

Students' Perception of Mental Load in Multidisciplinary Workshop during Pandemic Covid-19 Era

by Raden Roro Christina, Elizabeth Wianto, Erwin Ardianto Halim, Elty Sarvia, Ivory C.

Submission date: 04-May-2025 09:33AM (UTC+0700)

Submission ID: 2665477710

File name: 2._Students_Perception_1__removed.pdf (202.07K)

Word count: 4385

Character count: 24672

Students' Perception of Mental Load in Multidisciplinary Workshop during Pandemic Covid-19 Era (Case Study: Interior Design and Industrial Engineering Students of Universitas Kristen Maranatha, Bandung, Indonesia)

Raden Roro Christina¹, Elizabeth Wianto^{2,3}, Erwin Ardianto Halim^{4,5}, Elty Sarvia¹,
Ivory Charlesa Uneputty³

¹ Bachelor Program in Industrial Engineering, Universitas Kristen Maranatha, Indonesia;

² Department of Industrial Design, National Cheng Kung University, Taiwan;

³ Bachelor Program in Visual Communication Design, Universitas Kristen Maranatha, Indonesia;

⁴ Bachelor Program in Interior Design, Universitas Kristen Maranatha, Indonesia;

⁵ Faculty of Decorative Arts, Silpakorn University, Thailand;

Abstract

The Ministry of Education and Culture Republic of Indonesia changed the higher education concept to achieve the world class education equality considerably at the same time with the outbreak of COVID-19. Therefore a sudden change in learning method change drastically whether it is using synchronous or asynchronous method due to time and capacity availability. Thus, student's mental load arguably enhance in this current situation and therefore it is assumed that the evaluation of the new way of distance learning study never be done especially for collaborative study between department based on different faculty in Indonesia. This study used NASA-TLX paper based as the inventory instrument, evaluated and understood the current learning situation while the collaborative events with problem based assignment took place. All of the workshop activities were given and reported online with the duration of eight weeks from the beginning to the end. From the result, it was shown that the collaborative workshop implementation did not perform any different perception of the two departments who were originally came from science and social. The participants were equally assumed to participate seriously because they came from the 3rd semester's mandatory subject. Other implication related to academic performance, reduces of team member which not fully cooperated, credit load taken in the current semester and the flexibility in doing individual or team assignment are discussed.

Keywords: Collaborative Workshop, Mental Load, Multidisciplinary, NASA-TLX, Online Distance Learning



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INTRODUCTION

A sudden change in adopting distance learning happened because of the Covid-19 pandemic. The urge become crucial, because at the same time the Ministry of Education and Culture Republic of Indonesia flipped the higher education practice to achieve the world class education equality. The concept known as "Merdeka Belajar-Kampus Merdeka" (Independent Campus, Freedom to Learn) open for the students to access the knowledge not just limited to the curriculum, classroom, or lecturer as the main source. There are 8 off-campus learning activities in Merdeka Belajar-Kampus Merdeka: student exchange, research, entrepreneur, independent study, humanitarian project, teaching at school, internship, and project in village (2020a) as the initial major programs. This program could be categorized as a breakthrough learning concept that supported student centered learning and incongruence with andragogy concept emphasizing young generation to be able to compete globally. Nevertheless, since 2013, the higher education curriculum had been designed for those two goals which were competitive based higher education curriculum implementation that replaced the content-based curriculum implemented on 1994 (2014). It could be said that competitive based curriculum aim to have a unique character, clear limitation, as well as getting competition level determined based on nine level of Kerangka Kualifikasi Nasional Indonesia (KKNI or Indonesian Qualification Framework (iqf)).

Congruence with Covid-19 pandemic, this global pandemic could be utilized as an opportunity that could raise the education acceleration through technology implementation because of the main obstacle, which was face-to-face learning, because through the online learning implementation, as one of freedom

Corresponding author

christina@eng.maranatha.edu; P38077018@gs.ncku.edu.tw; elizabeth.wianto@art.maranatha.edu
DOI : 10.31098/cset.v2i2.526

Research Synergy Foundation

learning that indicated the importance of the collaboration among the knowledge, could implemented soon. The idea of online learning policy, was assumed to be able to be pressed through long distance communication use, using the internet facility that was facilitated up to 15 GB by the Ministry of Education and Culture Republic of Indonesia (<https://kuota-belajar.kemdikbud.go.id/>).

Apart of the technology issue, the distance learning also face some specific problem (Ginting et al., 2021) such as student boredom, unpreparedness in using Learning Management System (LMS), unmeasured assignment load, and sudden change characteristic on how study delivered while they need to stay at home and join every activity virtually ((Corrales et al., 2020). However, it is reported the students still have high motivation in studying (Fitriyani et al., 2020) and able to achieve high GPA (Rusdiana and Nugroho, 2020, N et al., 2021). A research of the learning process' change from face-to-face method to online method in the pandemic era showed that the students perception of the theory and vocation material was still considered positively (Maulana and Hamidi, 2020). Nevertheless it should be concerned in the students' fatigue in doing the study (Susanto and Azwar, 2020). By concerning to the change of material given online, also affected to the readiness of the lecturers to become moderator of knowledge instead of passive transfer learning. The distance learning synchronous and asynchronous method could also affect the student mental load (Didin et al., 2020).

To our knowledge, there are not similar research that discussed about the material giving out of the meeting in a structural curriculum such as workshop and a inter department collaborative work. Therefore, this research would specifically measure each student group mental load that participated in the inter department workshop program, in which collaborate to create a project design for elderly. This research argue that collaboration built between the different major had a probability of different mental load perception because of their different thinking perspective. Based on that thought, this research would try to bridge the study that had a similar topic, which was ergonomics, in two different departments. Both departments assumed would enrich each other in specific knowledge. In contrast with their department, this study also will compare whether the holder of higher/ lower GPA, student took lower/higher average credits in the semester, or the group which lost their member during collaboration process will comprise their performance or their perception of mental load. Mental load perception measurement in this study will use the NASA TLX instrument developed by Hart and Staveland (G.Hart and E.Staveland, 1988).

LITERATURE REVIEW

Indonesia's higher education curriculum was designed to match the global agreement and commitment (two of them were AFTA and WTO) so that the interaction among the countries could be more fluid. Consequently, the graduates as the outcome of the higher education should be able to compete by their adequate qualification. Thus, since 2012 many professionals incorporated with approved independence association standardized each level of iqf and the National Accreditation Agency for Higher Education (Badan Akreditasi Nasional Perguruan Tinggi/ Ban-PT) formulized the expected outcome of higher education graduates. The biggest obstacle for this issue is the effort to link and match the industries and the educational institution and the quality disparity among the universities, especially in some different areas of Indonesia (2014, Mustofa et al., 2019). In short, higher education needs to manage, design, and implement innovative learning processes so that the students can adopt the attitude, knowledge, and skills (2020a) and motivate them right before they start to work. Compared with other formal education, higher education needs to accommodate various quality of student which has previous education system and character development. Even though each student passes the university entrance examination, it is no guarantee that they have similar baseline education (Wautier and Vileyn, 2004). Thus the higher education curriculum should be flexible enough to fit a wide range of students' quality. Hence provision for lifelong learning should be accommodated (Emami et al., 2011).

"Merdeka Belajar-Kampus Merdeka" is the answer to fitting the curriculum for wide range quality of students. As the freedom spirit to learn, then every student has the rights to experience the education, for example to take courses outside his/her department, faculty or even university. To promote the idea, the Ministry of Education and Culture Republic of Indonesia launch Competition Program-Freedom to learn (Program Kompetisi-Kampus Merdeka), the grant specifically support eight key performance indicator for university outcome, three among them are: graduate readiness, off campus student

activities and university cooperation (2020b). All of the performance indicator, referring to the independence and supporting capacities of the higher education student to pursue their idealism, or in short, the ability to cooperate or collaborate others. This postulate then bring the literature review to the urgencies of creating collaboration interdepartemental, even more to interdiscipline or multidiscipline department. Affordance to collaborate interdisciplinary arguably could overcome the difficulties by combining or coordinating skills thus creating better solution frameworks or strategies (MacLeod and Nagatsu, 2017), therefore become a prerequisite for inclusive education in general (Hedegaard-Soerensen et al., 2017).

RESEARCH METHODOLOGY

This research used a quantitative method based on participants' perception to the specific experience about collaborative workshop in ergonomic theme. This workshop was held every two weeks for three times. Each workshop contained two hours Lecturing and Question and Answer session. On each interval time between each lecturer session, there was one individual assignment and two group assignments related to the given materials at previous workshop. The final assignment was presented virtually on official department Instagram account. Group assignment involved knowledge and skills in both of major department's comprehensive specificity. All of the activities were given and reported online. To increase participants' interest and effort, two highest achievements in terms of best final design based on previous speakers and favorite design based on highest voted in Instagram were given rewards.

This study was carried out at private university in Bandung, Indonesia. 49 people consisted of 21 men and 28 women, majority in their early twenties were recruited and ask for their written consent. However, due to incomplete participation, 12 people were dropped. All of them were the participants of the collaborative workshop. Their major study was separated from social sciences (majority from Interior Design/ID) and science (from Industrial Engineering/IE). Majority of the students were sophomores in Interior Design Department or in Industrial Engineering Department. Final participants were only calculated of 37 participants (17 men, 20 women, 26 people from Industrial Engineering, and 11 people from Interior Design. Their previous GPA (4.00 for highest point) were averagely 3.37, but with 3.65 in median, due to 3 people have discrepancies in for having too low GPA (0,78/ IE; 1.64/IE and 1,9/ID). The collaboration group were divide into 10 workgroup students, containing two students from Interior Design Department and 3 students from Industrial Engineering Department due to inbalance number of participants as Interior Design were much less than Industrial Engineering Students. The groups were managed by the lecturers; however, each student could propose one of their most preferred team-mates. In general, most of the student agree to get their preferred peer group at least within their department.

NASA-TLX (Task Load Index) was used as the inventory instrument to measure the subjective workload perceived by students from different type of majors. A multi-dimensional rating scale (G.Hart and E.Staveland, 1988) was modified from Paper and Pencil Package v.1.0, to Google Form in order to manage the current condition by online learning method due to pandemic restriction in Indonesia. NASA-TLX ratings were adopted in this study due to quick measurement right after the experimental condition. The usability of NASA-TLX was quite broad and even reliable to implement to elderly with or without cognitive impairment (Devos et al., 2020).

There were six factors measured in this measurement, as follows: Mental Demand, Physical Demand, Temporal Demand, Performance, Effort, and Frustration Level. The process of using these instruments was begun by pair wised measured each factor into 15 comparisons, weighted the selected factors, rate each measured factor with 1- 100 scale, multiply the scale with the weighted and then divide it with 15, then sum all of the factors into total work load score. There were three cut off points for general interpretation as follows: >80; 50-70; and <50 stated the high, medium and light mental workload use. However, this instrument did not tell what to fix but would help the researcher to understand whether

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the phenomena of giving the workshop to different group of people from different study program was suitable as a learning process.

Due to the original instruments were in English language and all of the participants were the native Indonesian, thus, back translated process were conducted. Online questionnaire was shared and filled after finishing each assignment using the following link: <https://reurl.cc/QjEerZ>. To get more comprehensive result, mediating variables in GPA, gender and the number of courses were taken in current semester also gathered for data collection. Prior to data collection, participants were giving their informed consent by voluntary filling the questionnaire.

The questionnaire should be filled in three times, right after the students submitted the assignments. The first questionnaire was about the individual assignment to recognize the target of the kitchen design users. The second questionnaire was about the group assignment to build the kitchen design draft for elderly while the third questionnaire was about the group assignment to build the final kitchen design for elderly. Short brief was given to all of the Interior Design and Industrial Engineering students.

FINDING AND DISCUSSION

The average GPA of the students was in the highly satisfied category, which was above 3.00, so they could take at least 21 credits for the semester. Based on the fact, the Interior Design students were taking 5 until 8 subjects while the Industrial Engineering students were taking 6 to eleven subjects. Another fact was the students that took less subjects in that semester had taken some subjects on the short term or they might be seniors. The descriptive statistics could be seen on the Table 1.

Table 1.

Descriptive Statistics

| | N | Range | Minimum | Maximum | Mean |
|-------------------------|----|-------|---------|---------|-------|
| Credits | 37 | 6 | 5 | 11 | 8.57 |
| GPA | 37 | 3.21 | .78 | 3.99 | 3.34 |
| I_assign_persona | 37 | 83.80 | 14.40 | 98.20 | 71.86 |
| II_assign_draft_design | 37 | 49.00 | 51.00 | 100.00 | 76.54 |
| III_assign_final_design | 37 | 44.07 | 53.33 | 97.40 | 78.41 |
| Final_des_rank | 37 | 9 | 1 | 10 | 5.62 |
| Missing_member | 37 | 3 | 0 | 3 | 1.16 |
| self_ave | 37 | 45.78 | 52.33 | 98.11 | 75.60 |
| Valid N(listwise) | 37 | | | | |

From the mental load questionnaires distribution, also known that individual assignment was lighter than the group assignment, for both the draft and final design (the mental load value for Assignment I, II and III were 72.74, 77.37, and 79.36). The cut off point was determined on each assignment, which was known that Assignment I was felt light, mild and heavy by 1, 11, and 25 students, while Assignment II was felt mild and heavy by 10 and 27 students, and the last assignment, Assignment III was felt mild and heavy by 7 and 30 students respectively. No students felt Assignment II and III light. The complete data was shown on Table 2.

Table 2.

Nasa TLX to Assignment I, II and III

| | I_assign_persona | II_draft design | III_assign final design |
|--|------------------|-----------------|-------------------------|
| | | | |

| | | | |
|--|-----------|-----------|-----------|
| AVERAGE | 72.74 | 77.37 | 79.36 |
| MEDIAN | 76.67 | 78.00 | 78.33 |
| Low Mental Load (0- 49.99) | 1 | 0 | 0 |
| Medium Mental Load (50.00 -69.99) | 11 | 10 | 7 |
| High Mental Load (70.00-100) | 25 | 27 | 30 |

The normality data was tested to the group of data, and was achieved to fill the mental load questionnaire for Assignment II and III, but the difference load assumption was not detected for both departments (Table 3), for the low or high GPA students (with cut off point 3.51 on Table 4), and for the group that loss its members.

Table 3.

Independent t-Test for each study department

| | TI_DI | N | Mean | Std. Deviation | Sig. (2-tailed) Equal variances assumed |
|--------------|-------|----|--------|----------------|---|
| draft_design | TI | 26 | 77.34 | 11.58 | .537 |
| | DI | 11 | 74.678 | 12.638 | |
| final_design | TI | 26 | 79.51 | 9.33 | .318 |
| | DI | 11 | 75.79 | 12.10 | |

Table 4.

Independent t-Test based on Higher/Lower GPA

| | GPA | N | Mean | Std. Deviation | Sig. (2-tailed) Equal variances assumed |
|--------------|--------|----|-------|----------------|---|
| final_design | >=3.51 | 19 | 79.80 | 10.48 | .403 |
| | < 3.51 | 18 | 76.94 | 9.99 | |

The last test was given to the team which lost their team member at the end of the workshop. In fact, the lost of the team members would not affect the load of each students to participate in the workshop. Kruskal-Wallis Test was chosen to test the complete team members and incomplete team members that lost their 1 until 3 team members (4 groups, sig = .0631, .769, dan .466 untuk tugas I, II dan III respectively).

From the result, it was showed that the collaborative workshop implementation did not perform any different perception of the two departments who were originally came from science and social. The participants were equally assumed to participate because they came from the 3rd semester mandatory subject. From the beginning, the number of Interior Design students not as many as Industrial Engineering students, but in this research, the distribution of the team members based on the department was implemented. The result showed that there was no different perception of mental load of those came from different departments, different range of GPA, and the team who lost their members. It was also needed to be questioned if there were any assumption of significant load if they experienced the common of the special assignment, having pressure to maintain their achievement, additional work in consequence of losing any team members. It was also showed that individual assignment was considered to be easier than teamwork assignment. There were also dropped-out participants because

of lacking complete filling of some questionnaires. We argue that the insignificant differences about mental load for the group which lost their team member is because in short of time for collaborate, they focused on the result, not on how the best solution needs to promote, it is reasonably true that they feels that collaboration between other student from other department is the burden for them, not the assignment it self. Related research showed that cognitive barrier on different department contribute to failures and difficulties of interaction between students ((MacLeod, 2015).

In addition, the workshop schedule that was held beyond the courses schedule, which was on Saturdays, also considered to contribute the heavy mental load, although the assignment that was given was just simple. Nine Interior Design students dropped out compared to only 3 (three) Industrial Engineering students, and it was also should be further reviewed the cause why they missed to obey the rules of filling the questionnaires.

CONCLUSION AND FURTHER RESEARCH

The result showed that the best design came from the incomplete team members group, in this case, the members left proven could maintain the consistent performance until the end of the workshop. It was also shown that through rewards or concrete goal, the students could carry the responsibility although they felt the heavy load.

In limited face-to-face meeting for collaborative participation in pandemic Covid-19 era, a high tolerance among the team members that had their own busy schedules, needed further research, whether all of the team member gave out their best for team's sake, or freeloading short cut was the preferred role. Considering the scope was university interdepartmental, then this collaboration could not refer as a complex collaboration, however for further understanding, much detailed of the set up team should become consideration, i.e: the unit of analysis for the research, role in each team, whether the team needed a group leader, or the key skills were already adopt by the participants (Beyerlein et al., 2004).

The loss of team members who were from another department, could be handled well by other members. The judge also commented that the performance was just the same. It was shown that the highest score was achieved by the team that lost its three members and the lowest score was achieved by the team that lost none of its members. It should be further reviewed that if there were domination origin members of one department would show better performance because they did not need to accept the aspiration of the whole team to contribute. It could be reviewed also if fewer number of team member would give better performance. Unbalanced solidity in the team should be furthered reviewed, as the member chose his own team was not be able to reach the highest score, even his team members were recorded not fulfilling the questionnaires and categorized as drop-out.

Through the interdiscipline workshop, it was shown that a design did not have to be produced by a designer, or a technical understanding did not have to be produced by the engineers, therefore the students should understand that their competences could be easily replacable in the workplace so that the skill to differentiate the profession quality should be understood when they studied.

Acknowledgement

The authors are grateful to financial support for this study provided by the Ministry of Education and Culture of Republic of Indonesia under the grant of Program Kompetisi-Kampus Merdeka (PK-KM), contract number: 081/EI/KM05.03/2021 KS.06/KL/2021, for the year of 2021.

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