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# The impact of task value upon the stress and workload levels of first year engineering students

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***Abstract:** Engineering degrees are often perceived as arduous with the large workloads involved causing much stress for the students. Students' stress levels can be affected by a range of factors, including the nature of their workload. This paper investigates first year engineering students' reported stress and workload levels and the reported size, difficulty and learning value of the tasks they are required to perform.*

*The analysis of the gathered data shows that both task size and task difficulty have an impact upon students' perception of stress and workload. Larger and more difficult tasks lead to an increased proportion of students who report higher stress and workload levels. Task size and task difficulty were strongly linked variables - most students who reported that their workload consisted of larger tasks also reported more difficult tasks.*

*Task value, on the other hand, appeared to have only a small impact upon students' perception of workload, and appeared to vary independently of students' perceptions of stress. This contradicts the belief that more meaningful tasks do not cause as much stress in students.*

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## Introduction

Engineering degree programs are notorious for placing considerable demands upon their students. Balancing study and other commitments, such as paid employment, is a challenge faced by an increasing number of undergraduate students (McInnis, 2001). These challenges are particularly difficult for first year students who are also dealing with the transition from high school student to the university environment.

The Graduate Course Experience Questionnaire is a key indicator of the teaching performance of Australian universities, and Engineering has historically underperformed against other degree programs. Average ratings on the Good Teaching Scale are consistently 10-20% lower for Engineering programs than the overall national average (Graduate Careers Australia, 2006), with excessive workload issues being a common theme in graduate responses.

There are a wide range of factors that cause stress in undergraduate students (Garrett, 2001). While academic-related issues certainly contribute, a significant number of non-academic-related factors also contribute heavily to the stress levels of students (Ross et al., 1999). Academic workload is only one part of the issue; however it is often misunderstood.

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 (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).

There are also issues with the way in which academics view student workload. High workloads are a common expectation of academics; with this comes the fear that students will rate an instructor lower

on teaching evaluations as a result. The work of Dee (2007) shows that the quality of instructional techniques can be more important than the level of workload in determining student satisfaction; however the challenge of balancing student workload and satisfaction remains.

While clearly linked, students' perceptions of stress can differ from their perceptions of workload (Lindsay, 2009). Some students can be highly stressed with low workloads, and vice versa, suggesting that other factors influence the student experience. This paper explores the impact of the nature of academic tasks upon students' stress and workload levels.

The study was carried out with a large cohort enrolled in a first year Engineering Foundation Principles and Communication (EFPC) unit at Curtin University. Students were asked to complete an online survey on a weekly basis. The students' responses regarding their workload and stress levels, and the size, difficulty and perceived value of their academic tasks over a full semester are presented in this paper.

## Method

Students were asked to respond to a weekly workload survey consisting of fourteen questions (see Appendix for a copy of the full survey). The survey was implemented online using the WebCT module for their first year communications unit. Participation was voluntary and anonymous.

This paper reports on the relationships between their responses to six of these questions; three that deal with the nature of the task they are completing, and three that deal with their stress and workload levels.

The survey required students to consider all of their current university assignments and tasks (homework, studying projects etc.). They were then asked to enter how many assignments/tasks they had that week that fitted into each of five categories.

- For task size, students were given the categories: trivial, short, medium, long and huge.
- For task difficulty, students were given the categories: trivial, easy, medium, hard, very hard
- For task value, students were given the categories: a waste of my time, not very good to help me learn, adequate to help me learn, good to help me learn and very good to help me learn.

Students were also asked to consider their stress and workload levels, with stress being measured in both relative and absolute terms.

- For relative stress and relative workload, students were given the categories: much less than normal, a little less than normal, pretty typical, a little more than normal and much more than normal
- For absolute stress, students were given the categories: Not at all stressed, a little stressed, somewhat stressed, very stressed, extremely stressed.

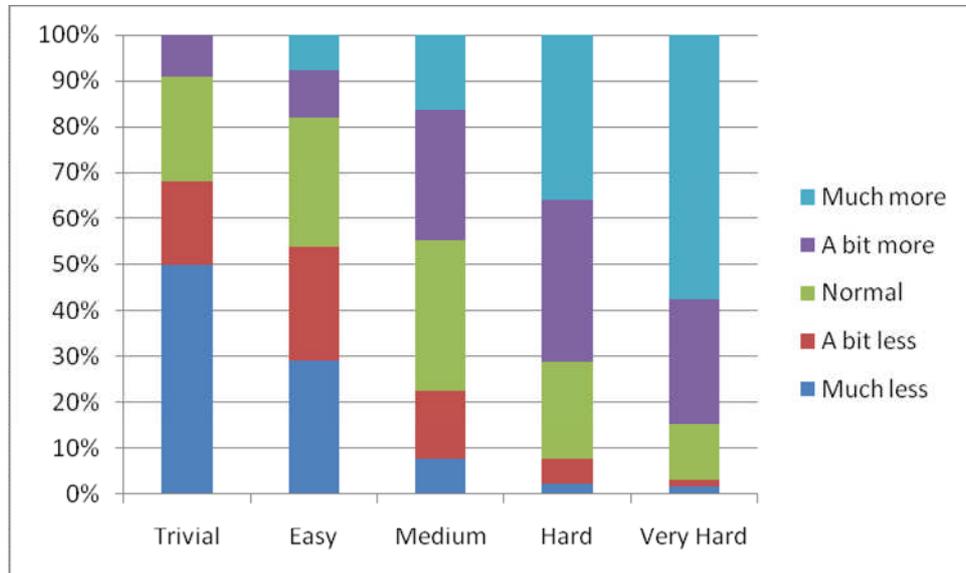
A total of 1402 survey responses were gathered. This dataset was cleaned up to remove unusable responses such as "a few", to convert words to numbers, to use a single average value where students had responded with a range of numbers, and to delete responses that did not include responses to all questions. Once the cleanup was completed 1305 useful data points remained.

Each student response represents a variable number of tasks distributed across the five size / difficulty / value categories. In order to allow the analysis of the data for this paper, measures for averaging were developed. Each of the ordinal categories of size, difficulty and value were allocated a numerical value from 1 to 5, from lowest to highest. These category ordinal values were used as weights for the numbers of tasks reported in each category to produce a weighted average for each of the three metrics for each student response. The weighted averages were then rounded to the nearest integer to provide five categories of average size, difficulty and value. A total of 1280 valid data points were left after this analysis had been completed.

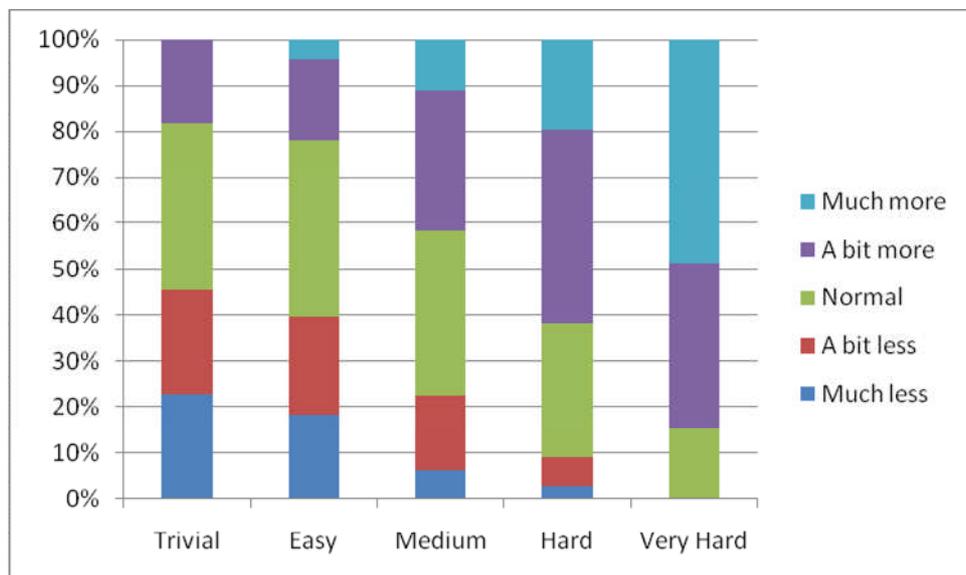
Anonymous data encourages authentic participation by the students; however it also prevents analysis of how the students' responses correlate to their assessment outcomes (both in this unit and in previous years), or their demographic profile. Meaningful comparisons can still be drawn concerning the correlations between their responses to different survey items; these comparisons are presented in the following sections.

## The Impact of Difficulty

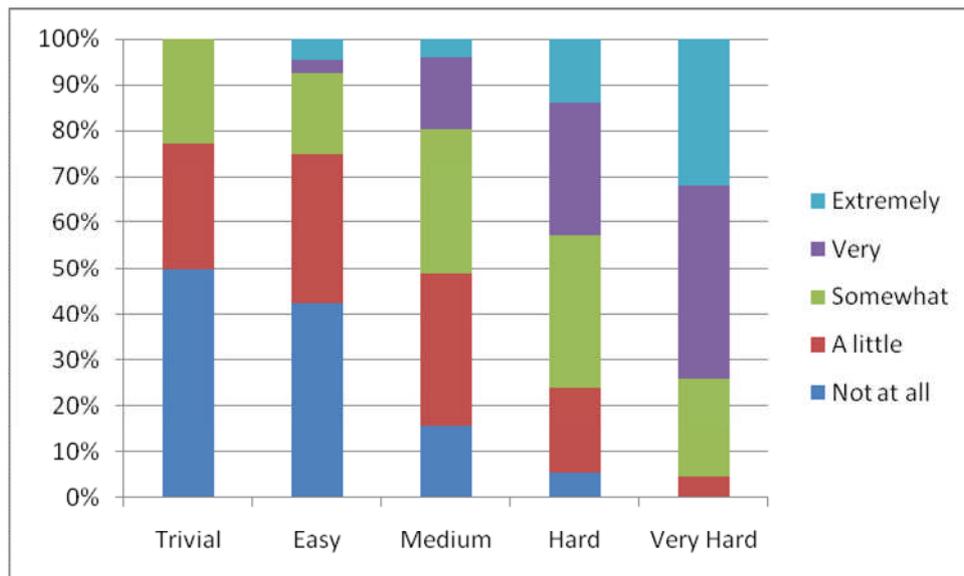
The impact of average difficulty upon the distribution of workload and stress responses is illustrated in Figure 1-Figure 3 below:



**Figure 1: Relative Workload vs Average Difficulty**



**Figure 2: Relative Stress vs Average Difficulty**

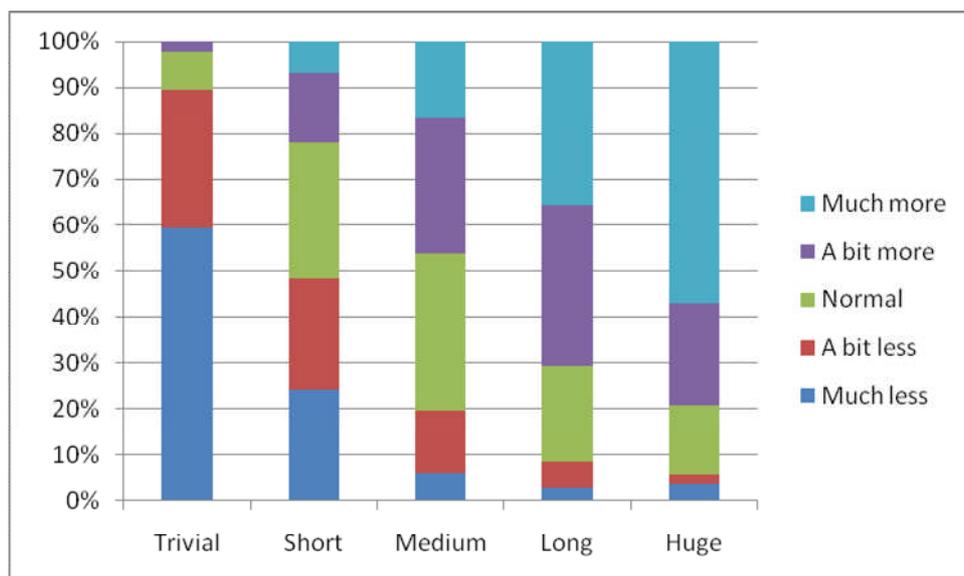


**Figure 3: Absolute Stress vs Average Difficulty**

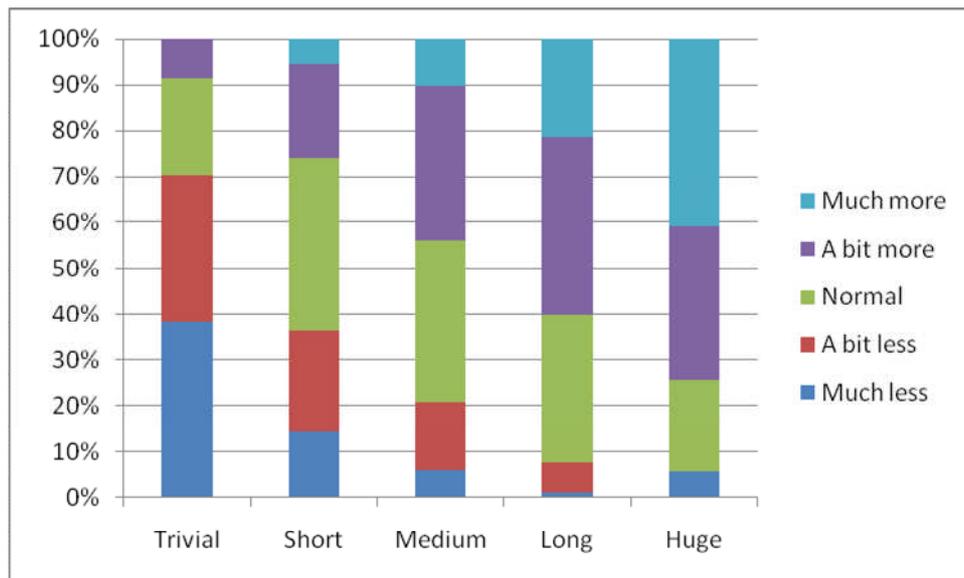
Figure 1-Figure 3 show that as the reported level of difficulty increases, the distribution of workload and stress responses skews towards the higher end. Students who report that their work is on average harder are more likely to report that they are highly stressed, or are experiencing high workloads.

### The Impact of Size

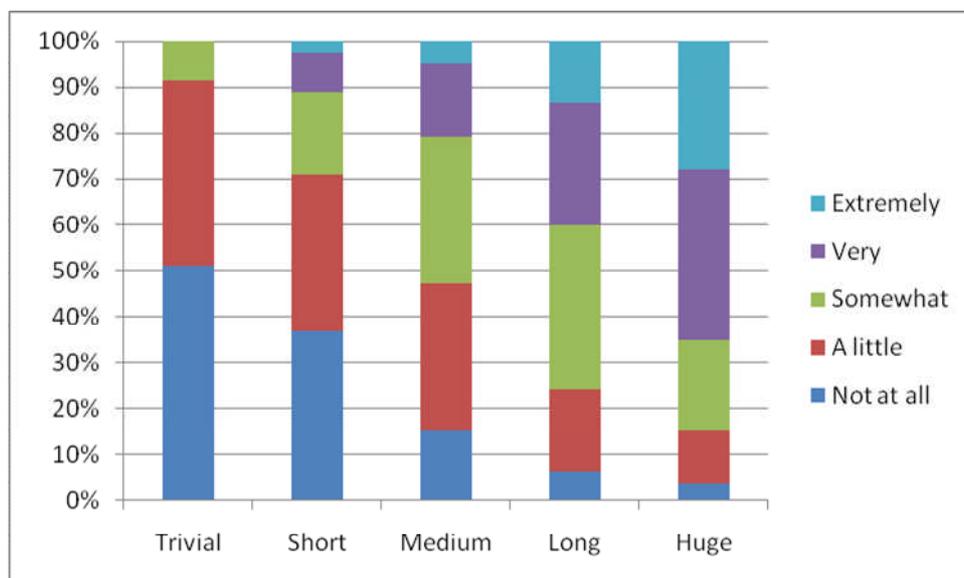
The impact of average difficulty upon the distribution of workload and stress responses is illustrated in Figure 4-Figure 6 below:



**Figure 4: Relative Workload vs Average Size**



**Figure 5: Relative Stress vs Average Size**

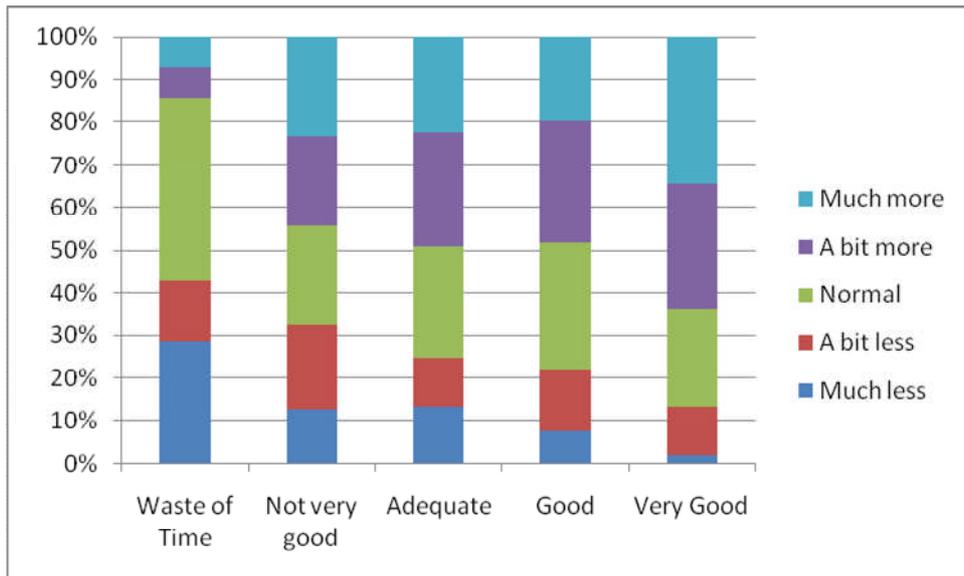


**Figure 6: Absolute Stress vs Average Size**

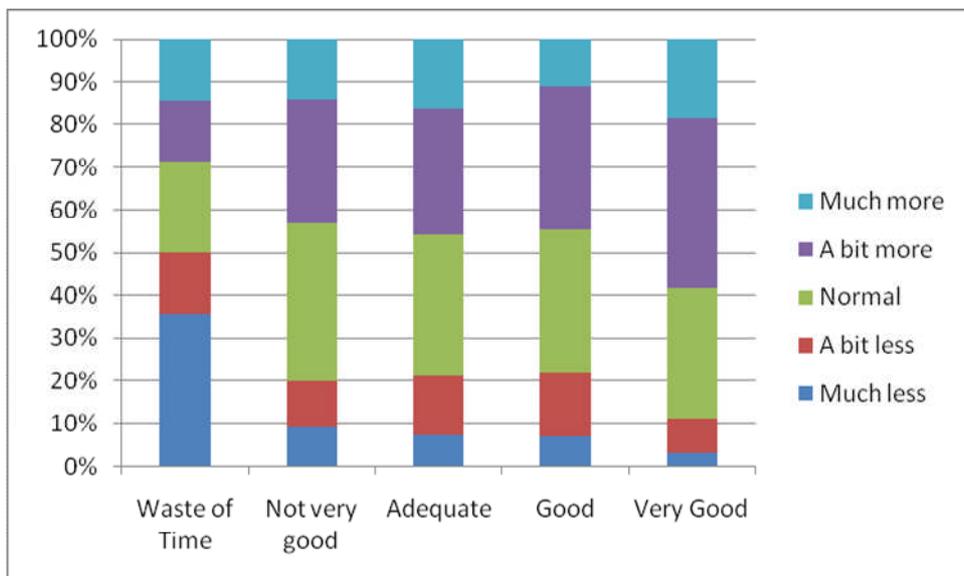
Figure 4-Figure 6 show that as the reported average size increases, the distribution of workload and stress responses skews towards the higher end. Students who report that their tasks are on average larger are more likely to report that they are highly stressed, or are experiencing high workloads.

### Impact of Task Value

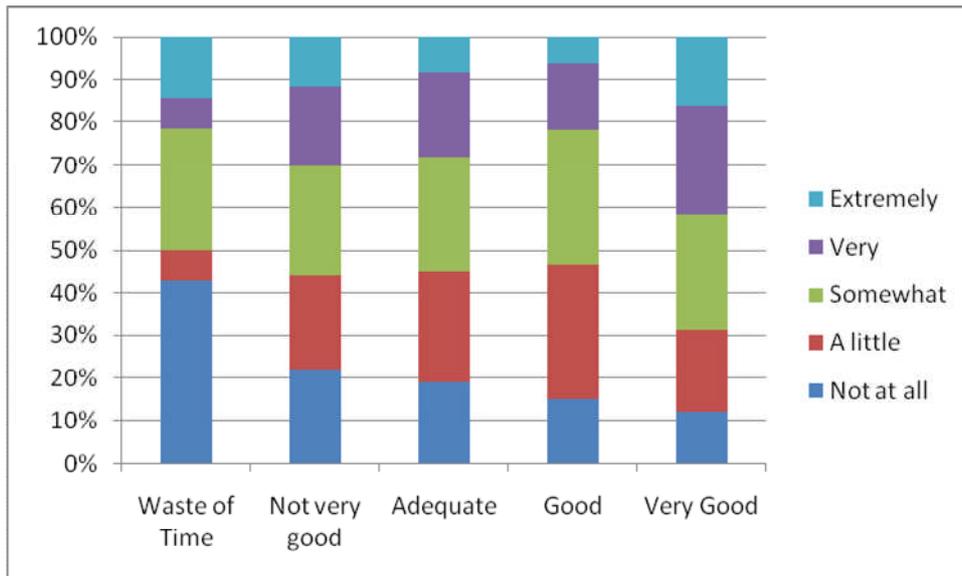
The impact of average difficulty upon the distribution of workload and stress responses is illustrated in Figure 7-Figure 9 below:



**Figure 7: Relative Workload vs Average Value**



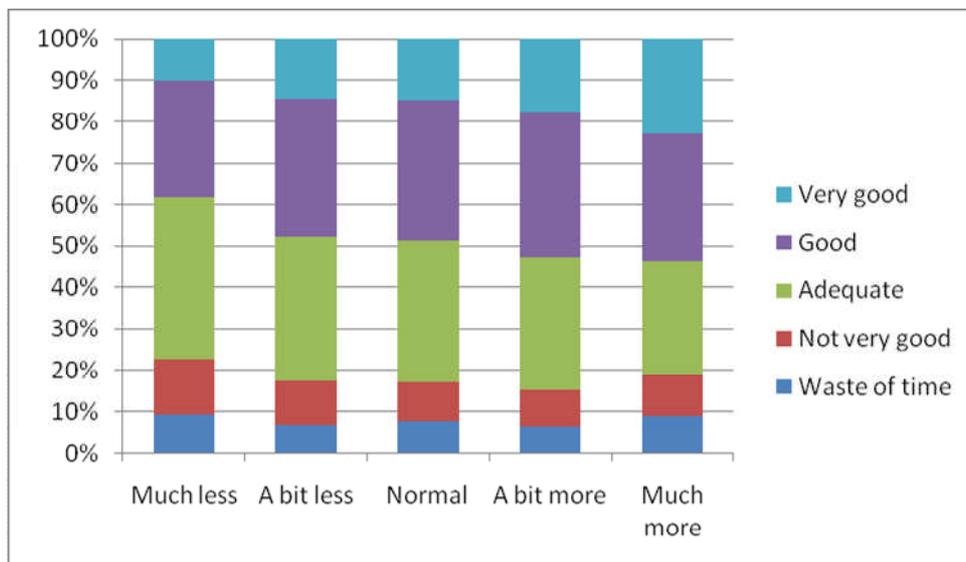
**Figure 8: Relative Stress vs Average Value**



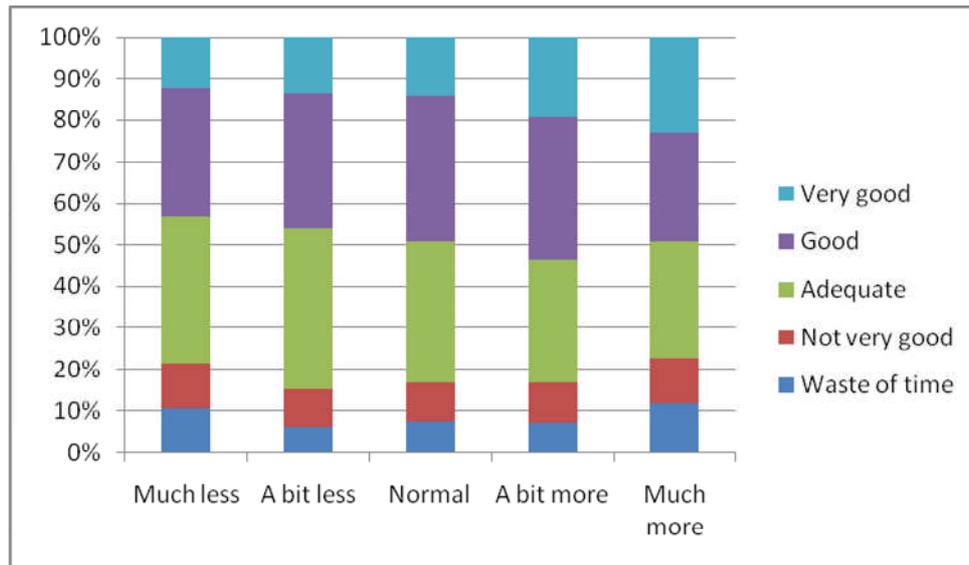
**Figure 9: Absolute Stress vs Average Value**

Figure 7-Figure 9 show that the distributions of stress and workload responses are largely independent of the reported average value of the tasks. Students who report that on average their tasks are a waste of their time are more likely to report that they are not at all stressed, or that their stress and workloads are much less than usual. Students who report that on average their tasks are not a waste of time do not display a difference in the distributions of stress or workload perceptions.

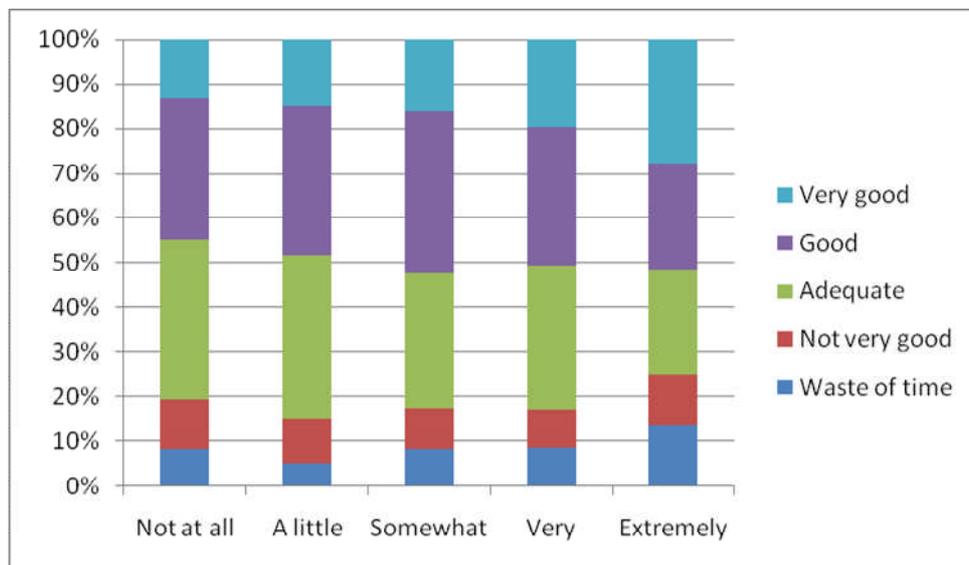
That perceived stress and workload levels are independent of task value is more clearly illustrated in Figure 10-Figure 12, which show the distribution of task value responses broken down by stress and workload response:



**Figure 10: Task Value vs Relative Workload**



**Figure 11: Task Value vs Relative Stress**



**Figure 12: Task Value vs Absolute Stress**

Figure 10-Figure 12 show that the distribution of task value responses is the same for each of the stress and workload categories. The subset of the cohort who are highly stressed report the same distribution of task value as the subset that report only low levels of stress.

## Conclusion

The results shown in this paper support two findings: firstly, that task size and task difficulty have an impact upon both stress and workload; secondly, that task value is largely independent of perceived stress and workload.

The first finding is similar for both size and difficulty – as students rated the average difficulty or size of their tasks to be higher, the distributions of workload and stress responses correspondingly moved towards higher levels. The similarities in the responses suggest the possibility that there is a confounding effect between the two variables, with more difficult tasks appearing to be larger to the students. The results suggest that designing assessments to include smaller tasks will result in lower

stress and workload levels for the students; however without a corresponding analysis of the overall number of tasks this must be considered carefully.

The second finding contradicts the prior work that suggests that the extent to which the work is perceived as meaningful impacts upon the perception of workload (Kember, 2004, Marsh, 2001). Further work is necessary to determine whether the discrepancy is due to an inability to generalise one cohort of students to the other, or whether the more detailed analysis of size, difficulty and value has unpacked multiple dimensions that were confounded in prior work.

Regardless of its generalisability, the results in this paper suggest that more meaningful tasks do not engender more stress or workload than less repetitive tasks; as such there is a (hopefully unnecessary) argument to support making assessment tasks as meaningful as possible for the students.

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**Appendix: Weekly Workload Reflection Survey Questions**

Students were asked to respond to the following 14 questions each week:

**Range of Tasks**

1. Consider all of your current university assignments and tasks (homework, studying, projects, etc.). In the appropriate columns below, please enter how many assignments/tasks of each size you are supposed to work on this week.

trivial	short	medium	long	huge

2. How many assignments/tasks of each *difficulty level* are you supposed to work on this week?

trivial	easy	medium	hard	very hard

3. How many assignments/tasks of each *learning value* are you supposed to work on this week?

a waste of my time	not very good to help me learn	adequate to help me learn	good to help me learn	very good to help me learn

**Actual Hours**

- 4. How many hours did you put into your study this week?
- 5. How many hours of paid employment did you do this week?
- 6. How many hours of volunteer work did you do this week?

**This Week in Perspective**

- 7. How does your academic workload this week compare to your typical weekly academic workload?
  - This week requires much less work than normal
  - This week requires a little less work than normal
  - This week is pretty typical
  - This week requires a little more work than normal
  - This week requires much more work than normal
  
- 8. How would you characterize your current level of overall stress?
  - Not at all stressed
  - A little stressed
  - Somewhat stressed
  - Very stressed
  - Extremely stressed
  
- 9. How does your current stress level compare to your typical stress level?
  - I'm much less stressed than normal
  - I'm a little less stressed than normal
  - My current stress level is pretty typical
  - I'm a little more stressed than normal
  - I'm much more stressed than normal

**Contributing Factors**

- 10. Which factors contributed to your workload this week, positively or negatively?
  - Housemate(s)
  - Romantic relationship(s)
  - Family issues
  - Economic issues
  - Personal health issues

- Academic workload
- Employment issues
- Academic achievement level / grades
- Other (what?)

11. Which factor has contributed the most to your workload this week?
12. Which strategies for managing your workload have worked well this week?
13. What will you do differently next week to help you manage your workload?

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