33rd Annual Conference of the Australasian Association for Engineering Education (AAEE 2022)
4 - 7 December 2022 – Sydney, NSW

A Pilot Study; Academic Interpretation and Student Sights on the Quantitative Tool

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ABSTRACT

CONTEXT

The workload is a constant issue in students' lives and is used as a measurement to evaluate students' performance and engagement in their studies. The introduction of a quantitative tool to predict the workload in advance to the teaching team can be useful to plan and moderate the workload and can assist the students in managing their time.

PURPOSE OR GOAL

In two previous papers (AAEE2019 & 2020 (Mansouri et al., 2019 & 2020)), we introduced a tool to predict the assessment loading dispersion across the semester and a data analysis method to observe student workload during the semester. The target of this pilot study paper is to understand if the tool can be helpful for students to have better time management and if it is possible to encourage the teaching team to plan the assessment schedule by using this tool.

APPROACH

The research was designed based on initiating group discussions as a qualitative approach to gain an understanding of academic interpretation and student sights on the quantitative tool. In this preliminary research, the tool was demonstrated for one group of students and for one group of academics. The workload was calculated based on the four units and shown to the academics to give them a measure of the workload for students.

ACTUAL OR ANTICIPATED OUTCOMES

It was determined from the group discussions that students develop a sense of time management as they progress through the degree. Although academics mentioned the tool was helpful for them to view workload across the semester; the assignment submission dates have been scheduled following the weekly topics and it was difficult to reschedule them even though it clearly clashed with another assignment.

CONCLUSIONS/RECOMMENDATIONS/SUMMARY

Overall, the quantitative tool received positive feedback from the participants, showing prospects for further research and using the tool in workload planning. The results obtained from the pilot study show a positive prospect for the tool to be included as a pre-learning activity for future students.

KEYWORDS

Assessment load, workload, Evaluation, Learning System Management.

Introduction

Students commonly encounter stress during their academic studies. Students constantly strive to achieve academic excellence, especially during their courses as their academic performance is a common measure of their abilities as graduates to perform in the workplace.

The student's academic performance is generally evaluated by the marks they obtained through examinations and continuous assessments followed by an average of their marks in every subject classified as Grade Point Average (GPA) or Weighted Average Mark (WAM). However, many students struggle to perform well academically due to a multitude of factors. These factors include negative behaviour such as tardiness and lateness (Tice and Baumeister, 1997), lack of interest in the course that they are enrolled in leading to lack of motivation, and poor mental and physical health (Ding et al., 2009). However, a common factor that negatively affects students is the workload from the study (Blumberg and Flaherty, 1985) ;(Talib and Zia-ur-Rehman, 2012); (Campbell et al., 1992).

Many engineering and science students report course workload as a stress factor impacting their academic studies and personal well-being (Kausar, 2010); (Rafidah et al., 2009); (Talib and Zia-ur-Rehman, 2012). This is most likely due to the high study load during the semester, at the Faculty of Engineering, Monash University, there is an expectation of completing 6 hours of personal study time, in addition to an average of 6 hours of face-to-face study time per unit per week. Typically, during the semester, a student would be completing multiple units with multiple assessments simultaneously. While the engineering curriculum may induce a high study and stress load, the student is given the opportunity to practice essential engineering skills such as project management, time management, and teamwork as described by the Engineers Australia Stage 1 competencies for a professional engineer (Australia, 2017). These elements of competency are 1.6d) Understand the fundamental principles of engineering project management as a basis for planning, organising, and managing resources. 3.5d) Manages time and processes effectively, and prioritises competing for demands to achieve personal, career, and organisational goals and objectives.

Therefore, an intervention approach is required to help them cope with the workload and stress. The intense workload experienced could be managed more efficiently with the development of quantitative tools. Thus, the application of time management could inherently improve students' academic performance and personal well-being.

Correlation between performance and workload factors

The Engineering and Science courses tend to have a heavy workload across the semester, forcing the average engineering student to allocate much more time towards the course compared to most courses offered by the institute (Kausar, 2010). A questionnaire survey performed by (Ali et al., 2009) completed by 418 students has shown a negative correlation between course assessment and students' Cumulative Grade Point Average (CGPA). The questionnaire analyses the demographic variables of the respondents followed by the relationship between students' performance and course assessment, peer influence, extracurricular activities as well as active learning. The Pearson correlation factor is a measure to determine the linearity of the relationship between two variables. The factor ranges from -1 to 1 with -1 indicating a perfect negative linear relationship, 0 indicating no linear relationship, and 1 indicating a perfect positive linear relationship. The correlation factor between course assessment and the student's CGPA was then found -0.027 which is negative compared to a positive correlation with the other factors. Hence, the researchers concluded that frequent course assessments do not improve the student's CGPA (Ali et al., 2009).

A study performed by (Talib and Zia-ur-Rehman, 2012) investigated the effect of perceived stress on the academic performance of university students. A questionnaire was collected from a sample size of 250 students from the universities of Rawalpindi and Islamabad. The stress factor survey returned results that a majority (53%) of students have claimed the course load to be the source of their stress. Furthermore, a significant correlation between perceived stress and academic performance was found in the study. The data collected has shown a correlation value of -0.392 which implies that higher levels of perceived stress lead to lower academic performance in students. Other than that, it was noted from the study that the mean stress score collected from engineering

students is higher compared to other students such as management students (Talib and Zia-ur-Rehman, 2012).

Interventions

The study has discovered that academic workload shows a positive relationship with practical coping strategies. Therefore, counselling services were recommended to assist students with coping with stress (Kausar, 2010). Furthermore, familiarising students with the learning, evaluation, and grading process in the educational institution, as well as the introduction of active learning throughout the course as changes in the teaching and learning process, were also recommended (Kausar, 2010). Another recommended method of coping with stress is the introduction of stress management programs for students (Talib and Zia-ur-Rehman, 2012).

Time management

As the top source of engineering and science students' stress has been discovered to be the heavy workload throughout the degree, interventions have been proposed to manage the heavy workload thus reducing the stress-induced is required (Weissberg, 1982); (Misra and McKean, 2000); (Kausar, 2010); (Britton and Tesser, 1991); (Hall and Hursch, 1982); (Carter et al., 2000). A survey conducted (Weissberg, 1982) showed that 67% of students agreed with the need to manage their time more effectively as their greatest personal need.

A survey was performed by (Misra and McKean, 2000) on 249 full-time undergraduate students at a Midwestern university where they saw a relationship between academic stress, anxiety, time management, and leisure satisfaction. The survey returned results that most students reported that proactive behavioural methods such as time management was used to cope with academic workload among other methods (Misra and McKean, 2000). These other methods include seeking information and help, as well as leisure activities (Kausar, 2010). The academic stress of college students who have high perceived control of time was also lower compared to the other students.

Another questionnaire survey performed by (Britton and Tesser, 1991) tested the hypothesis that CGPA would be predicted by time-management practices. Ninety undergraduates enrolled in a psychology class at the University of Georgia took part in the survey. The collected data suggested that self-reports of time management were related to academic achievement and encouraged a relationship between time-management skills and GPA. Moreover, the students who perform well academically were shown to develop short-term planning skills as they progress through their course.

A study performed by (Hall and Hursch, 1982) was designed to investigate whether work efficiency gauged through time spent on high-priority tasks could be increased with exposure to time-management practices. Four participants who are members of the faculty and staff at West Virginia University were exposed to the concept and practice of time management through using a training manual and weekly meetings with a time management consultant. The participants showed an increase in the amount of high-priority tasks done after the exposure to the manual and having weekly meetings with the consultant (Hall and Hursch, 1982). The study shows time management skills can be embedded and nourished over time using time management practices. Therefore, it is critical for engineering students to develop time-management skills and apply these skills in managing the workload and assessments in their courses. Some essential time management practices for every student include a form of written schedule for recording and tracking time management choices (Carter et al., 2000) and good planning (Tracy, 2007). Further development of time management practice would require the following elements (Britton and Tesser, 1991): selection of goals, prioritising goals to focus effort, and monitoring task and goal accomplishment. Therefore, by training students to use the quantitative tool (Mansouri et al., 2019) they can set their goals in advance according to the assignment schedule.

In this research paper, the quantitive tool which has been introduced in the two previous papers presented and published in AAEE2019 & AAEE2020 (Mansouri et al., 2019 & 2020) was presented to both the teaching team and students. This was an initial stage of viewing the quantitative tool by

students and academics to have a better understanding of their reactions to the further development of the tool.

Approach

To understand the academics and students' sights on the quantitative tool, it was practically demonstrated for both in one semester. The tool has been applied to the second and third years students at Faulty of Engineering.

Academics interpretation

The tool was presented to the teaching teams from two different departments for undergraduate and postgraduate courses and 20 academics to collect their feedback on its efficacy. Although most of the academics provided positive feedback on providing a wide view of academics; however, only one teaching team of postgraduates (Masters by course) decided to put the tool into action.

Students sights

The research used two questionnaires as well as a group discussion with the participants to obtain quantitative feedback on the tool.

Training plan for time management

While the studies examined in the previous sections looked at understanding the student perceptions of stress and factors in the engineering curriculum, not many studies propose a practical training activity that enables students to develop their time and project management skills. Therefore, to help students improve their academic performance and develop essential skills such as time and project management, that could be used for the rest of their lives, it is necessary to develop a long-term training plan. Although in this research, we were not able to provide completed training on time and project management, however, the tool was proposed to be developed and piloted in one department in the Faculty of Engineering at Somewhere University. In this pilot plan, the tool was applied to assist in managing the student's workload and assessments as well as embedding good time-management practices in a visual manner. Incorporating the time management principles and practices listed earlier, the tool is reflective of the stress factors that students would encounter whilst completing assessments in a given semester. These factors include:

- Commitments outside of the University
- Team-based Assessment
- Marks Allocated for Assessment
- Type of Assessment (Assignment/Test)
- Workload factor (Some assessments are not reflective of the total marks awarded)

The tool aims to collect the data of every assessment the student has for the semester such as assessment type, amount of marks assigned, and duration of assessment to determine the stress level as well as the priority of the assessment. Students are then able to monitor and manage their time based on the workload accordingly with the spreadsheet as a visual aid. This tool thus assists in five out of eight effective time management tools listed by (Swart et al., 2010):

- implement a study plan which requires a well-outlined schedule;
- constantly survey and maintain the schedule;
- implement a time planner organised according to priority;
- keep a checklist of tasks completed and outstanding;
- implement an effective filing system.

Therefore, by allowing the learning experience in the development of time and project management to be more authentic and active, students will be able to develop good study habits to improve their academic performance and personal well-being.

Research plan

The research was conducted by inviting small numbers of students to be used an initial group discussion to identify problems, strategies, and solutions. The tool tested out the data collected from the participants according to their unit enrolment. The research approach was evident in the students taking part in piloting the quantitative tool and its potential application to the learning managing system (Moodle).

The user inputs the details with regards to the assessments and the units under the "Assessment Task", "%", "Start Week' and "End Week" columns, and the tool then generates the semester week for the unit as well as the recommended priority rating for each assessment. The priority rating is mainly determined by the mark weightage of the assessment out of the total internal assessment percentage while the semester week column gives a visual representation of how the unit would look like in terms of assessments for the semester (the details were published on the first paper AAEE2019, Mansouri et al, 2019).

Results & Discussion

Academics interpretation

A full-time student at Somewhere University has to complete four units during one semester which is equivalent to 48 hours of study per week to cover 24 credits with a 100% grade for each unit. The quantitative tool has been used by the teaching team to determine the student workload in advance. Table 1 shows one example of assessment distribution across the semester. The units A, B, C, and D have been sorted by various types of assessments either individual or group activities. The cumulative weekly assessment load weighting for four units from Table 1 has been determined and presented in Figure 1.

The overall student workload has been calculated by using the quantitative tool (Mansouri et al., 2019) and shown in Figure 1 It is obvious how the student would be overloaded during weeks 8 and 11 by indicating 70% and 60% loads and minimum load during weeks 9 and 12 by indicating 20% and 0% load respectively.

The original workload prediction (Figure 1) has been shown to the teaching team. In this research, two members of the teaching team have decided to change the due weeks for the assignments and the results have been demonstrated in Figure 2. As it is used in Figure 2, one assignment with a 10% value has been moved from week 8 to week 9 and one big assignment with a 30% value has been transferred from week 11 to week 12. Therefore, the student will have less pressure during weeks 8 and 11. It will be more manageable to complete their assignments.

Table 1: One semester's assessment schedule

Unit	Assessment	Marks	Due Week
Unit A 100%	Individual	15	4
	Group	15	6
	Individual	20	7
	Individual	20	Mid-S
	Individual	30	13
Unit B 100%	Group	30	9
	Individual	20	11
	Individual	50	14
Unit C 100%	Individual	20	4
	Individual	20	8
	Group	20	10
	Individual	15	3, 7 & 10
	Individual	15	2, 6 & Mid-S

	Individual	10	2, 6 & Mid-S
Unit D 100%	Individual	10	1-12(Attendance)
	Individual	30	8
	Group	30	11
	Group	10	8
	Individual	5	5
	Individual	10	8
	Group	5	5

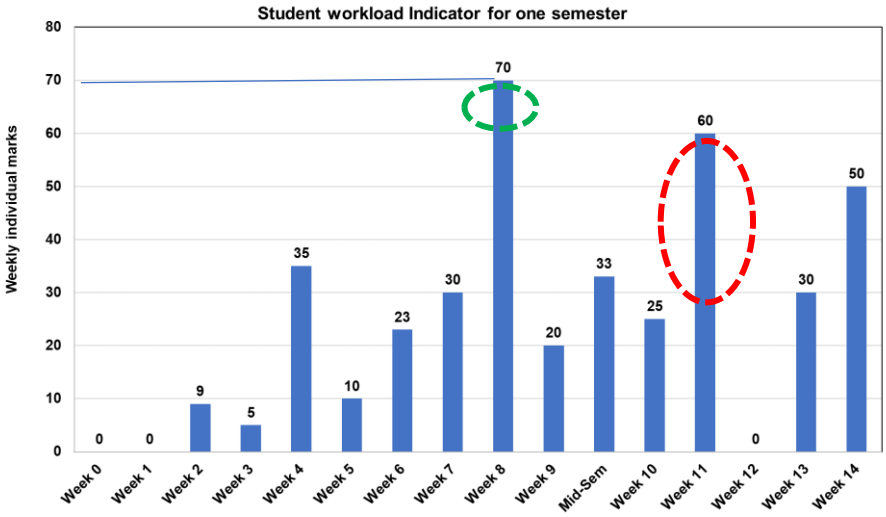

Figure 1: Predicting and Presenting the Assessment Semester Schedule to Plan and Manage Student workload for the teaching team before the semester- The original workload prediction for one semester following the calculation from Table 1

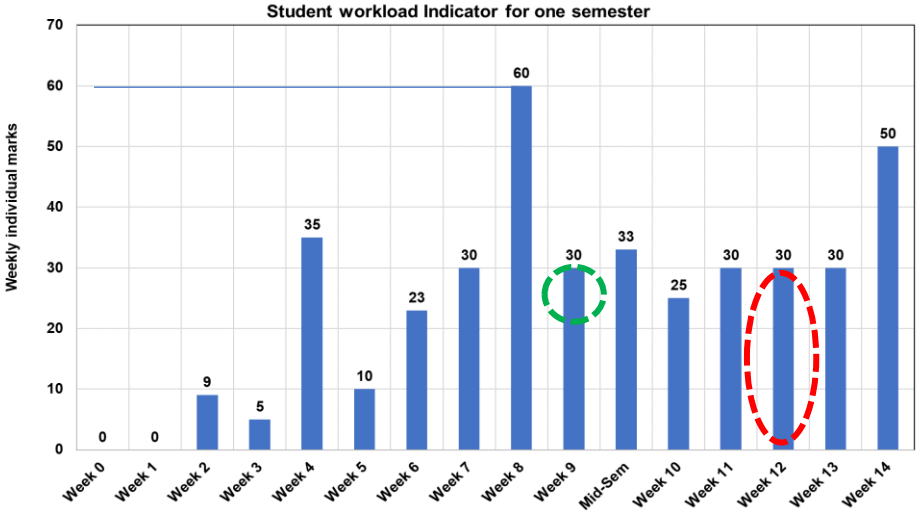

Figure 2: Predicting and Presenting the Assessment Semester Schedule to Plan and Manage Student workload for the teaching team before the semester- After Action- The changed workload prediction for one semester following the calculation from Table 1

Students sights

Participants demographics

The participants' demographics were collected at the beginning of the pre-exposure questionnaire to determine how accurately the participants represented the average students undertaking the course.

The research was based on a group of 8 students at the early stage and then 6 students to complete the whole research. The participants' demographic gave a more accurate representation of the average student in the course since the participants had an average grade of credit and distinction which would be similar to the average student compared to the extreme two grades of fail and high distinction. This deduction was made as the participants were almost evenly split between the 3rd and 4th year in terms of year level and evenly split between single-degree and double-degree students.

Students group questionnaire results

An exposure questionnaire was carried out to understand the participants' perceptions of stress and time management. The questionnaire also asks the participants' sources of stress and whether they manage their time and assessment often before being exposed to the quantitative tool.

Figure 3 shows that 50% of the participants find that the main source of stress when completing assessments is the heavy workload of the assessments. The next main source of stress when completing assessments is working with teammates in a group assessment.

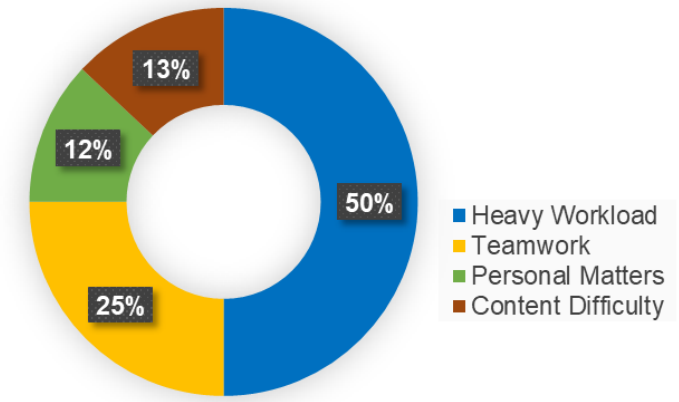

Figure 3: Main Source of Stress Perceived by 8 Participants when Completing Assignments

The frequency in which the participants time manage their assessment load was determined and shown in Figure 4. The participants were found to manage their assessment load on a weekly basis at a minimum with one participant managing their assessments on a daily basis. Then, the participants completed the last part of the questionnaire. The results from the questionnaire were used to determine a quantitative analysis of the feedback from the group.

The participants found the tool to be easy to use as shown in Figure 4. There was a briefing session at the start of the process showing how to use the tool. Furthermore, with the utilisation of the popular spreadsheet software Microsoft Excel to develop the tool, most participants would be familiar with using the tool already.

The participants were then asked to determine the effectiveness of the tool in terms of managing time and assignments and the results are plotted in Figure 4. The tool is deemed to be effective for the majority of participants. This shows that there is room for improvement for the tool before it could be used further. From the results in Figure 4 and Figure 5, it was deduced that there is a positive prospect of incorporating the tool for future students to be trained in time management.

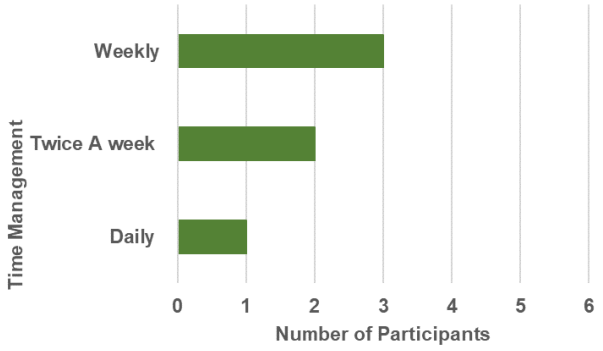

Figure 4: Frequency in Time Manage Assessments

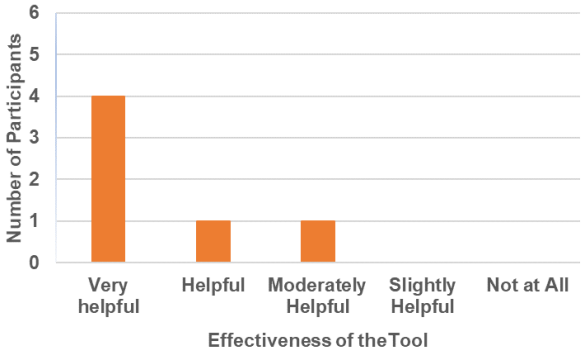

Figure 5: Effectiveness of the Tool

Based on the results collected from the small sample size, participants seem to have an adequate understanding of the concept of time management and have personally developed their own time management skills and methods. The participants have a positive impression of the quantitative tool in general. However, there is still room for improvement in the development of the tool in the future.

Conclusions

It was determined from the research discussion that students tend to develop a sense of time management as they progress through the degree. Overall, the quantitative tool received positive feedback from the participants, showing prospects for further research and incorporation of the tool in teaching. The tool can be accessible to students by evaluating their semester workload for single, or combinations of all taken units in one semester for better time management.

In addition, the tool was applied to predict student workload across one semester before starting the semester for academics. Therefore, academics were able to observe multiple combinations of units and possible overload periods across the semester. Although academics mentioned the tool was helpful for them to view workload across the semester; however, the time limitation for academics due to busy schedules and teaching topics sequences factors were avoided for complete development through planned assessments except for two actions which were very helpful for decreasing the workload across the semester.

The results obtained from the research show a positive prospect for the tool to be incorporated as part of a training plan for student time and project management. Due to the research sample size, a larger cohort is necessary for a conclusive result to be determined on the quantitative tool.

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