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Research Article

Sentiment Analysis of Educators and Learners on Google Classroom as an Online Learning Environment

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ABSTRACT

Ideas surrounding online learning are rapidly evolving due to ongoing technological advancements that support innovative approaches. The widespread availability of information and communication technology (ICT), an expanded toolkit, and its integration into daily life, particularly within the academic domain, have become increasingly inevitable, particularly taking into account the COVID-19 epidemic. This study engages in a discussion about the utilization of Google Classroom as an online learning tool. By conducting sentiment analysis on the online learning experiences of educators and students, academic institutions can gain valuable insights into their students' needs, assess the effectiveness of current instructional methods, and foster meaningful learning experiences. Data were collected from 31 faculty members and 533 students at the Don Mariano Marcos Memorial State University-South La Union Campus. All participants were invited to partake in an online survey to share their experiences and potential challenges encountered during synchronous online instruction using Google Classroom. This research utilizes a mixed-method approach, integrating quantitative and qualitative approaches alongside machine learning applications. The findings suggest that both students and faculty members found the Google Classroom platform to be a valuable tool, motivating further exploration of optimal learning environments for blended learning.

Keywords: blended learning, Google Classroom, online learning, sentiment analysis

1) INTRODUCTION:

The application of information technology within the realm of education and learning has increased significantly recently. For this reason, pedagogical tools or software are created and distributed for computers, tablets, and mobile devices since they may be used to supplement classroom instruction. Several academics have examined the branch of these studies that relates to online teaching-learning settings [1].

Online learning as a strategy faces a critical need for modification due to several significant challenges. The primary obstacles include inadequate infrastructure, low-quality internet connectivity, outdated technology, and the high costs associated with internet access. The abrupt and unplanned transition to large-scale online learning, which has replaced traditional face-to-face instruction, has triggered various societal responses [2]. This shift, driven by necessity, raises concerns about its coercive nature and the lack of prior planning [3]. Given that numerous universities worldwide have adopted online learning, its impact is expected to be widespread, and there's a possibility that it could become the new standard in education [4].

Online learning is increasingly becoming the standard, bringing both advantages and disadvantages. Concerns about the effects of online learning throughout the pandemic have emerged among educational institutions, educators, learners, school leaders, and guardians. Researchers have identified various issues, including unstable or inadequate internet connectivity, a lack of essential devices (such as smartphones or laptops), limited opportunities for collaborative learning, subpar instructional quality, technology misuse, reduced motivation for learning, increased distractions, suboptimal learning environments, mental health challenges, issues with academic integrity, ineffective feedback, limited study materials, and non-participation among students. A significant drawback of online learning,

impacting interactions among peers as well as between instructors and students, is the lack of essential personal connections. [5].

In contemporary times, higher education across diverse subjects is readily accessible through online educational platforms, which serve as digital avenues for disseminating knowledge. These applications offer distinctive content, accompanied by user feedback, often shared in comment sections. These reviews and comments can be effectively analyzed through natural language processing techniques [6].

Sentiment analysis is a method for classifying text to ascertain whether it conveys positive, negative, or neutral sentiment and for identifying opinions [7]. This analysis is commonly employed to assess and extract textual data related to various subjects, such as services, products, individuals, phenomena, and other topics, using data mining techniques [8]. The data collection process involves examining text reviews, forum discussions, tweets, blogs, and other textual sources [9]. Data pre-processing incorporates tasks like tokenization, removal of stopwords, stemming, emotion recognition, and sentiment categorization [10].

The worldwide effects of COVID-19 have resulted in extensive consequences, including the suspension of classes, curfews, restricted operations, temporary closures of businesses, and disruptions in logistics. Institutions, such as Don Mariano Marcos Memorial State University-South La Union Campus, have aligned with government directives by allowing teaching and non-teaching staff to work remotely, with only essential personnel reporting to work while observing safety measures. To restore disrupted activities and classes, educators and students may need to acquire and enhance their proficiency in technology-related skills. With the increasing prevalence of remote work, more individuals are turning to Learning Management Systems (LMS) applications like Google Classroom [11].

Since its introduction in 2014 as part of Google Apps for Education, Google Classroom (GC) has emerged as an online or virtual learning environment [12]. It stands out due to its unique features, which provide support in terms of technology, pedagogy, and social interaction, making it an effective platform for teaching and learning [13]. As schools are expected to continue utilizing ICTs for more advanced and hybrid education, studies on virtual learning environments remain essential, even after the COVID-19 pandemic [14].

A survey was conducted at DMMMSU-SLUC in order to assess the attitudes of both faculty and students regarding the use of Google Classroom as an online learning platform during the study. The outcomes of this study offer valuable insights for faculty members, enabling them to consider potential recommendations for enhancing instructional delivery.

2) METHODS AND METHODOLOGY:

This research applies a mixed-method approach which includes qualitative as well as quantitative techniques, and utilizes machine learning techniques, similar to those adopted by various authors [15]. To gather data, an online survey was disseminated through social media groups after obtaining official approval following a request letter submission. An open-ended question was included in the survey, and the link to this question was distributed via Messenger group chats and email.

The research involved both faculty members and students at DMMMSU-SLUC. Convenience sampling, a non-probability method that selects respondents based on the ability to access them and familiarity to the researcher, was used to pick respondents. The link for the open-ended question was encoded and made shorter via Bit.ly. Subsequently, the replies were collected and organized with the help of Google Sheets. The dataset was then exported as an Excel file for pre-processing and subjected to sentiment analysis using a machine learning-based service [21]. Sentiment analysis, often referred to as opinion mining (OM), is the process of collecting and evaluating individuals' opinions, feelings, attitudes, perceptions, and more about different entities, including topics, products, and services. [16].

3) RESULTS:

The research found that both professors and students had mostly favorable opinions about the usage of Google Classroom as an internet-based educational tool. 83.87% of faculty members had a positive opinion of Google Classroom for its helpfulness in assisting their teaching responsibilities. On the other hand, 12.90% had worries about possible problems, with just one participant remaining neutral and unsure of the advantages of the platform. Key phrases like "online course," "Google Classroom," and "students" were emphasized as focal points in faculty opinions. The sentiment analysis showed that 68.66% of students had positive experiences, valuing the flexibility, accessibility of resources, and the ability to juggle academic work and other duties. However, 23.27% of students faced obstacles

like technical issues, lack of internet access, and money problems, while 8.07% stayed neutral. Mobile accessibility and class recordings improved convenience for learning, while technical and connectivity problems posed major obstacles. In general, both groups acknowledged the platform's possibilities, despite facing various challenges.

4) DISCUSSION

The sentiments expressed by the respondents were obtained in Excel format from Google Forms. The subsequent phase entailed data preprocessing, which sought to remove noise and ready the gathered data for natural language processing (NLP). Each sentiment was meticulously examined, and any words, phrases, or sentences in Filipino were translated into English using Google Translate.

In order to assess subjectivity, polarity, and general sentiment, the data was then processed using sentiment analysis, and visual representations were created. To validate these findings, the polarity was compared against the outcomes of an unsupervised classification, utilizing a pre-trained sentiment analysis machine learning algorithm from MonkeyLearn. Additionally, a word cloud was generated for visualization, with word size indicating its frequency within the dataset.

A. The Sentiments of Faculty Members on Google Classroom

Among the faculty respondents, there is an even distribution of genders, with 50% being male and the remaining 50% female. The majority of these respondents hold the position of Instructor I, and a significant portion, accounting for 56.3% (18 individuals), are affiliated with the College of Computer Science.

Regarding sentiment analysis of educators' views about Google Classroom as an online learning environment, a significant majority, comprising 83.87% of the respondents, expressed a positive sentiment, as illustrated in Figure 1. This indicates that teachers are comfortable using Google Classroom for their teaching activities. On the other hand, four respondents, or 12.90%, mentioned potential issues with Google Classroom. Only one respondent had a neutral sentiment, signifying uncertainty about whether Google Classroom is beneficial or may pose challenges in instructional delivery.

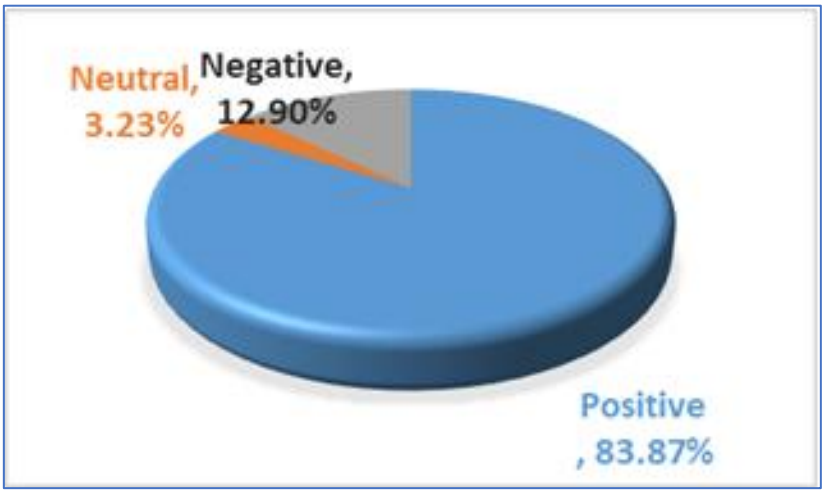

Figure 1 Sentiments of faculty members

The favorable result implies that the educators who participated in the study perceive Google Classroom as a highly effective online learning environment.

Additionally, we extracted common keywords from the sentiments expressed by the faculty respondents and created a word cloud using an online tool, as depicted in Figure 2. Notably, the words "online class," "Google Classroom," and "students" feature prominently in their sentiments

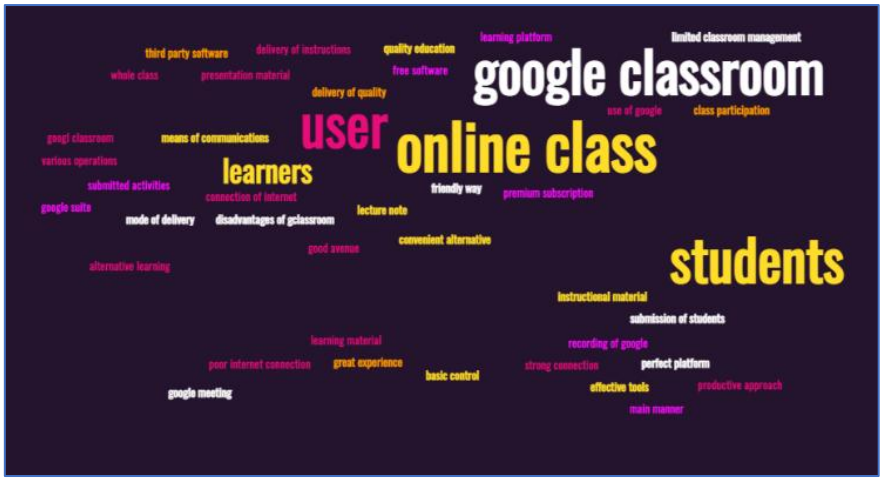

Figure 2 Keywords extracted from the sentiments of faculty members.

A related study emphasized that certain issues may still need to be addressed to ensure the success of future endeavors in online education [17]. Notably, the time spent on tasks such as assessing assignments, evaluating the suitability of activities (especially engaging ones), and maintaining communication with students were highlighted as significant aspects of online education [18]. In the end, the teaching and learning process in this new normal presents significant challenges; yet, all educators must take on the task of instruction to achieve maximum satisfaction and suitable academic success [19].

B. The Sentiments of Students on Google Classroom

A total of 533 students from DMMMSU-SLUC participated in the online survey. Responses were gathered using a convenience sampling approach, which is a non-probability method frequently employed in clinical and qualitative research. The sample consisted of 66.4% females and 33.4% males, with the majority being second- and third-year college students, making up 42.2% and 28.6% of the total respondents, respectively.

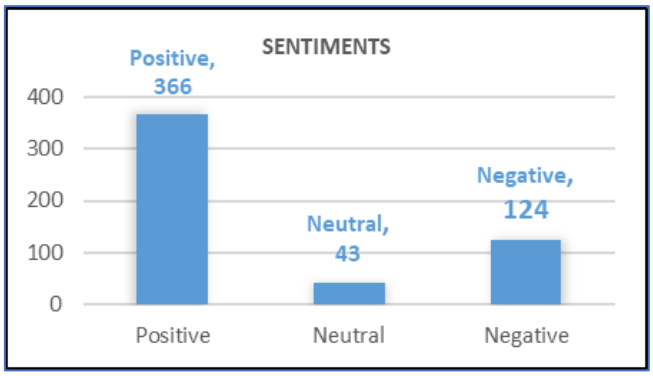

Figure 3 Overall sentiment analysis of learners on Google Classroom.

Concerning the sentiment analysis of students' experiences with Google Classroom as an online learning environment, Figure 3 illustrates the comprehensive polarity of sentiment scores. The examination demonstrates that students' online learning experiences are predominantly marked by positive sentiments (366 responses), accompanied by a smaller number of negative sentiments (124 responses), and a modest count of neutral sentiments (43 responses).

According to the findings, most students had a positive online learning experience with Google Classroom. They showed that they could manage their intellectual and technical demands, use e-learning tools and resources efficiently, and participate in their academic assignments quite easily. As noted by Coman et al. [20], by encouraging flexibility and a student-centered approach, the availability of asynchronous as well as synchronous resources—like email, forums, chats, and videoconferences—can improve the way that students learn in distance learning. The findings also suggest that students may have previously acquired learning experiences that facilitated the development of their independence, resourcefulness, resilience, and time management skills, thereby enabling them

to adapt to similar online learning situations. Furthermore, students viewed online learning via Google Classroom as an opportunity to enhance their skills through online resources, allocate more time to family and loved ones, and generate additional income by participating in remote work on side projects and small businesses. The accessibility of class recordings and course materials through mobile devices further underscores the positive experience with Google Classroom in terms of course content delivery, allowing students to work at their convenience and attend classes while on the move.

On the contrary, some students encountered challenges and had negative experiences using Google Classroom as an online learning tool. These challenges encompassed inadequate technical and mental preparation, academic work overload, internet connectivity issues, technical difficulties with Google Classroom features (especially video uploads), financial hardships due to job losses within their families, a lack of essential equipment for subjects requiring laboratory work, and other contributing factors. The impact of poor internet connectivity on students' adjustment to online learning was particularly noteworthy.

Furthermore, some respondents had a neutral sentiment, implying that their academic, social, or mental health was unaffected by the learning experiences they had during an uncertain time. They expressed dedication and confidence in reaching their objectives by continuing to have faith in their capacity to overcome current difficulties. These findings are similar to that of Gede et al. [21], where the study's findings indicate that students believe their needs may be met and that learning is more structured.. However, learners believe that an absence of internet connectivity in Google Classroom might occasionally make studying and communication more difficult.

The learners' Google classroom learning experiences are shown in the visualization result. Figure 4 demonstrates how Table 1 continues to represent the student sentiments that are most frequently expressed when learning online.

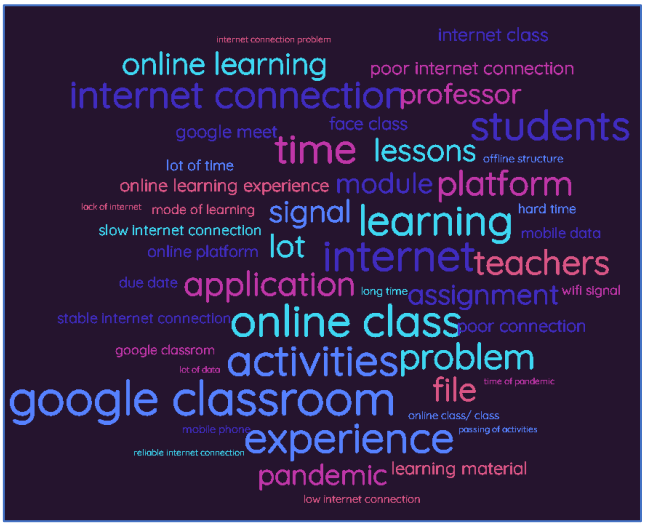

Figure 4 Word cloud of students' Google classroom experiences

The top 10 terms are listed in Table 1, along with their prevalence and sample remarks from student responses. Grammar mistakes may be present in the feedback to demonstrate the sincerity of the responses from the students.

Table 1. Most Frequently Appearing Words of the Student-Respondents' Opinions

Rank	Words	Frequency	Sample Feedback
1	google classroom	206	Google Classroom is not that hard to use. It is student friendly and I did not experienced any problem when it comes to submission of requirements.
2	Online class	145	The online class is hard, but I can handle it for the dream.
3	internet	137	I experienced slow internet connection and I can't upload my assignment on time when no internet
4	activities	130	it makes it easier to submit any activities
5	experience	120	In my experience with online courses, the positives greatly surpass the negatives. I don't actually notice any distinction between the online and offline frameworks.
6	learning	111	Using the GC application is crucial to every student in online learning. The experience is definitely great since it is very easy to operate. I have wide access to my subjects and also a safe place to send documents.
7	time	107	Since I am using an old laptop and my internet is not that good my experience in my Google classroom is not that good because sometimes it lags and tends to load a lot of time and when uploading it it takes a lot of time same as downloading.
8	students	102	It's fine but I am much more concerned on the POV of other students who have unstable reception.
9	internet connection	76	Unstable internet connection is a major problem in online class.
10	problem	59	Sometimes I have encoutered some problems like the mic and camera option and poor internet connection. But it's a good application.

5) CONCLUSION

The application of Google Classroom for online learning at DMMMSU-SLUC has generally gained positive feedback from both educators and students. Faculty members and the majority of students were able to adjust to the new teaching methodologies despite some challenges with the switch to online learning. They saw conquering the pandemic's difficulties as a crucial goal in their life, and they were motivated to succeed. Being a totally online platform, Google Classroom gave students the chance to experiment with various learning environments and take on new challenges while still receiving individualized attention from teachers. As a result, both teachers and students at DMMMSU-SLUC have embraced Google Classroom, which has been essential to sustaining the continuity of teaching. To gain a varied and insightful result interpretation, this research might be expanded upon by performing sentiment analysis on Google Classroom using additional tokenization techniques.

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7) FUNDING STATEMENT:

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8) DATA AVAILABILITY:

The data that support the findings of this study are available from the corresponding author.

9) CONFLICT OF INTEREST:

The authors declare that there is **no conflict of interest.**

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