DIGITAL ASSESSMENT: IMPACT ON STUDENT MOTIVATION, PEER LEARNING, GROUP DYNAMICS

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Abstract

As universities shifted to online education with the onset of the Coronavirus Disease 2019 (COVID-19) pandemic, both pedagogy and assessment patterns across disciplines underwent a change, with a shift towards collaborative digital assessments. In this context, using qualitative and quantitative methods for data collection from an assessment conducted for 55 students who worked in groups to create YouTube videos on pre-selected modules, our analysis reveals that this assessment tool had a significant impact on peer learning, motivation and group dynamics. Students were more motivated to learn and share their learning, and they could also successfully engage in recognising and addressing group dynamics, thereby cultivating more than just subject knowledge. This finding aligns with existing scholarship and the paper adds to research about pedagogy and assessment via digital education in the Indian context, which is still upcoming.

Keywords: Blended Learning, COVID-19, Higher Education, Innovative Pedagogy, Under-graduate Students.

I. Introduction

Pedagogy, assessment, peer learning, student motivation, and conflict management are aspects that educators confront irrespective of their disciplinary location, and due to this literature on these aspects is also rich and available in different disciplines, including but not limited to higher education, management, and psychology. With respect to this study, we attempt to clarify some of these concepts and review recent literature on the same that is relevant to our hypotheses regarding the relationship between peer learning and student motivation, peer learning and group dynamics, and conflict management. The learning experience is often a mix of several entities, including pedagogy and assessment. Both affect students' ability to grasp and apply knowledge. Learning is often measured through assessment, and while learning may indicate mastery over subject matter, it is also concerned with developing skills such as critical thinking, effective communication, analysis, and synthesis of data. Owing to this, it is important to "recognize the power and potential of assessment and evaluation in the learning process" [1].

In response to this need for assessments that build skills, educators have innovated in many ways, including online and digital assessment forms, such as digital storytelling, creating blogs, and integration of social media into assignments. While some of these forms have been used by educators even before 2020, it has been noted that the coronavirus disease 2019 (COVID-19) pandemic pushed many educators to adapt to new assessment modes in response to the shift in teaching and learning to the online mode [2]. According to Williamson et al. [3], "a distinctive approach to pedagogy" was witnessed in early 2020, as educators took to online teaching, and distance education became the "new normal." What Williamson et al. [3] particularly emphasises is that these methods of pedagogy and

assessment were not particularly new, but took on a "renewed salience." In addition, some scholars have examined the most effective aspects of the online learning process. For example, Randi and Corno [4] conclude that "...learning experiences are a clear contributing factor to student motivation in online courses…" There have also been debates about whether these shifts to digital education have benefited everyone equally, and who has been excluded in the process [3].

The debates notwithstanding and with the pandemic receding in public memory, many institutions have adopted "blended learning" practices, which entail using a mix of traditional and online teaching methods [5]. Some scholars also claim that blended learning has a beneficial impact on student motivation and achievements. In this context, student motivation can be understood as a student's willingness to perceive academic activities as meaningful within the online learning environment and to attain the intended benefits from these activities [6]. Many scholars have observed a link between motivation and the use of blended learning practices. For instance, Prifti [7] reviews studies which claim that "blended learning increases students' motivation and attains higher subjective learning gains." Blended learning and the use of technology also helps to create a more conducive learning environment [8]. Perhaps a case may be made for the success of blended learning approaches with the current generation of students, as they are considered "digital natives," (though this does not automatically imply proficiency in media skills) [9]. However, they often have their own computing devices [10], and hence, are uniquely positioned to benefit from a mix of traditional and online- based teaching-learning methods.

In examining the effectiveness of blended learning techniques, examining student assessments is useful to give insights into whether learning has actually been beneficial, and whether learning and assessment techniques impact student motivation. Scholars agree that assessment and learning are interconnected and assessments can also be a rather influential aspect of the teaching process [1]. Moreover, assessments are often a cause of student dissatisfaction with higher education and this is often because the teaching process is focussed more on delivering content than designing assessments that can accurately measure the attainment of learning outcomes [11].

In contemporary times, learner-centric assessments are often encouraged which enable students not just to repeat what they have learnt, but also to reflect on their realities and resolve issues [1]. This is also fruitful for increasing student satisfaction with the assessment process and equipping them with transferable skills [11]. Assessments involving podcasting, digital storytelling, and video production serve this purpose and are often taken up by students enthusiastically [11], [12]. This is because students now have greater access to online video content for their own learning and are keen to contribute to this existing pool with their own creations [13]. Moreover, students stand to gain important skills such as creativity, communication, and professional skills through digital storytelling assignments [12], of which video creation may be seen as a type. Wakefield et al. [11] use the term "authentic assessments" for such assignments that can equip students with skills relevant to the real world, as well as increase student satisfaction. Another equally crucial aspect of assignments in the digital domain is the integration of social media for content creation and promotion. This is facilitated by the easy availability of and access to gadgets such as smartphones, tablets and laptops, social media sites such as Facebook and Twitter, as well as students' familiarity and comfort with using them. Some scholars posit that using social media tools for instructions can promote greater student engagement [14].

Scholars also argue that leveraging social media for learning can help promote collaborative and peer learning [15]. While there is ample evidence to show that peers have a significant influence on adolescent academic performance [16], there is also research on how peer assessment and collaboration promote learning among students of higher education. For instance, Huang and Law [17] show how help-seeking as a form of peer interaction can enable student learning in the online scenario. According to Wengrowicz et al. [18], collaborative learning becomes possible with students having cognitive and

metacognitive skills, which are "simultaneously developed as a result of the collaboration…" This implies that as students learn skills such as teamwork; their quality of learning the subject matter is also enriched. In addition, poor collaborative efforts can also affect learning outcomes in a negative manner and may give rise to conflicts [18]. It is important to note that the presence of and interaction with peers is imperative to any collaborative learning activity. In this regard, scholars such as Arvelo-Márquez et al. [19] contend that peer-led team learning can have a positive effect on "student engagement, critical thinking, and success in introductory biology courses." However, peer learning has implications for the kind of conflicts that students encounter in peer-oriented assessments or learning activities. Irrespective of the different conflicts and challenges that arise from collaborative learning activities, Wengrowicz et al. [18] suggest that training students in social skills can help them benefit from the collaborative learning process. Some scholars posit that collaborative learning assignments can also aid in acceptance of diversity, and prevent workplace conflicts in future, as students would have developed skills to effectively deal with intercultural differences [20].

Conflicts and their resolution are an integral part of group assessments and can arise in even one of the most common forms of group assessments used in the digital domain, that is, video creation. Scholars have reviewed studies that show how video creation assessments are beneficial in multiple ways, such as helping students learn technical skills of creation and production, over and above the subject knowledge [9]. In addition, Reyna and Meier [9] review studies that establish a clear link between digital forms of assessment and collaborative and peer learning. Research by Reyna and Meier [9] found evidence of video creation being a useful assessment tool in disciplines such as chemistry and physiotherapy.

Across disciplines, YouTube has been a preferred and popular platform for hosting and disseminating videos created by students due to its easy availability and access. For instance, scholars such as Sari et al. [21], who used YouTube for English teaching, found that more than improving students' speaking skills, the assessment using video creation helped students improve their technical skills in producing and editing videos. Belanche et al. [22], who also used video creation on key theoretical concepts of the subject for students of a marketing course, found increased levels of student satisfaction with the activity, as well as its evaluation. Both student success and satisfaction are dependent on a host of different factors, including prior training of students in using digital media tools (production and editing), as well as adequate preparedness of the instructors [23]. This study aims to understand how group dynamics, peer learning, and conflict resolution are managed in the creation of YouTube videos as an assessment and thus tests some of the conclusions mentioned in the review above in an Indian classroom. The detailed methodology is described ahead.

II. Method

This study was conducted for second year (third semester) students pursuing a three-year undergraduate degree in Computer Science. The third semester curriculum requires students to pursue three core courses of 6 credits each, one skill enhancement course of 4 credits, and one general elective course (from a different discipline) of 6 credits. Each course is supplemented by project/lab work. As a result, student workload is high. However, clear timelines spread over the semester were provided for each step of the project. Students were encouraged to discuss their progress at each step. Each group was compulsorily expected to submit a progress report documenting the completion of each step, on the Google Classroom platform.

The experiment was devised in January 2022 while the teaching was completely online (since March 2020) because of the COVID-19 pandemic. The course is technical in nature and being at the beginning of the second year, the students do not have the opportunity to engage with many live oral presentations or group- based projects. However, the students had prior experience of working in an online group setup. Additionally, since it is

a technical subject, the delivery of technical content plays a major role in the oral presentation. Consequently, an expected benefit of this study is that the students get first-hand experience of group dynamics and conducting oral presentations. It is important to note that the teaching mode shifted to offline mid-semester during the project, around the time when the students were preparing to start the video recordings. It turned out to be beneficial as it gave the students an opportunity to have greater peer interaction and learning within and between the groups.

As this research intends to understand the impact of digital assessments on student learning, it was decided to gather quantitative data via a questionnaire specifically pertaining to three issues: i) student satisfaction and learning, ii) group contribution/peer learning, and iii) the process of assessment. The experiment was rolled out in the spring semester of 2022, in a Computer Science subject database management system. A total of 55 students participated in the experiment, and out of these, 12 were female students. Each of them was put in groups of three-four, thus resulting in 15 groups. Each group was expected to pick a database design question in consultation with the faculty. The group composition was decided by the students and they were free to collaborate with their choice of group mates. Seven out of the 15 groups involved only male students. Interestingly, there were no female-only groups.

Once the students selected their topic, they developed a detailed statement of interest in discussion with the faculty. After securing the approval of the faculty member, each group was instructed to upload a maximum of five videos, totaling to a maximum of 15 minutes duration overall, to showcase their work. A nodal person, selected by the group, was responsible for uploading the videos on YouTube. The students were expected to fill in questionnaires regarding satisfaction and feedback after the completion of the assignment and the sharing of grades. In addition, the study also analysed students' qualitative feedback to determine how interpersonal issues were resolved by students working in groups.

Data Analysis

Participant Demographics

Participant's age group: Table 1 shows that the mean average age of the participants is 19 years, implying that the maximum numbers of participants are in the age bracket of 18–22 years. Participant gender distribution: The participants in the study include 41 males and 12 females. Figure 1 shows that the majority of participants in the study are males i.e., 77%, and the rest i.e., 23% are females.

Table 1. Mean age

Number of participants	Mean age of participants
53	19.65

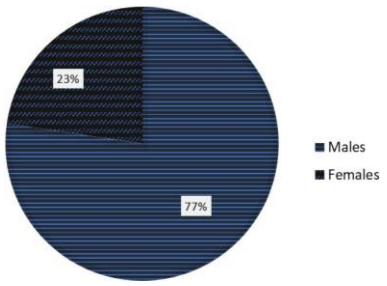

Figure 1. Gender distribution

Scale Reliability and Validity

The scale devised under the study had 25 items that were administered to 53 students at the undergraduate level. For standardisation purposes, the reliability of the scale was calculated by finding the Cronbach alpha, and for computing scale validity, Pearson correlation was calculated using SPSS. The extent to which a questionnaire, test, observation, or measurement process gives the same results on repeated trials is known as

reliability [24]. To compute the reliability of the scale, an overall Cronbach alpha value was calculated for all 25 items which came out to be 0.943, as shown in Table 2. An overall alpha value of 0.943 indicates an excellent internal consistency among the items of the questionnaire.

The questionnaire seeks to gauge participant responses on two dimensions i.e., the learner's attributes and the group's attributes. Tables 3 and 4 indicate Cronbach values for the two dimensions respectively. Dimension 1 (learner's attributes) had 15 items and the alpha value obtained for these was 0.912, which signifies high internal consistency between the items under this dimension. As Table 4 shows, the Cronbach alpha value for dimension 2 (group's attributes) is 0.872. The obtained value is comparatively lower than the overall and dimension 1 alpha value but still is indicative of high reliability of the scale items.

The extent to which an instrument measures what it claims to measure is referred to as its validity [24]. Validity gives a clear picture of whether the construct as specified in the context is being accurately measured through the scale. To determine the validity of the questionnaire, the Pearson correlation coefficient was calculated. In the present study, all the items (except items 8 and 17) have a significance value of 0.000, which is less than 0.05, making them valid. The two items 8 and 17 have significance values of 0.221 and 0.267, making these two items invalid.

The questionnaire developed for the study measured two constructs: learner's attributes and group's attributes. Learner's attribute seeks to measure a learner's take on motivation, acquisition of technical skills, communication, presentation skills and domain knowledge, effectiveness of teacher's feedback, and process of active learning with respect to the experiment. Group attributes focus on aspects such as peer involvement, conflicts, nodal person/leader, timelines and group dynamics in the context of group working.

For the first construct i.e., learner's attributes, the overall mean of all 15 items was taken for all the respondents and the standard deviation was calculated to see how far the items deviate from the mean value of these items. The standard deviation obtained was 0.299, which shows that the items marginally deviate from the overall mean, making the items reliable to be measured. Similarly, there were 10 items to measure for group's attributes in the scale, whose overall mean for each item was calculated and then the standard deviation of these items came out to be 0.280, which again shows only marginal standard error from the mean and renders the items in the second construct to be reliable too. A low score on standard deviation is indicative of low deviation of the items from the mean of the items and is desirable for it to be a sound scale of measurement. Table 5 shows the standard deviation for both learner's and group's attributes.

The present study seeks to understand the effect of peer-learning on motivation, group dynamics, and conflict management. For this, quantitative data collection was done on a self-developed standardised scale from a sample size (n) of 53. The following hypotheses were proposed in the study:

H1: peer learning positively contributes to student's motivation.

H2: peer learning contributes to better group dynamics.

Table 2. Reliability statistics (overall)

Cronbach's alpha	N of Items
0.943	25

Table 3. Reliability statistics (learner's attributes)

Cronbach's alpha	N of Items
0.912	15

Table 4. Reliability statistics (group's attributes)

Cronbach's alpha	N of Items
0.872	10

Table 5. Standard deviation

Constructs	Standard deviation

Learner's attributes	0.299
Group's attributes	0.280

I. Results and Discussion

Peer Learning and Motivation

A linear regression analysis was conducted to verify the causal relationship between peer learning and motivation. The results indicated that peer learning (independent variable) significantly and positively causes motivation (dependent variable) in the students. As indicated in Table 6, the R square shows the total variation caused by the dependent variable that can be explained by the independent variable.

Table 6. Model summary

Variables	Peer learning and motivation	Peer learning and group dynamics
Multiple R	0.808	0.790
R square	0.653	0.624
Adjusted R square	0.646	0.616
Std. error of estimate	0.55597	0.55361

In the current case, the value is 0.653, pointing out that peer learning causes a 65.3% change in motivation. In Table 7, showing the correlation between the two variables, the beta value obtained is 0.808, which signifies that a one-unit change in peer learning will cause a 0.808-unit change in motivation. Furthermore, a positive beta value indicates a positive relationship between the two variables, which means that if peer learning increases, the levels of motivation in students would increase too. The level of significance is 0.000, which is below 0.05 confidence intervals, indicating that a change in peer learning causes a significant change in motivation. Table 8 depicts the analysis of variance (ANOVA), where the p-valu e= 0.00, which is less than 0.05, indicating that the result of the present study is significant. ANOVA helps to find if the current model proposed in the study is significant enough to determine the final outcome. Based on the results of the study, it can be claimed that there is a positive causal relationship between peer learning and motivation, which means motivation is a likely outcome of peer learning in the current experiment.

Table 7. Correlation of variables (peer learning with motivation and group dynamics)

	Variables	Unstandardised coefficients		Standardised coefficients	T	Sig.	95% confidence interval for B	
		B	Std. error	Beta			Lower bound	Upper bound
Correlation 1	Motivation	0.015	0.334	0.808	0.045	0.964	-0.656	0.687
	Peer learning	0.873	0.089		9.792	0.000	0.694	1.052
Correlation 2	Group dynamics	0.606	0.333	0.790	1.821	0.074	-0.062	1.275
	Peer learning	0.816	0.089		9.197	0.000	0.638	0.995

Table 8. Analysis of variance (ANOVA)

	Peer learning and motivation					Peer learning and group dynamics				
	Sum of squares	df	Mean square	F	Sig	Sum of squares	df	Mean square	F	Sig
Regression	29.635	1	29.635	95.874	0.000	25.922	1	25.922	84.578	0.000
Residual	15.764	51	0.309			15.631	51	0.306		
Total	45.399	52				41.553	52			

Peer Learning and Group Dynamics

As for peer learning and group dynamics, a linear regression analysis was performed. The results for these variables were quite similar to the results of peer learning and motivation. The analysis showed that peer learning (independent variable) and group dynamics (dependent variable) had a significant and positive relationship (r-square = 0.624).

It can be seen that peer learning causes a 62.4% variance in group dynamics. Table 7 (Correlation 2) shows the correlation coefficient of peer learning and group dynamics (B value = 0.790 and sig. value = 0.000), which shows that one unit change in peer learning will lead to a 0.790 unit change in group dynamics. The correlation coefficient indicates a strong relationship between the two variables. The positive beta value shows a positive relationship between the two variables, indicating that if peer learning increases, the group dynamics among the students will also improve. Moreover, in Table 3, the sig. value = 0.000, which validates the findings of the current study as statistically significant. From the obtained results, both the dependent variables i.e., motivation and group dynamics, have a significant, strong, and positive causal relation with peer learning.

Current findings in the research are suggestive of a positive causal relationship between peer learning and group dynamics, wherein peer learning will lead to better group dynamics among the members. The present study also examined the effect of peer learning on conflict management strategies used by groups to resolve interpersonal conflicts. Qualitative data which indicated conflict management and conflict resolution questions in the questionnaire helped to collect this information from 53 respondents. In the questionnaire given to the participants, subjective questions were incorporated towards the end to gauge the participant's views on how interpersonal issues were resolved among the members of the group. This was done to explore how peer learning influences better conflict management among group members, thereby improving interpersonal connections among the members. To conduct the analysis, the subjective data collected in the questionnaire was coded, and relevant insights were generated based on what the participants suggested in these regards. The codes for content analysis are described in Table 9. The frequency for each conflict- resolution mechanism was also calculated to find the most utilised strategies, and this is depicted in Figure 2.

Table 9. Content analysis table

Emerging themes	Codes	Frequency
Communication	Frequent group discussions, proper communication, paved easy way, ensured collective effort rather than individual, discussion to address group issues, discussions regarding late submissions, holding conversations, well defined communication, better understanding, and mutual agreement	16
Consistent interaction	Repeated contacting, regular online sessions and brainstorming sessions, frequent meetings and discussions, greater socialisation	7
Setting work boundaries	Assigning strict deadlines and reminders, task distribution among members, division of work, time to time resolution, assigning individual tasks and accountability, and set clear deadlines	7
Cooperation	Coordination to meet deadlines	2
Additional resolution mechanisms	Professionalism, rational thinking, and adjustment	2

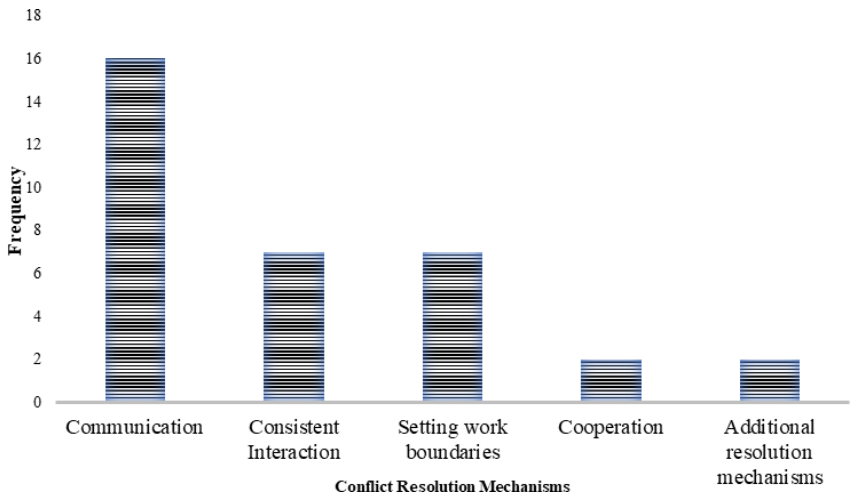

Figure 2. Frequency of conflict resolution mechanisms

Results of Qualitative Analysis

Based on the subjective analysis of the data, the following resolution mechanisms have emerged: communication has the highest frequency, followed by consistent interaction, setting work boundaries, cooperation, and additional mechanisms like professionalism, rational thinking, and adjustment. It shows that participants have used these mechanisms to resolve interpersonal issues among themselves. The results show that these resolution strategies have helped the participants improve their overall relationship, work quality, and learning outcomes, along with establishing new connections in some cases.

Communication

This is the most commonly used mechanism for maintaining work relations in group work. As per participants, communication involved frequent and regular communication among members, which facilitated ease of working. Collective discussions also aided in managing group-related problems. Communication also emerged as a key to ensuring collective effort over individual effort, led to better understanding among group members, and promoted mutual agreement. This shows that without proper communication, effective conflict resolution among group members remains unlikely.

Consistent Interactions

The second prominent theme for interpersonal conflict resolution was repeated interaction. Participants reported that ongoing interaction during their course of work was also a conducive way to reduce interpersonal conflicts among group members. Students kept regular online brainstorming sessions with their respective group members and held frequent discussions on different work- related aspects to ensure the flow of work and outcomes. Moreover, these interactions not only helped improve working but also acted as a catalyst for improved socialisation among the students. Through repeated interactions, students got a chance to get to know other members better, thereby reducing interpersonal conflicts.

Setting Work Boundaries

Another important mechanism that emerged from participant responses is setting clear and precise work boundaries. A lot of interpersonal rifts occur because there is no clear work division, leading to confusion and doubts. Work boundaries helped the students set clear timelines and deadlines that had to be achieved. It also fixed each group member's accountability and task contributions with timely resolutions if any conflict arose. With set boundaries, participants could own their work and perform their tasks efficiently in a timely manner.

Cooperation

Another theme that emerged, though not very prominently, was cooperation. A few participants shared that they were able to manage interpersonal issues better by improving cooperation in the group. Participants tried to work in a coordinated fashion with each other rather than competing, which could have hampered each group's team spirit.

Additional Conflict Resolution Strategies

Apart from these prominent themes, some resolution strategies were not reported by multiple students but can contribute to an improved understanding of conflict resolution mechanisms. These include professionalism, rational thinking, and adjustment. A professional working setup ensures clear work allocation, strict timelines, efficient and quality working, being responsible and accountable, and consistency in work operations. Rational thinking entails a person's ability to think and then act in a reasonable and rational manner, which is necessary in any domain of professional work. Adjustment is one of the key aspects of successful working, as it ensures that the individual moulds, reshapes, or alters their working patterns and styles in order to fit within the context in question. Some students suggested that these mechanisms have also contributed, to some extent, to maintaining sound interpersonal relations and reducing interpersonal conflicts among the group members.

I. Discussion

The research finds that digital assessment has a positive impact on peer learning and group dynamics even when teaching–learning happens in an online mode. It also shows that a positive relationship exists between peer learning and motivation. The findings are in line with those of earlier research [25] that confirms the existence of peer effects in a learning process in an experiment setting. The results show that the presence of a peer has a positive effect on the group and the motivation to perform increases in a group. The study also suggests that there is a relationship between peer learning and group dynamics which implies that peer learning leads to better group dynamics among the members.

When the experiment was initiated, the classes were held in an online mode, yet the results show that peer learning not only facilitated learning but also helped in improving group dynamics and enhanced the overall learning experience of the participants. Another significant finding of the research is that participants used various mechanisms to resolve interpersonal issues that arose due to the collaborative nature of the assessment. Working together in a virtual mode made them develop consistent and innovative methods to communicate with each other. These channels of communication improved the connectivity among the group members and also led to improved quality and outcomes. The participants also learnt to adjust and promote mutual agreement. They also learnt to set clear and attainable work boundaries which are required to achieve any goal in the future.

II. Conclusion

The research found that there is a positive impact of digital assessment on student motivation, peer learning, and group dynamics. The study also suggests that online peer assessment facilitates conflict resolution among learners by using mechanisms like regular interaction and communication. The results may not be generalised to the entire population since the sample size of the study was small. In the present work, the assessment of using YouTube video creation was specific to the discipline of Computer Science which can be further replicated in other disciplines to observe the results. Further, the research highlights digital assessment and its conducive relationship with factors like student motivation, peer learning, and group dynamics specifically in the Indian higher education scenario, broadening the geographical applicability of studies conducted around similar focus areas, but in different regions.

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