Unpacking Student Workload through Elicitation Techniques: Perspectives from Engineering Faculty and Students

Dr. Isabel Hilliger, Pontificia Universidad Católica de Chile

Isabel Hilliger is Assistant Professor of Practice and Associate Director for Assessment and Evaluation at the Engineering Education Unit in Pontificia Universidad Católica de Chile (PUC-Chile). Isabel received a BEng and PhD in Engineering Sciences from PUC-Chile, and an MA in Policy Organizations and Leadership Studies from Stanford Graduate School of Education.

Prof. Marietta Castro, Universidad San Sebastián

Marietta holds a Master in Technological Innovation from Federico Santa Maria University (Santiago, Chile) and a BA in Design from Diego Portales University (Santiago, Chile). She is the Course Director of the Design and Digital Animation programmes at the School of Design and Creative Industries, San Sebastian University (Santiago, Chile)

Ema Huerta Torres, Universidad Católica de Norte

Psychologist, Gestora Unidad de Innovación Docentes de las Ingenierías (UIDIN)

Mr. Erick Vaclav Svec, Pontificia Universidad Católica de Chile

Erick is a project manager at the Engineer Education Unit and the Research and Innovation Unit at the School of Engineering, Pontificia Universidad Católica de Chile. He is also an Adjunct Faculty member at the School of Digital Design and Creative Industries, San Sebastian University. Erick received his Master's Degree in Engineering Science with a focus on Computer Vision from PUC-Chile.

Dr. Jorge Baier, Pontificia Universidad Católica de Chile

He is an associate professor in the Computer Science Department and Associate Dean for Engineering Education at the Engineering School in Pontificia Universidad CatÃ³lica de Chile. Jorge holds a PhD in Computer Science from the University of Toronto in Ca

Unpacking Student Workload through Elicitation Techniques: Perspectives from Engineering Faculty and Students

Introduction

This is a work-in-progress about student workload. Over the past two decades, practitioners and researchers have shown concern for student workload within faculties and schools of engineering [1], [2]. Since the late 1990s, engineering curricula have been overloaded with content and outcome assessments, with the objective that students are able to demonstrate both technical and professional skills [3]. Different types of course assignments are often concentrated in specific weeks, what amplifies learners' levels of anxiety and academic stress [4]. During the pandemic, some students perceived that they have spent more time on academic tasks, without necessarily obtaining better learning results [2], [5], [6]. Considering the continuous curriculum changes, engineering teaching staff should support students who struggle with their ability to self-regulate their learning [2], [6].

So far, different theoretical models have tried to define student workload without reaching consensus [7]. In the context of self-regulated learning, it represents the time students invest in various tasks to achieve their learning goals [8]. According to rational choice, the time students spend on tasks is relative to the perceived benefits, like deeper learning or better grades [9]. Cognitive load theory further breaks it down into intrinsic, extraneous, and germane cognitive loads based on students' prior knowledge and mental demands [10]. Researchers have also differentiated between objective and subjective workload [11]. Objective workload represents the desire to quantify the actual hours students spend inside and outside the classroom, whereas subjective workload relates to students' perceived time and effort, what can be further categorized into a quantitative variable (number of hours) and a qualitative variable (the difficulty of academic tasks).

Elicitation techniques could be useful when discussing abstract or sensitive topics such as student workload, as they encourage participants to share more meaningful insights by reducing power imbalances between interviewers and participants [12]. One set of these techniques involves construction tasks [12], such as free listing, where participants list words related to a given topic, shedding light on cultural interpretations and priorities. According to researchers from different fields [12], this method is adaptable, easy-to use, and suitable for various cultural contexts, and can yield both qualitative and quantitative data, making them valuable for group-level comparisons. Considering these benefits of the free listing technique, its use could be valuable for understanding student academic workload, capturing both qualitative and cultural nuances for comprehensively exploring the perspectives of those who are directly affected by it.

Methods

This study is part of the first stage of a large project whose research question is: *What are the dimensions of student workload in higher education programs from the perspective of faculty and students therein?* To address this research question, a free-listing activity was included at the beginning of 10 group interviews held in three different research sites in terms of size, geographical location, and year of foundation (see Table 1):

- The first research site (RS1) is an engineering school that is part of a prestigious non-profit private university recognized as a top institution in Latin America. It offers 22 majors across 10 engineering departments in a metropolitan campus in Santiago de Chile, and six of their majors are accredited by ABET.
- The second research site (RS2) is a faculty of engineering, architecture and design that is part of one of the largest private universities in Chile. This university is a non-profit institution with a metropolitan campus and other campuses in the southern regions of the country. The faculty of engineering, architecture and design comprises 10 undergraduate programs across three Schools: a School of Engineering, a School of Architecture, and a School of Digital Design and Creative Industries. The latter was created in 2021 and offers a Digital Animation degree, whose students and staff participated in this study.
- The third research site (RS3) consists of two engineering schools that are part of a non-profit private university. There are 17 undergraduate and 17 postgraduate programs across seven departments, covering six fields in engineering and one in geology. It is recognized for its excellence in education, aiming to be an agent of change in the north of Chile, where their two campuses are located.

Table 1. Description of the research sites involved in this study

Research sites	**Geographical location**	**Year of foundation**	**Student enrolment (*n*)**	**Full time faculty (*n*)**	**Part time faculty (*n*)**
RS1	Metropolitan	1892	~6.000	~160	~200
RS2	Metropolitan and regional	2021	~500	~50	0
RS3	Regional	1987	~3280	~111	~177

In total, 28 faculty and 32 students participated in the 10 group interviews, which were conducted with faculty and students separately in each research site (i.e., five interviews with faculty members, five interviews with students). In each group interview, there were between five and six participants, and Table 2 describes their affiliation with the corresponding research sites. At the beginning of every group interview, each participant was required to write what they understand by student workload. The research assistant who moderated the group interviews gave each participant the following instruction:

- *Since the purpose of this session is for us to discuss student workload in different subjects, I will ask you to write down your understanding of student workload [a timer will be set for two minutes].*

Table 2. Convenience sample of students and faculty who participated in this study (60 in total)

	RS1	**RS2**	**RS3**	**Total**
Students (*n*)	11	11	6	28
Faculty (*n*)	12	14	6	32

Each one of the papers written by participants was transcribed verbatim into a Google Doc by the leading researcher. Subsequently, the same researcher conducted a word and phrase count to identify repetitions across participants. The group interview, conducted with participants' informed consent, was recorded, and transcribed verbatim in two steps: initially by AI-driven software and then reviewed by a research assistant who was previously responsible for moderating each one of the group interviews. Both leading research and research assistant were involved in the final process of analyzing the frequency of repeated words and selecting quotes.

Results

Table 3 shows words and phrases that were listed by more than 10% of the participants according to their understanding of student workload. According to the frequency count, most participants listed the time allocated for subjects (37 out of the 60 participants), and for many of them, this implied both class time and independent study hours to achieve a good performance.

> (Student workload is) the average number of hours dedicated to a course, considering all the activities associated with its delivery and necessary to obtain good performance: class attendance, assistantships, personal study, project development, etc. (Faculty, RS1)

> Student workload refers to the number of hours that must be dedicated to a subject, including lecture and autonomous study. This allows us to have a measure whether there is an excess or deficit of attention or dedication given to a subject. The hours of study and the sacrifice are key to success, along with dedication, effort, demand, and organization. (Student, RS3)

Table 3. Words and phrases listed by more than 10% of the participants in the free-listing activity

	Students (*n*)	**Faculty (*n*)**	**Total (*n*)**	**Percentage (Total *n*=60)**
Time required by subjects	16	21	37	62%
Study time (outside class or indirect hours)	7	18	25	42%
Good performance	8	5	13	22%
Homework	5	7	12	20%
Number of subjects	6	4	10	17%
Credits	4	4	8	13%
Exams	4	4	8	13%
Academic stress	7	0	7	12%
Course difficulty (content)	5	2	7	12%
Study schedule (hours/week)	4	3	7	12%

Although most of participants listed curriculum elements such as homework, the number of subjects within an academic period and the corresponding academic credits, some students wrote about social-emotional aspects of learning such as academic stress (7 out of 28) and perceived course difficulty (5 out of 28).

> Student workload consists of the amount or rather the duties that we have as students. These duties can be tests, assignments, deliveries, or evaluations. The way this load is organized or distributed will affect the student's health and well-being, and this may even affect their performance. (Student, RS2)

> In my opinion, student workload is not only about the weekly time used by the subjects, but also the influence that the combination of these has, either due to the level of difficulty or the psychological pressure it exerts on the student. (Student, RS1)

Discussion

The dimensions of student workload, as perceived by both faculty and students, primarily revolve around the allocation of time for subjects. This aligns with self-regulated learning models as the one proposed by Pintrich [8], which define time management as a key tactic for integrating new knowledge and skills. Additionally, the participants' emphasis on time allocation resonates with rational choice models [9], suggesting that the time students invest in tasks is relative to their academic performance. This dual perspective underscores the multifaceted nature of student workload, incorporating both strategic time management and considerations regarding the importance of achieving good learning outcomes in pursuit of completing their degree.

> Workload is associated with the time, effort, and preparation that a student must use to successfully complete their university degree. (Student, RS2)

> I see (student workload) as the weight and importance of a subject in the student's academic career. More technically, the hours of study dedicated to a field so that good learning can be achieved for the student. (Student, RS3)

Taking into account these preliminary findings, the free-listing activity proved instrumental in capturing faculty and student perspectives on subject workload. By prompting participants to list elements associated with student workload, it provided an unstructured platform for expressing diverse thoughts regardless of their academic role [12]. Not only did students and teachers demonstrate a certain consensus regarding time allocation, but several of them alluded to the curricular elements that influenced students' perception of workload, such as the number of subjects and credits enrolled in a specific semester. They also alluded to types of assignments, such as homework and exams, which could amplify learners' academic stress [4]. This is not only reflected in the number of students who listed 'academic stress' when thinking about workload, but also in some reflections from faculty members.

> (Student workload) is the time that all academic work entails in a given period of time. It includes study, classes, workshops, exercises, etc. It includes direct work (classroom or tutored) and indirect work (self-employed). But it is also affected by their personal lives and their conditions, such as: work, people in their care, travel distance, socioeconomic conditions, sports, etc. (Faculty, RS3)

> I understand student workload to be the number of hours that the student must invest to pass the course and to be able to learn and perform well. From my experience I feel that it is something very important to define a priori to not overload the students because it lowers their performance and learning, and it also implies more burden for teaching staff, because there are more tasks to do. (Faculty, RS2)

In conclusion, this preliminary study serves as an initial attempt to highlight potential consensus between faculty and students regarding workload perceptions. However, the findings are subject to certain limitations. Despite collecting data across three distinct research sites, the reliance on convenience sampling raises concerns about the generalizability of the results to broader contexts. Also, the study primarily presents frequency counts and extracted quotes from transcripts, offering a foundational understanding of student workload. Yet, future analyses will be conducted to deepen insights, such as prioritizing terms based on their order of mention

(ranking). In addition, a thematic analysis of the interviews will be carried out, which will be complemented with a survey of a larger sample of participants.

Acknowledgements

This work was supported by FONDECYT (Chile) [grant number 11230827]. The authors would like to thank Sebastián Buzeta and Paul Sargent for supporting the development of this work.

References

[1] D. Chadha *et al.*, "Are the kids alright? Exploring students' experiences of support mechanisms to enhance wellbeing on an engineering programme in the UK," *Eur. J. Eng. Educ.*, vol. 0, no. 0, pp. 1–16, 2020, doi: 10.1080/03043797.2020.1835828.

[2] B. J. Sottile, L. E. Cruz, Y.-A. Lo Burleson, and K. Mclain, "It's About Time: An Analysis of Student Activities Under Remote Learning," 2021, [Online]. Available: https://peer.asee.org/37412.

[3] J. Armstrong, "Workload in Engineering Courses and How To Reduce It," 1996, [Online]. Available: https://aaee.net.au/wp-content/uploads/2020/07/AAEE2019_Annual_Conference_paper_72.pdf.

[4] S. Mansouri, M. Wai, J. Li, and J. Lamborn, "A quantitative method to evaluate student workload," in *Proceedings of the Australasian Association Engineering Education Conference (AAEE2019)*, 2019, pp. 568–574, [Online]. Available: https://aaee.net.au/wp-content/uploads/2020/07/AAEE2019_Annual_Conference_paper_72.pdf.

[5] D. Chadha *et al.*, "Are the kids alright? Exploring students' experiences of support mechanisms to enhance wellbeing on an engineering programme in the UK," *Eur. J. Eng. Educ.*, pp. 1–16, 2020, doi: 10.1080/03043797.2020.1835828.

[6] I. Hilliger, G. Astudillo, and J. Baier, "Lacking time: A case study of student and faculty perceptions of academic workload in the COVID-19 pandemic," *J. Eng. Educ.*, vol. 112, no. 3, pp. 796–815, 2023, doi: 10.1002/jee.20525.

[7] Q. Liu and G. Evans, "Supporting Information for the Student Workload Quick Guides," Toronto, 2020. [Online]. Available: https://tspace.library.utoronto.ca/bitstream/1807/104242/1/quick_guide_supp.pdf.

[8] P. R. Pintrich and E. V. De Groot, "A Motivational Science Perspective on the Role of Student Motivation in Learning and Teaching Contexts," *J. Educ. Psychol.*, vol. 95, no. 4, pp. 667–686, 2003, doi: 10.1037/0022-0663.95.4.667.

[9] S. J. Marshall, "Student time choices and success," *High. Educ. Res. Dev.*, vol. 37, no. 6, pp. 1216–1230, 2018, doi: 10.1080/07294360.2018.1462304.

[10] J. Sweller, J. J. G. van Merriënboer, and F. Paas, "Cognitive Architecture and Instructional Design: 20 Years Later," *Educ. Psychol. Rev.*, vol. 31, no. 2, pp. 261–292, 2019, doi: 10.1007/s10648-019-09465-5.

[11] E. Kyndt, F. Dochy, K. Struyven, and E. Cascallar, "The perception of workload and task complexity and its influence on students' approaches to learning: A study in higher education," *Eur. J. Psychol. Educ.*, vol. 26, no. 3, pp. 393–415, 2011, doi: 10.1007/s10212-010-0053-2.

[12] K. C. Barton, "Elicitation techniques: Getting people to talk about ideas they dont usually talk about," *Theory Res. Soc. Educ.*, vol. 43, no. 2, pp. 179–205, 2015, doi: 10.1080/00933104.2015.1034392.