to sacrifice paid employment for the sake of additional study. Early in semester, lifeloads increased through the addition of extra study; towards the end of the semester lifeloads remain relatively steady, but the proportion contributed by study increases at the expense of paid employment. This suggests that students scale back their employment to focus upon study at the end of semester.

It is also significant to note that the weeks following the non-teaching weeks display a greater reduction in the overall lifeload of the students – they are taking the opportunity of not having classes to perform additional paid employment, rather than investing into their studies.

It is not enough to simply say “students have to work, and need to accept this in our teaching”. Many of our students do not engage in paid work, and for those that do there is no “one size fits all” description. This fine-grained analysis of the time commitments of first year engineering students shows that there are complex interactions between study, paid employment and volunteer work, and that these interactions evolve throughout the course of the semester. Our responses to these demands must therefore correspond to these changing needs in order for us to serve our students appropriately.

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