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Undergraduate Creative Multimedia Design Students' Perceptions of Online Team-Based Learning

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Abstract

With higher learning institutions shifting to an online mode of instruction since the onset of the COVID-19 pandemic, educators have found it challenging to engage students through video conferencing tools whilst students struggle to concentrate and feel a sense of disconnect due to lack of social interaction in the online class. This is prevalent in design courses that are traditionally very hands-on and studio based. Team-Based Learning (TBL) offers a possible instructional approach to increase student engagement through a series of structured activities with emphasis on learning through small group interactions. However, there is a lack of research on the implementation of TBL in the creative multimedia design discipline and it is unclear how students in this discipline would perceive this method of learning. This paper presents a study that sought to introduce TBL to undergraduate creative multimedia design students and elicit their perceptions and attitudes towards this new approach to learning online. The design of the TBL class and student learning experience are discussed in detail. A survey questionnaire was used to gather feedback from students and a simple statistical analysis was conducted. Results suggest that at this introductory stage, students had an overall favourable perception of TBL however felt that the lengthy duration of TBL sessions affected their satisfaction of TBL and therefore remained on the fence about their preference for TBL classes.

Keywords Team-based learning, Online teaching and learning, Creative multimedia

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Introduction

When the COVID-19 pandemic hit, higher learning institutions around the world responded promptly by closing campuses to restrict movement and shifting most, if not all, conventional in-person teaching to online teaching (Crawford, Butler-Henderson, Rudolph, & Glowatz, 2020). Educators and students alike had to learn to quickly adapt to the changes and try to bring some sense of normalcy back to the classroom. The sudden shift towards an online mode of instruction was not without its challenges and teething problems particularly in countries with limited resources and infrastructure (Adnan & Anwar, 2020). Aside from socio-economic and infrastructure challenges, Adedoyin and Soykan (2020) argue that the crisis-response migration effort adopted by universities were akin to emergency remote teaching as it was limited to the delivery of content without adequate consideration of effective online learning educational theories and models.

For the creative multimedia discipline, moving in-person studio-based teaching and learning strategies into an online environment presented a substantial challenge to educators and many felt that teaching design courses online was ineffective, suggesting that a blended approach would be more beneficial (Ibrahim, Attia, Bataineh, & Ali, 2021). Marshalsey and Sclater (2020) found that across the creative disciplines students consistently reported needing more guidance and individual feedback from instructors which they felt they lacked access to in an online setting. Educators felt they were unable to gauge student understanding and level of engagement in a virtual classroom and tried to overcome this by increasing interactivity in online lectures.

While educators had previously relied on non-verbal or visual cues to gauge if students were engaged in the content, they were now faced with the challenge of engaging students whom they cannot "see" if they do not turn on their webcams (Wong, Jumat, Lee, Foo, Goh, Ganapathy, Lai, & Hwang, 2020). Educators have also been found to struggle with creating a sense of connectedness due to the lack of cooperation from students while using video conferencing tools, thus leading to them feeling frustrated with online teaching (Mpungose, 2021). Students on the other hand struggled to concentrate in front of the screen for long hours listening to online lectures and were deprived of the social interaction they would have with their classmates (Simamora, 2020). The prolonged lockdown, fear, and anxiety about the pandemic have also led to mental health implications in students (Singh, Roy, Sinha, Parveen, Sharma, & Joshi, 2020). Chiu (2021) suggests that educators ought to provide students with an online space for social interaction with lecturers and peers to build a sense of belonging, have mental health activities that allow

for students to express emotions, and ensure online teaching strategies take into consideration peer support groups, learning-focused assessment, and interdisciplinary learning activities. In fact, Tichavsky, Hunt, Driscoll, and Jicha (2015) found that when comparing online learning and face-to-face learning, students indicated a strong need to have in-class interactions with their peers and the lecturer which goes beyond having a discussion board online.

The Team-Based Learning Approach

With the lack of social interaction and engagement being one of the prominent challenges of online instruction, Team-Based Learning (TBL) offers a structured approach that may help create opportunities for active participation and increase class engagement. TBL is an instructional strategy which focuses on learning through small group interactions where a majority of the class time is spent on groups working together to apply course content towards the solving of real-world problems (Michaelsen & Sweet, 2008). The history of TBL is said to have stemmed from a business school in the 1970s and was first developed by Larry Michaelsen. Since its introduction, TBL has been widely implemented as an instructional approach by various other disciplines particularly in STEM-related fields and at all levels of learning (Haidet, Kubitz, & McCormack, 2014; Kibble, Bellew, Asmar, & Barkley, 2016; Rajalingam, Rotgans, Zary, Ferenczi, Gagnon, & Low-Beer, 2018).

TBL is a learner-centred active learning approach where students go through a series of structured group activities that provide opportunities for the practical application of conceptual knowledge (Parmelee, Michaelsen, Cook, & Hudes, 2012). In a TBL classroom, students are accountable for both their individual performance as well as the team's performance which allows the instructor, who takes on a facilitative role, to manage multiple teams in a large classroom. The three key features that distinguish TBL from other group-based learning approaches are: 1) individual student preparation before class, 2) readiness assurance tests at both an individual and team level, 3) dedicating the majority of class time towards the solving of application exercises as a team (Parmelee et al., 2012).

Michaelsen and Sweet (2008) provide clear guidelines on what they call the "Four Essential Elements of Team-Based Learning". Firstly, as small groups are the central focus of TBL, proper formation and management of groups plays an important role on the successful implementation of TBL. Secondly,

students need to be held accountable for the quality of both their individual work as well as group work. The third cornerstone of TBL is that feedback must be provided to students in a frequent and timely manner. Last but not least, group assignments should be designed to not only promote learning but also allow for team development by providing opportunities for a high level of interaction amongst group members. In the context of TBL, unlike other forms of group-based learning, a meta-analysis of past literature found that the size of the groups had a significant impact on the effectiveness of TBL. Smaller groups (less than 5) showed a higher effectiveness compared to larger groups and this difference was attributed to students being able to participate more efficiently and engage in discussion with one another in smaller groups (Swanson, McCulley, Osman, Scammacca, & Solis, 2019). Generally, the recommended size is between 5 to 7 to account for instances where some members of the team may be absent and their absence would not hinder the team from proceeding with the TBL sessions (Michaelsen, Knight, and Fink, 2002).

The benefits and advantages of TBL are well documented in literature particularly in health science related courses (Anas, Kyrou, Rand-Weaver, & Karteris, 2022). TBL has been found to improve learning outcomes and increase student confidence in application of course content (Bleske, Remington, Wells, Klein, Guthrie, Tingen Marshall, & Dorsch, 2016). Pharmacy students were found to prefer TBL over traditional lecture-based learning particularly when TBL was introduced early in the curriculum; they felt better prepared for examinations as TBL was able to facilitate critical-thinking and problem-solving. (Frame, Cailor, Gryka, Chen, Kiersma, Sheppard, 2015). TBL has also been found to bring about benefits such as better class attendance rates and overall higher exam scores (Peters, Johnston, Bolles, Ogilvie, Knaub, & Holme, 2020). Instructors have found that TBL provides opportunities to pinpoint issues or misconceptions on the content and address these in a timely manner (Yuretich & Kanner, 2015). TBL, be it implemented in person or in an online learning environment, has been said to potentially help facilitate remote learning through the enhancement of the student learning experience and therefore is a recommended approach to help improve student performance (Anas et al., 2022).

Of course, no teaching and learning approach is without its challenges. Yuretich and Kanner (2015) posits that perhaps the type of learning that occurs in TBL is not measured effectively through the use of traditional test scores but may be best evaluated through the completed application exercise content. This is true in the context of the creative discipline where traditional test scores are not able to provide a clear evaluation or measurement of student learning outcomes. While TBL allows students to gain valuable

experiences and critical skills that prepare them for the workplace, educators need to be aware of the possible challenges students may face while experiencing TBL such as mismatches between peers in terms of learning readiness and insecurities due to inadequate soft skills (Watkins, Forge, Lewinson, Garner, Carter, & Greenwald, 2018). And although some believe the benefits of TBL can be achieved even when conducted in an online setting (Anas et al., 2022), others have cautioned that its implementation online is still at the beginning stages (Goh, Di Gangi, & Gunnells, 2020) and the impact of a fully online synchronous TBL class still lacks adequate assessment across all disciplines (Lino-Neto, Ribeiro, Rocha, & Costa, 2022).

Current research on TBL notes that its implementation has been largely in the context of medical science disciplines and posits that TBL studies are rarely done in other disciplines (Lino-Neto et al., 2022). In the context of creative multimedia design courses, there persists a need for guidelines on successfully conducting active online learning classes in this area of discipline as educators are challenged with replicating the benefits of physical design processes in an online environment (Yu & Da Silva, 2021). Design courses that were normally taught through lectures were found to lack interactivity in an online setting compared to the physical class and students were less inclined to participate in lectures delivered through real-time video platforms (Kamil & Sani, 2021). Some studies have proposed the use of online or virtual design studios that provide social support from peers and pedagogical support from tutors or facilitators (Asadpour, 2021; Jones & Holden, 2021). Although TBL is more popularly implemented in social and health sciences, the core principles of TBL draw parallels with guidelines on good practices for design education. Ash and Schofield (2014) suggest that design education should provide learning environments that draw connections between practical work and theoretical understandings, allow students to work collaboratively in groups, provide opportunities for students to engage in discourse through the exchange of ideas, and allow for reflection on learning through feedback and critique sessions. Liu, Nagai, Yabuuchi, and Cui (2021) also believe that design education ought to focus on stimulating creativity in designers to improve design outcomes. This lends some basis to the consideration of using TBL as an approach to overcome some of the challenges faced in online modes of delivery for creative multimedia design courses.

However, there is a lack of research on the implementation of TBL in creative multimedia design courses and if creative multimedia students would be receptive to TBL, even more so when implemented in an online setting. Therefore, as TBL is a very new instructional approach in the creative design discipline, this study sought to answer the following research question: *What are the perceptions and attitudes of*

undergraduate creative multimedia students towards the use of a TBL approach in an online learning environment?

The Study

Due to the COVID-19 pandemic, Multimedia University's campuses were closed to students and classes were moved to online delivery. To support faculties during the transition to online teaching and learning, TBL was a new instructional approach introduced as a structured way to help increase engagement in the class. With classes moved online and no changes to the student contact hours, TBL presented an opportunity to increase active student engagement during the long online learning sessions be it between peers or with the lecturers, however it was unclear if students would respond positively to this new way of learning especially in the creative multimedia discipline. Participants of this study were a cohort of undergraduate creative multimedia students (n = 19) in the second year of their advertising design degree programme and were registered to the e-marketing course. This cohort of students had no prior learning experience with TBL and even more so with an online version of TBL. All students registered to the course experienced the TBL sessions as part of the teaching plan throughout the trimester of classes; however, participation in the data collection was entirely anonymous and optional. The study was conducted in the first trimester of the 2020/2021 academic year.

Design of the Online TBL Sessions

Each TBL session was designed using the "Backward Design" process. Therefore, the intended learning outcomes were first determined, followed by the steps needed for students to achieve those outcomes (Wiggins & McTighe, 1998). The first step required identifying the intended learning outcomes to be achieved by students for each TBL session. This was then followed by the design of application exercises that were to be attempted as a group. Next, learning materials that students would have to go through before coming to class were gathered and prepared. Lastly based on the learning materials prepared, tests are prepared with questions designed to gauge the readiness of students to apply theory into practice. However, the TBL sessions designed in this study were modified slightly to better suit the teaching of design subjects which are 100% coursework-based and to accommodate the limitations of online platforms available to implement TBL classes. Some of these modifications include how teams were formed by students based on their group projects instead of formed by the lecturer, immediate feedback during the team readiness assurance test was not possible in Google Forms and so feedback was given during the

clarification sessions, and application exercises did not have a specific choice answer because real-world problems in the design field often have varied solutions.

For this course, appropriate learning outcomes were first identified by reviewing the course teaching plan in order to form the learning objectives for each TBL session. The learning topics listed in the course syllabus were already pre-mapped to the course learning outcomes which therefore made it easier to select appropriate topics to be designed into TBL modules. As with the majority of design-based courses, the assessment for this course was 100% coursework with no final examination. The class project required students to work in groups of 4 to 5 towards planning, designing, and implementing an online digital marketing campaign. The group project was also tied to two other courses in the programme with each course focusing on different aspects of the marketing campaign which included areas such as the big idea, advertising message, key art, and video content. Hence for the TBL sessions in this study, application exercises were modified based on existing tutorial materials and redesigned to help scaffold students in their project or be directly related to their formative coursework assessments.

The TBL guidelines of 4S - "significant problem, same problem, specific choice, simultaneous reporting" were followed as much as possible during the design of the application exercises, however slight modifications still had to be made to accommodate the subjectivity of design outcomes. According to Michaelsen and Sweet (2011), "significant problem" refers to having a complex and meaningful exercise that is relevant. "Specific choice" requires teams to decide on the best possible answer. All teams should work on the "same problem", and all teams should "simultaneously report" their answers so teams can discuss the different decisions made by other teams. In this study, the application exercises were still designed to best reflect how a theoretical concept would be applied in a practical scenario. All teams were given the "same problem" or a scenario to solve, however the application exercises did not have a "specific choice" and was more of a free response because real-world practical application of design concepts will have a variety of ways to solve the same creative brief. As for "simultaneous reporting", this was changed into a presentation and feedback session. Teams would submit their outcome through Google Classroom and then during the presentation teams would "pitch" their solutions and receive feedback from peers and the lecturer. This mimics how creatives would pitch ideas to clients.

Once the application exercises were prepared, pre-work materials were gathered in the form of lecture slides and other supporting materials such as videos, articles, and images. This was then followed by the designing of the readiness assurance tests (RATs) which proved to be challenging for a design subject. Multiple choice questions and short answer questions were created based on digital marketing theories. For the multiple-choice questions, the questions were written with superlatives and the answers were either very close or had no wrong answers but required students to rank them depending on the superlative used in the question. The intention was to encourage students to discuss each possible answer and choose what they as a group thought was the correct answer.

For technology support in the online classroom, Google Workspace applications were the main tools and platforms used. Google Classroom was the learning management platform used to post announcements, house the pre-work learning materials, and manage the TBL activities. Google Meet was the video conferencing platform used to conduct the online classes and for students to have online discussions in their teams. Google Slides was used to compile tRAT answers for the clarification sessions and to prepare some of the application exercises. Google Forms was used for the RATs and Google Sheets for the management of the teams. Other platforms and tools used such as Figma, infogram.com, Canva, and so on were mainly to support the application exercises as and when necessary.

In this study, two TBL sessions were prepared and implemented. Each TBL session was conducted in one class session (4 contact hours) and spread apart with one session conducted in Week 3 of the trimester and the other session in Week 8. The remaining 12 weeks of classes were conducted through the usual teaching approaches such as consultations, lectures, tutorials, critique sessions and presentations. This was planned as such to not overwhelm the students with a completely different learning method as they were only just starting to familiarise themselves with attending online classes.

The Online TBL Experience

In Week 1 of the trimester, students were introduced to the course learning outcomes and given an overview of the teaching plan. This included the teaching and learning activities, course assessments, as well as lecture topics they would learn throughout the 14-week course. They were then briefly informed about how some of the classes would be conducted as a TBL session, what TBL is, and what they can expect those sessions would be structured like. Terminologies of TBL components were explained and an informal ice-breaking session was conducted using the TBL process. The intention of the ice-breaking session was two-fold: 1)

To have students acquainted with the TBL process without the added anxiety regarding course content, thus providing a positive experience of TBL, and 2) To identify any potential operational or technical issues that may arise from conducting the TBL process online. As an added benefit, students were able to get to know their course mates in an informal setting before later on working in more formal learning groups.

Before Class: Pre-Work

One week before a designated TBL class session, students were instructed to review all learning materials as required preparation before coming to class. As Google Classroom was one of the platforms used in the university for online classroom management, all pre-work learning materials were uploaded onto the classwork section of the Google Classroom and organised accordingly for student's ease of access. Students were informed of this during class as well as in a follow up announcement in Google Classroom (see Figure 1).

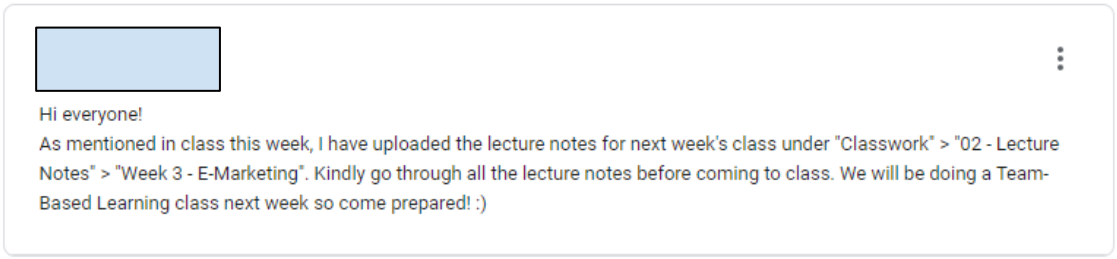


Figure 1 Announcement in Google Classroom

During Class: Online TBL Session

Readiness assurance test (RATs)

At the beginning of a TBL session, students were once again reminded about what a TBL class is and what the flow of a TBL session entails. Students were first instructed to complete the individual readiness assurance tests (iRATs) and were given 15 minutes to answer 5 questions that were a mix of multiple choice questions and short answer questions. Since the RATs were prepared using Google Forms, students were given the RAT links as an assignment in Google Classroom. Upon checking Google Classroom's assignment feature to confirm all students had submitted their test; students were then instructed to take the same test but this time in their assigned teams (tRATs). At the time of this study Google Meet did not have breakout rooms and therefore students were given pre-created Google Meet links for each team. Teams were given 30 minutes to go through each question and discuss their answers before making a decision on their

preferred answer. While TBL practitioners would set up the RATs using scratch cards or other digital platforms that provide immediate feedback thus allowing students to keep trying until they get the correct answer, in this study the tRATs set up in Google Forms did not have this feature and the answers were not revealed until they moved on to the clarification section. Figure 2 shows an example of how the RATs were "assigned" to students using Google Classroom.

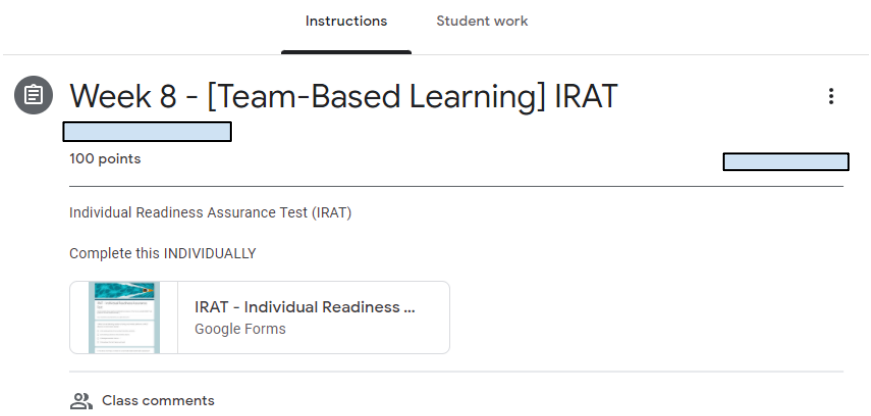
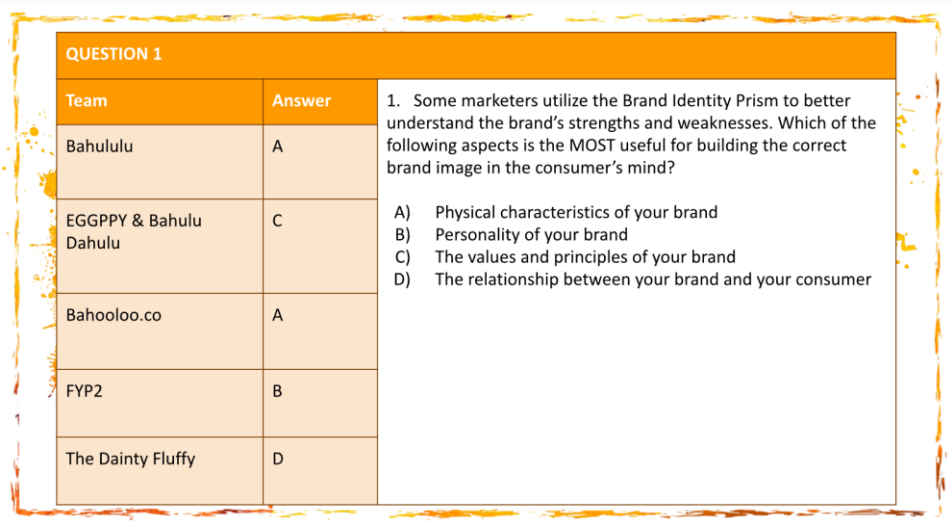


Figure 2 Screenshot of iRAT Assignment in Google Classroom

Clarification and Mini Lecture

After completing the tRATs, students would then come back to the main Google Meet where the lecturer would take on the role of a facilitator and go through each RAT question with the students. The allocated time for the clarification and mini lecture was 40 minutes. Before revealing the answers to the class, each team would be prompted to explain and justify their answer choice. Discussions were then generated by inviting random students from other teams to give their reasoning or arguments on what they think are the correct answers. Students are prompted and asked if they agree or disagree with their peers and why. Students were all held accountable for their answers and this ensured all students completed their pre-work in order to effectively participate in the team discussions. Figure 3 shows an example of how the team's answers are displayed during the RAT discussions. The preferred answer is then revealed to students after all teams have been given a chance to articulate their thoughts. Explanations and reasons are also provided at this stage on why the preferred answer is as such. Short answer questions did not have a specific preferred answer and any justified answer from the teams could be accepted. This modified style of RATs was done to better suit the nature of design courses.



QUESTION 1		
Team	Answer	1. Some marketers utilize the Brand Identity Prism to better understand the brand's strengths and weaknesses. Which of the following aspects is the MOST useful for building the correct brand image in the consumer's mind? A) Physical characteristics of your brand B) Personality of your brand C) The values and principles of your brand D) The relationship between your brand and your consumer
Bahululu	A	
EGGPPY & Bahulu Dahulu	C	
Bahooloo.co	A	
FYP2	B	
The Dainty Fluffy	D	

Figure 3 Screenshot of tRAT Discussion Slides

Once all questions have been discussed, students then go through a short mini lecture which focuses more on the areas of the topic that they were still struggling with or had misunderstandings about. This allowed the lecturer to move away from the usual delivery of lectures to really hone in on areas that need extra clarification.

Application Exercise

The last portion of the TBL session presented students with an application exercise that they had to solve as a team. The application exercise consisted of a scenario or real-world problem that would require students to apply theoretical knowledge towards solving it. Students were given 90 minutes to work on the application exercise in their groups. The application exercises presented to the students were adapted from existing course tutorial materials and again due to the subjectivity of design work, differ from the typical TBL modules in that there is no one answer to the problem or scenario given. The tutorial materials were redesigned into scenarios that were relevant to their class project. As with the tRATs, students went into their group Google Meet links to discuss and work on the application exercise. Figure 4 shows an example of one group working on an application exercise together where usually one student will share their screen and since the online platforms used for the exercise are collaborative by nature, students have the option to work on the same file together while using Google Meet to discuss their solutions.

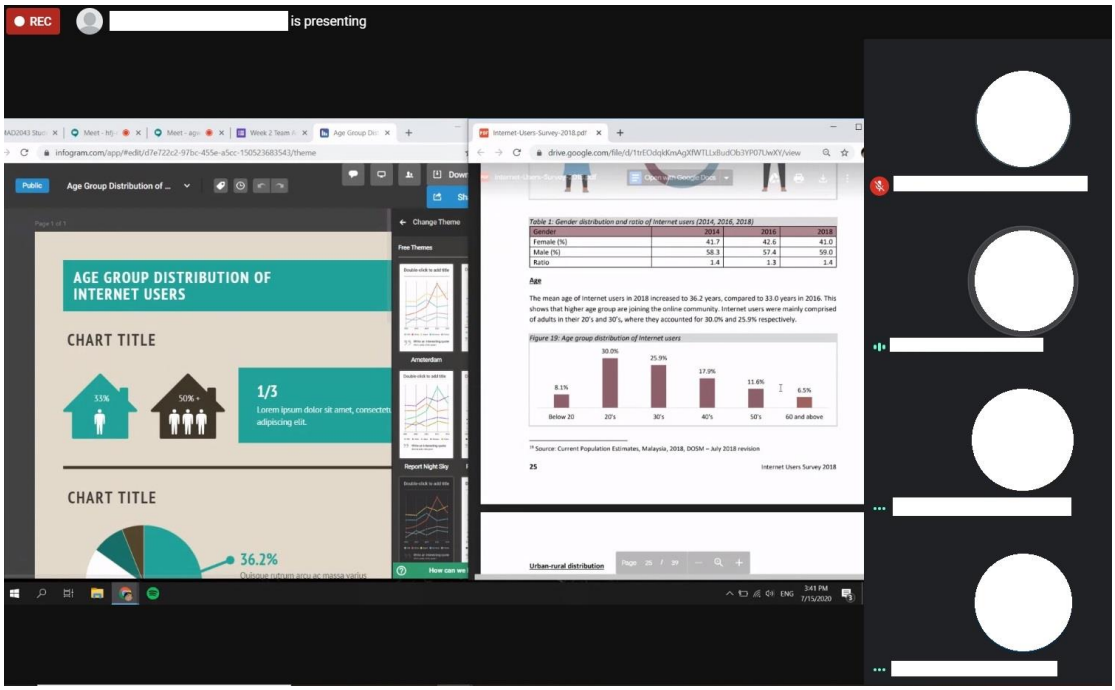


Figure 4 Example of One Team Discussing and Working on the Application Exercise

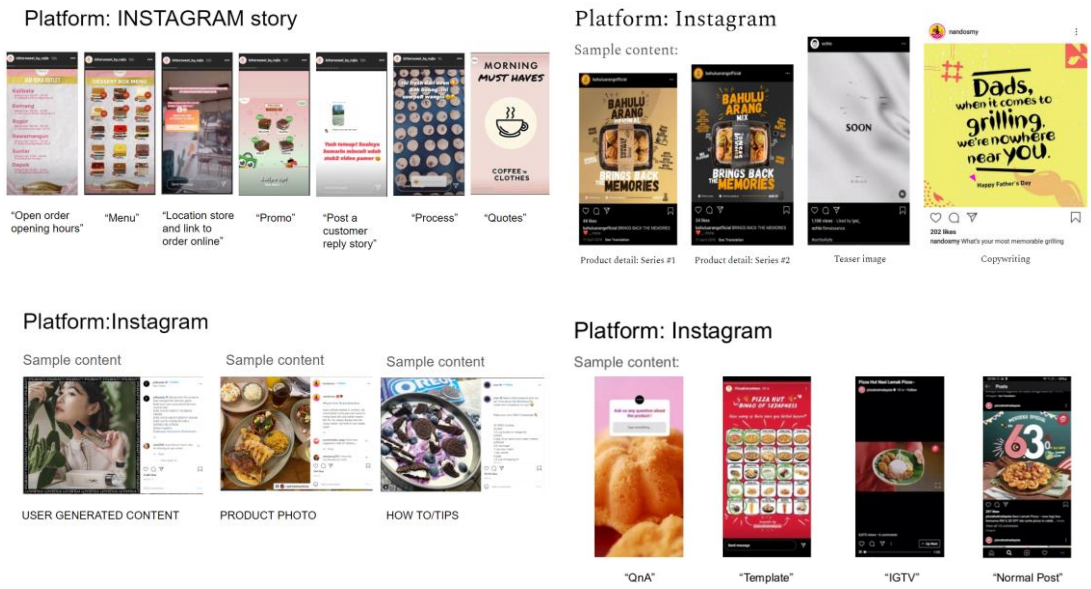


Figure 5 Application Exercise Outcomes of 4 Different Teams

Figure 5 shows an example of the different outcomes of the same application exercise done by four different teams of which there is no clear "correct" answer and relied on the teams to provide their thought process behind their choices. Once all teams have submitted their work into Google Classroom, the

remainder of the class time is used for presentation and feedback of the work done. Figure 6 presents a summary of the TBL class flow experienced by the students within a TBL session. The duration planned for each TBL activity was based on a 4-hour class with 5-to-10-minute breaks given to students in between some of the heavier activities. This was to reduce the feeling of fatigue from sitting in front of a screen for long periods of time and to allow the lecturer to prepare the materials needed for the next activity.

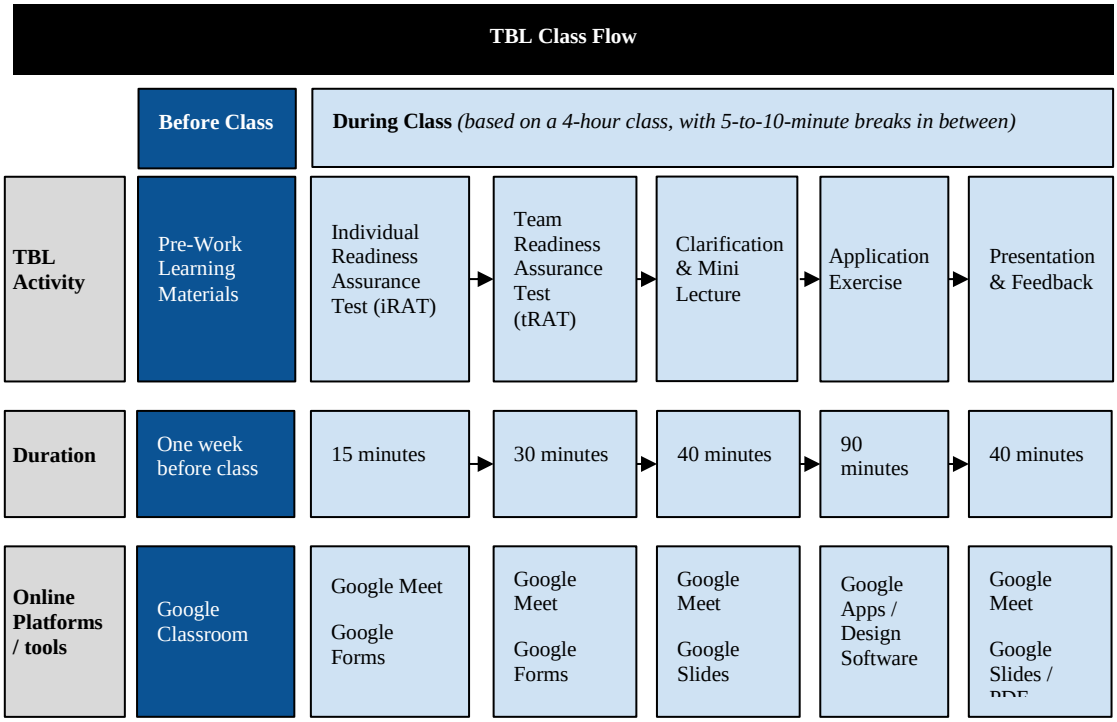


Figure 6 Summary of the TBL Class Flow

In this study, data was collected using a survey questionnaire with open-ended questions to gauge the attitude and perception of students towards TBL. A total of 25 survey items with responses ranging from 1 = Strongly Disagree to 5 = Strongly Agree were categorised into students' overall satisfaction with TBL, students' learning experience with TBL, and their perception towards working in teams. The questionnaire was designed by adapting guidelines and survey items used in similar research studies in order to elicit student perception on the TBL learning experience (Parmelee, DeStephen, and Borges, 2009; Vasan, Compton, & Defouw, 2009). Two open-ended questions were added to solicit a deeper understanding of what students liked and disliked about TBL. The survey questionnaire was distributed to students via Google Forms in Week 8, one week after the final TBL session. The intention of the survey was explained to the students and it was made clear to students that participation in the survey was optional

and anonymous. The TBL sessions carried no assessment marks and their non-participation in the survey would have no bearing on their coursework assessments.

Results and Findings

Quantitative data from the survey responses received were analysed using statistical analysis software and a Cronbach's Alpha test found that the survey is deemed reliable at 0.955. Descriptive statistics of the survey items are presented in Table 1. Findings are arranged by category with the Means (M), Standard Deviation (SD), and grand mean of the category shown.

Table 1 Descriptive statistics of survey results

Survey Item	**Mean (M)**	**Std. Dev. (SD)**
Overall satisfaction with TBL		
1. TBL helped increase understanding of the course materials	4.05	.524
2. Able to focus better in online classes with TBL	3.89	.658
3. Learn better online with TBL	3.47	.905
4. Able to pay attention in online classes during TBL sessions	3.79	.787
5. Enjoyed the online learning experience during TBL sessions	3.79	.631
6. Would like more TBL sessions in the future	3.58	.902
7. Found the TBL sessions challenging but interesting	4.00	.745
Grand mean = 3.80		
Learning experience		
1. Able to complete pre-work materials before class	3.89	.658
2. Was clear on learning objectives of class	3.95	.524
3. iRATs were useful to test understanding	4.11	.567
4. tRATs allowed for self-correction after team discussions	4.32	.582
5. Clarification session improved understanding of concepts	4.26	.452
6. Listening to other team's justifications encouraged looking at problem differently	4.11	.737
7. Mini lecture session helped focus on core information	4.16	.602

8. Team activities helped practical application of concepts	4.05	.524
9. Learning was more meaningful during TBL sessions	3.95	.705
Grand mean = 4.09		
Perceptions of Working in Teams		
1. Found working in a team a valuable experience	4.05	.780
2. Team was able to work well together	4.05	.911
3. Team members gave equal contribution	4.11	.875
4. There was mutual respect for each member's opinion during discussions	4.42	.607
5. Able to contribute meaningfully during discussions	4.21	.631
6. Found working in a team helped improve problem solving skills	4.21	.918
7. Team discussions helped improve teamwork skills	4.16	.898
8. Learn more with team members compared to self-study	4.11	.994
9. Solving problems together is effective to practice what I learned	4.26	.933
Grand mean = 4.18		
n = 19, Cronbach's Alpha = 0.955		

Overall, the mean scores in regards to the learning experience with TBL (grand mean = 4.09) and perception towards working in teams (grand mean = 4.18) indicate that students had a favourable opinion of their experience learning with TBL in the online class and responded positively to working in groups. However, when it comes to their overall satisfaction towards TBL, the grand mean of 3.80 suggests that while students did not respond negatively towards TBL they may still be unsure about the benefits of TBL towards their learning.

Students believed that the TBL sessions increased their understanding of the content (M = 4.05) and while the TBL sessions were found to be challenging it was still interesting to them (M = 4.00). However, they were undecided about whether they were able to learn better online with TBL (M = 3.47) and were on the fence if they wanted to have more TBL sessions in the future (M = 3.58). Students did find that they were able to focus better (M = 3.89) and felt that they were able to pay attention in the online

class (M = 3.79). Overall results from the survey indicate that they enjoyed the online learning experience with TBL (M = 3.79). These findings are supported by the following student comments as quoted verbatim:

- *"Sometimes if it has been a long day, I get a bit slow on the figuring things out and thinking aspect of the activities and it gets very tiring very quickly for me personally and in turn, slows me down even more and my brain don't cooperate for the rest of the class hahah"*
- *"If the classes drag too long, it can be boring."*
- *"time consuming but still we had great discussion which is fine for me "*

In terms of the learning experience in the TBL class flow, students felt that they were able to complete the pre-work materials before class (M = 3.89) and indicated that they were clear on the class learning objectives (M = 3.95). Students agreed that the iRATs were a useful way to test their understanding of the topic content (M = 4.11) and that the tRAT team discussions gave them the opportunity to correct their misunderstandings (M = 4.32). The clarification session was acknowledged to help improve their understanding of the concepts (M = 4.26) and students agreed that the mini lecture helped them to focus on core information (M = 4.16). Team activities were found to be helpful towards understanding practical application of concepts (M = 4.05) and listening to the justifications by other teams encouraged students to look at the problem from a different perspective (M = 4.11). Overall learning became more meaningful to students during the TBL sessions (M = 3.95). These findings are consistent with the following student comments:

- *"Allows me to have wider understanding on certain topics especially when discussing about designs and planning. Better brainstorming session when i get stuck on a particular idea."*
- *"Helps build confidence and gain extra knowledge…"*
- *"Learning and doing things on the spot sort of makes the learning sticks better and forces me to understand it quickly while doing it"*

Results show that students agreed it was a valuable experience to work in a team (M = 4.05) and they felt that they were able to improve their problem-solving skills (M = 4.21), acquired skills to work better in teams through the team discussions (M = 4.16), and that solving problems together was an effective way to practice what they learned in class (M = 4.26). Students believed team members had mutual respect for each other's opinions (M = 4.42) and that they were able to contribute meaningfully to the discussions

(M = 4.21). Students believe they were able to learn more with their teams compared to learning on their own (M = 4.11), agreeing that the team was able to work well together (M = 4.05) and felt that all team members contributed equally to the team (M = 4.11). Students also commented the following in regards to working together in their groups:

- *"...able to be open more to other opinions and perspectives from other members"*
- *"I don't have to stress alone trying to understand"*
- *"I do like to work in a team it is because we can share the knowledge and advice each person in the group also get the work done smoothly"*

Students also brought up some dissatisfaction in regards to the challenges of having team members who may be unwilling to participate in discussions or in the team activities. They mentioned "*Not everyone is willing to take part and communicate. When there's no teamwork it makes it hard as a team to work*", and "*some people slow understanding and not active in discussion*". Student feedback also highlighted how their work is affected when there are clashes amongst team members, stating the "*..slow-paced from others especially when you get not-so agreeable teammates*" and "*Sometimes opinions collides and is not what I expected for, which explanation will be much more harder*".

Discussion and Conclusion

This study sought to investigate creative multimedia design students' perceptions of learning with TBL when implemented as an approach to improve engagement in the online class environment. Findings of the study suggest that at this introductory stage, student perceptions lean towards being more positive and favourable of learning online with TBL however there is still uncertainty if TBL will become their preferred way of learning.

Students perceived working in groups as a valuable experience, but only if all members work well together. Results indicated that students found group work to be a valuable experience that brings about numerous benefits as they believe that working in groups offers them a form of peer support and allows them to teach and learn from one another. However, these benefits can only be realised if all team members actively contribute to the team, participate in the discussions, and are held accountable for their actions. As

mentioned by Watkins et al. (2018), educators implementing TBL need to be aware of possible mismatches amongst learning readiness of peers which could potentially lead to conflicts within the group. This sense of peer support in a community of learners appears to hold a certain level of importance in their learning experience. This is especially true in the context of online learning, where studies have found that it is imperative for educators to allay perceived feelings of loneliness in online courses as even though students are connected via technology, the negative feelings persist in the absence of planned opportunities for quality interaction and communication (Kaufmann & Vallade, 2020). With more and more courses moving towards hybrid and online modes of delivery, it can be gathered that TBL is one of the potential approaches to structure peer-to-peer interaction, generate meaningful discussions, and build positive group learning experiences in an online class.

Students had a positive response towards the online TBL experience. Students believed that the TBL session activities (iRAT, tRAT, and Clarification) helped improve their understanding of the concepts taught whilst the application exercises provided opportunities for them to apply the concepts into practice. Students felt that they learned better by actively working on the exercises and were able to widen their perspectives through the sharing of opinions by their peers. Students were more confident and reported being able to gain knowledge at the end of the TBL sessions supporting what has been found in literature (Bleske et al., 2016). These findings offer encouragement to continue exploring of the use of TBL in creative multimedia design courses.

Duration of the TBL sessions was found to play an important role in student's satisfaction towards an online learning experience. Results suggest that students perceived the TBL sessions to be lengthy and tiring as compared to the usual online learning approaches, thus eliciting a more neutral response as to whether they wanted more TBL sessions in future classes. As students are taking all their classes online, the long hours in front of the screen may be leading them to feel digital fatigue and cognitive overload (Simamora, 2020) and thus while they enjoyed the interaction with their peers, they felt tired from needing to fully concentrate and participate during the TBL sessions. This suggests that perhaps considerations can be made for TBL sessions to be broken up into smaller parts over a few classes to reduce the intensity of each session. Further observations are needed to help determine the appropriate length of time for conducting TBL sessions in an online classroom setting.

The limitations of this study are the small sample size and that this is essentially a case study of just one design course at a local private university. Results may not be generalisable as perceptions towards TBL in an online learning environment may differ across the different creative multimedia design majors and even differ by level of study. It would be beneficial for future studies to include other design majors or a bigger cohort of students.

Additionally, since TBL was only introduced in two sessions out of the 14 weeks of class, student exposure to the TBL approach may not be enough to form concrete preferences. Perhaps, as suggested by Frame et al (2015), future research may consider introducing TBL earlier in the programme curriculum by selecting foundation or first year courses to study the long-term beneficial effects of TBL on the student learning experience. Further investigations need to be done to determine if the touted benefits of TBL are able to be realised in the teaching of creative multimedia design courses, especially when courses are being delivered online. Nevertheless, as a preliminary look into the perceptions of creative multimedia design students towards a very new approach to learning, the results from this study offer encouragement for educators to try implementing TBL in undergraduate design courses as a way to improve engagement in an online learning environment.

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