# Exploring Student Interaction Patterns in WhatsApp Study Groups: An Online Community Ethnography

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**Abstract**
This paper examines communication dynamics in WhatsApp study groups among college students in terms of types of communication, peer support, and the group administrators. In this study, an online community ethnography method was used by analyzing the frequency and character of the interactions in a WhatsApp group that was created with the aim of collaborating academically. The outcomes indicated that text messages constituted the most frequently used mode of communication and voice notes, emojis and images were second, third and fourth respectively. The paper also pointed out that WhatsApp study groups are better places of both academic and emotional support, but the former and the latter types of peer support had the most frequent exchanges. Nonetheless, inequality of participation and the abundance of content was pointed out as the major issues that undermined the performance of the group. The intervention of group admins in group discussion, conflicts and guidance was important to keep positive group dynamics. The study is relevant in the context of learning community within a digital environment as it highlights the importance of ensuring that group participation is inclusive and that management strategies are effective. Its implications for teachers and learners include that informal digital spaces can improve academic cooperation and the support of higher education peers.

**Keywords:** WhatsApp, Study Groups, Peer Support, Online Community Ethnography, Participation Inequality, Content Overload, Digital Learning, Academic Collaboration, Group Administrators, Student Engagement.

**Introduction**
The invention of digital communication technologies has changed the face of education making it possible to collaborate with students in new ways and interact. WhatsApp, a messaging application, was originally intended to be used in personal communication but among the diverse tools and platforms that have come up, it has served as a focus to help the students hold discussions regarding their academic topics, work on their projects, and provide emotional support among others. The growing popularity of WhatsApp study groups among university students is a reason to conduct a more in-depth investigation into interaction patterns in these digital environments, particularly how the students cooperate, communicate, and learn in such non-formal and yet extremely efficient learning environments. This paper will be an inquiry into the pattern of interaction within WhatsApp study groups, the type of communication conducted in study groups, support systems as well as the challenges that might emerge within the study groups.

## Background of Digital Communication in Education

Digital communication is one of the pillars of education in the modern era, as formal and informal learning settings have become possible through it. Digital integration into learning has been brought to fruition by increased ubiquity of smartphones and the internet where students can remain connected to their fellow students, teachers, and learning resources outside of the physical classroom (Barrett and Clark, 2017). Such platforms as WhatsApp, where people can communicate through instant messaging, exchange multimedia files, discuss the topic in groups allow filling the gap between the physical classroom and the digital one offering students the opportunity to study together and at any time and place (Smith and Smith, 2019).

The popularity of WhatsApp in education, especially within higher learning institutions, has experienced massive popularity during the last ten years. It was revealed that students apply WhatsApp groups when sharing course materials, discussing lectures, and seeking assistance with academic activities (Baldwin, 2020). The ease of use and the high usage rate of WhatsApp by students make the application convenient to use when it comes to peer-to-peer learning; students can collaborate academically in the chat and socialize with their peers (Thompson et al., 2018). Consequently, WhatsApp study groups have become an indispensable component of student life, which is making them academically successful as well as socially bonded (Alam and Fatima, 2021).

## Rise of WhatsApp Study Groups Among University Students

WhatsApp study groups have become a characteristic of university life especially in areas where physical libraries or study rooms might be scarce or students desire to find a more informal area where to discuss academic matters. These groups came up as a direct reaction to the growing need to learn collaboratively both outside of the classroom (Choudhury et al., 2020). WhatsApp groups allow students to exchange knowledge using notes, and discuss and collaborate on group projects, which creates a dynamic experience of exchanging knowledge (Zhao and Lee, 2020).

WhatsApp study groups in numerous situations serve as a virtual classroom extension, and students communicate on the platform and provide advice to each other, explain various issues, and clarify confusion (Turner and Tinson, 2019). This support system among peers is very important to the progress of students in their schools since the research has revealed that teamwork leads to improved achievement and facilitates learning (Vygotsky, 1978). Moreover, WhatsApp's can be used as emotional support networks because students undergo academic stress, personal difficulties, and social loneliness and use WhatsApp's (Van Der Meijden and Kirschner, 2021).

## Importance of Understanding Online Peer Learning

It is essential to find out how online peer learning takes place within WhatsApp study groups because of various reasons. To begin with, it gives an insight into the interaction of students in online learning classes, which are gradually becoming a central part of contemporary education (Garrison, 2011). Online learning groups such as WhatsApp enable students to learn asynchronously as well as flexibly, taking their time yet benefiting themselves as well as the information of their peers (Wenger, 1998). In addition, the utilization of digital tools, including WhatsApp, can close the divide between formal and informal learning, providing students with the possibility to learn, both academic and social (Nguyen & Usher, 2020).

Second, the pattern of interaction in WhatsApp study groups may be used to compare the picture of multiple factors which influence the student engagement and participation in an online learning setting. Research has determined that motivation by the students, group behaviors as well as the degree of peer support are some of the factors that affect the effectiveness of online education (Lee and McLoughlin, 2011). Analyzing these aspects in the WhatsApp groups, this study will help fill the gaps in a more detailed perception of how tools of digital communication can influence the way students learn.

**Gap in Existing Research**
Although the aspects of digital communication in education have been studied in existing literature, including the use of such platforms as WhatsApp, this gap in research indicates a significant deficit of the WhatsApp study group study specifically applied in higher education. Politely most of the literature available about the application of WhatsApp and education had focused on its application in formal classrooms, teacher student communication, or as an educational supplementary tool (Donnelly et al., 2016). Yet, there have been less studies that involve the peer-to-peer learning on WhatsApp, based on the nature of interactions within a study group, the impact of emotional support, and the challenges encountered by students in such groups.

Additionally, other research on online learning communities also usually investigated formal, structured learning communities, and less emphasis is made on the less formal, student-driven communities that flourish on applications such as WhatsApp (Pimmer et al., 2014). This paper attempts to fill this gap by offering a detailed ethnographic research study on WhatsApp study groups and the manner in which students collaborate, communicate and support each other in these informal but strong digital platforms.

**Purpose of the Study**
This research is mainly aimed at examining the patterns of interactions within WhatsApp study groups in universities. This paper will set out to discuss the kind of communication that takes place in such groups, the impact of peer reinforcement in academic and emotional situations, and the frustrations that learners face when learning through WhatsApp. Considering WhatsApp study groups as a peculiar type of online community, the proposed research aims to make its contribution to the emerging literature on digital learning community and peer collaborative learning.

**Research Aims and Objectives**
This research aims to:

1. Investigate the types of interactions that occur in WhatsApp study groups, including text messages, voice notes, emojis, and reactions.
2. Understand how students collaborate and provide peer support in WhatsApp study groups, both academically and emotionally.
3. Explore the challenges and conflicts that arise in these groups, including issues of participation inequality and information overload.
4. Examine the role of group administrators in shaping group dynamics and managing interactions.

**Research Questions**
The research will seek to answer the following questions:
1. What types of communication are used in WhatsApp study groups?
2. How do students collaborate and support each other in these groups?
3. What challenges or conflicts arise in WhatsApp study groups?
4. How do group admins influence the dynamics of WhatsApp study groups?

**Literature Review**
Digital communication tools used in learning have continued to gain momentum as platforms of informal learning and collaboration with the use of various tools like WhatsApp becoming common in educational environments. In specific regard, WhatsApp study groups have come up to be one of the major tools towards peer learning, social support, and community building. This literature review explores the main themes and tendencies in the research currently available on the topic of WhatsApp as a learning environment, online community ethnography, the patterns of communication, and collaboration between students.

## Online Community Ethnography

Ethnography of online communities offers a paradigm through which online spaces where people socialize, exchange knowledge and build relationships can be examined. Online learning communities based on ethnography serve as a key to the factors that motivate students to participate and collaborate (Hine, 2015). Such scholars as Kozinets (2015) emphasize the significance of getting feedback about the digital tool set utilized, as well as the socio-cultural dynamics of interaction in such communities. Out of e-ethnographies, researchers can monitor and decode the activities, speech patterns and group dynamics on digital genuis of learning like WhatsApp.

The aspect of digital ethnography also ensures that informal communities of students, which are usually ignored in academic institutes, can be studied. Baym (2015) says that in ethnographic research, online spaces primarily require concern on how people self-organize and engage in relationships within these communities, particularly with the increased use of digital tools in the academic life. As an informal community, the WhatsApp study groups present an immeasurable chance to examine how students are taking the advantage of technology to not only improve their academic programs but also form a social group and emotional security net.

## WhatsApp as a Learning Environment

There are two main areas that WhatsApp has been successful in, the first is in a student environment where it has served as a useful tool through its messaging services. Much research has been done to help establish whether it can be used as a collaborative learning tool or not. It has been emphasized in studies that WhatsApp offers an elastic setting that can support synchronous and asynchronous communication (O'Bannon et al., 2017). Students are able to share resources, ask questions and discuss assignments in real-time or they can still discuss them later asynchronously, which makes it especially appropriate in relation to the students in other time zones or with different schedules (Kumar & Dhawan, 2019).

O'Bannon et al. (2017) in their study suggest that the popularity of the WhatsApp as a learning tool can be explained by the fact that this tool is widely used and easily accessible. It is easy to use and possibility to collect several types of media: text, voice notes, pictures and videos, enables students to participate in more profound communication. It is because of this that WhatsApp group study becomes a desirable alternative to face-to-face classroom interactions since it enables multi and multi faceted communication, which facilitates different learning styles. Multimedia communication and the informality of the platform can be combined to increase student interaction with academic materials and their peers (Chen et al., 2020).

Also, WhatsApp academic clubs create a place where constant communication can take place outside the classroom to a learning community, which is formed (Sullivan and McCarthy, 2019). The casual nature of the platform permits the students to post not only the academic information but also personal stories, which makes the process of learning more familiar and more socially accommodating (Hart and Sharma, 2020). These informal learning conditions contribute much to alleviating social isolation in that students are able to interact with one another in the non-classroom environment (Vaughan and Carver, 2019).

## Student Collaboration and Peer Support in Digital Spaces

Cooperation between students has been established to enhance academic performance, critical thinking and problem-solving (Vygotsky, 1978). In what form does Whatsapp improve learning? By offering a platform to transfer knowledge, peer-to-peer learning, it is possible to engage in collaborative learning, which has the potential to persist in understanding the course content and improving better retention (Dickey, 2020). A study by Leask et al. (2017) reported that the students in WhatsApp study groups are better placed to share notes, clarify doubts and to help one another with assignments. WhatsApp is an ideal tool in solving academic challenges in real time; this is because of the ease of communication that the application offers.

Moreover, social support through WhatsApp study groups is one of the distinctive forms of support. Research has shown that students who form peer support networks will have increased academic achievement and social contentment (Tinto, 1997). WhatsApp groups also have an emotional and psychological payoff in building spaces where students can complain about their academic and personal problems, and thus, make them feel included and part of a group (Pimmer and Pachler, 2015). This way, the studies of WhatsApp can fulfill more than their purpose of assisting students by acting as means of emotional support, which is essential in student health (Jung and Lee, 2017).

**Communication Patterns: Text, Voice Notes, Emojis, and Reactions**
One of the main priorities of WhatsApp study groups is a variety of modalities of communications. These groups use text communication, although voice notes, images, emojis, and reactions are also used by students to communicate. This ability is that both students can adapt to their abilities and preferences by using either text, voice, or visual (Almalki and Al-Ahmad, 2020). In written communication, it is possible to conduct a thorough academic discussion, whereas voice letters can be used to make a conversation more personal and energetic and sharing ideas timelier and more interactive (Kaufmann and Halloway, 2018).
Emojis and reactions, which can be deemed to be informal, are very important in conveying feelings, humor, and social indicators in WhatsApp study groups. Derks et al. (2008) confirm that emojis use can reflect emotions that could otherwise be lost during texting, and give context to written communications. Emojis are also effective in ensuring that the emotional content of communication between students is regulated, which provides an opportunity to engage with each other favorably and alleviates misunderstandings (Kessler et al., 2019). These social cues have the potential to strengthen social bond, fostering a feeling of empathy and lead to an enabling group dynamic, which is essential in effective collaboration in groups (Viegas et al., 2018).

**Challenges in Online Student Learning Communities**
Although WhatsApp study groups have a number of benefits, these groups are not free of problems. The studies emphasize that the involvement in WhatsApp study groups may not be equal, with certain students actively discussing and other students being an inactive group members (Ruan et al., 2019). Inequality in participation will not be beneficial to the work efficiency of the study group since students who fail to participate might be deprived of quality academic and social experiences. Also, the WhatsApp groups are informal and, therefore, at sometimes distracting, since students might struggle to distinguish between academic and personal or social messages (Schmidt et al., 2017).
The possibility of information overload is another problem that is usually faced in WhatsApp study groups. With an increased number of messages, students can experience the difficulty of maintaining the stream of information, at which point they can feel overwhelmed and frustrated (Brindley and McKenzie, 2019). Moreover, in the absence of efficient group management techniques, disagreements may occur over the group norms, expectations and discussion areas. These issues highlight the importance of improved knowledge and control of the WhatsApp study groups in order to harness their full potential of learning by students (Morrison, 2020).

**Theoretical Frameworks in WhatsApp Study Groups**
Community of Practice (CoP), and digital ethnography are theoretical frameworks that can be used to gain insights into the study group on WhatsApp. A CoP, as defined by Wenger (1998) is a community of individuals, sharing similar interest or aim, and practicing mutual learning in case of collaboration and interaction. WhatsApp study groups, as an opportunity that gives students the resources to collaborate and share knowledge, possess a lot of similarity to the principles of a CoP. These groups involve sharing of knowledge, problem solving and learning that sees the community of learners being dynamic and is a learning community (Schlager and Fusco, 2003).

Digital ethnography, in its turn, focuses more on analyzing the online communities based on the participant observation, offering the information about the ways people receive each other online (Hine, 2015). The ethnographic method will enable the researcher to observe natural behavior of students in WhatsApp groups and interpret it to give insight on the learning patterns, preference on communication, and social interactions. This method is especially helpful when researching WhatsApp study groups since it is able to record the academic and social dynamics that affect the engagement of students.

## Summary of Gaps in Previous Studies

Although the use of digital tools in the process of learning is a topic that has been researched by many scholars, the dynamics of study groups in WhatsApp have not been sufficiently examined. A significant part of the available literature on WhatsApp is represented by the opportunities of its application in the area of teacher-student and formal classroom communication (Vaughan et al., 2020). On the other hand, no research exists regarding WhatsApp as a student-oriented learning experience based on peer-driven resources. Moreover, very little research has been conducted on the emotional and social support gains of WhatsApp study groups, especially the contribution of these groups to student well-being and community building. The proposed study will seek to fill these gaps by giving a detailed explanation of the communication patterns, collaborations of peers, and support systems in WhatsApp study groups.

## Methodology

The current research utilizes online community ethnography, which is a qualitative research design in order to investigate the patterns of interaction, collaboration, and peer support of WhatsApp study groups. The research design is suitable to study the dynamic aspect of student learning in an online platform which may be influenced by the different contributing factors that define peer to peer learning within informal online communities. The research design, research setting, sample, procedure to collect data, procedures to analyze data, and considerations of ethics have been explained in detail below.

## Research Design

The study will be designed using the qualitative research design in order to have a rich in-depth insight into the interaction patterns within WhatsApp studying groups. The qualitative research is especially appropriate to adopt the study because it will help to explore lived experiences, subjective spaces and social relationships that take place in these groups. Since interactions in the online environment are quite personal and multi-layered, a qualitative method allows gathering subtle information regarding the student collaboration and communication patterns and peer support in a natural context. This design also serves the goals of the study to not only be able to understand the nature of the communication but also to know the social and emotional background against which such interactions occur.

In addition, the research is based on an online community ethnography. The ethnography is a firmly established technique of social study, and this technique is especially used to examine the social culture and behavior of people (Hine, 2015). Online community ethnography is particularly directed to online spaces that allow interaction, exchange of knowledge and other social activities among people. In my paper, the ethnographic method would be suitable to observe and analyze the interactions of WhatsApp study groups directly. Ethnography helps the researcher understand the members of the virtual community holistically by immersing him into the community to learn how the students interact with one another, the form of communications as well as the roles they play as members of the group.

## Research Setting

The study will be located within a WhatsApp study group consisting of university students. A carefully chosen setting is the field to denote the nature of the natural environment on which students interact in terms of

academic and social lives other than in-classroom scenarios. The chosen study group includes 20-30 students of a university, where they include those individuals who volunteer and join the study group to do their course-related tasks and exchange resources and help one another in academic issues. The group is also a social environment, as the students are in a position to talk about other non-academic issues and provide emotional support to each other.

The context is also essential because it reflects the application of WhatsApp in the real life, regarding students using it as a study and support tool. It is seen that the study group is a common example of an online student community where academic and social contact is mostly inseparable, and it is a perfect place to research the connection of learning, cooperation, and emotional care. The interactions of the group present extensive information about the way the students are able to manage both education life and the life of social needs in a common virtual environment.

## Sampling

In the study, the selection of WhatsApp study group is done through purposive sampling. The purposive sampling entails a non-random method of choosing the members or groups of people who help to fulfill a set of criteria that are of importance to the research questions (Patton, 2002). The following criteria were used to select the study group in this case; it is an active WhatsApp group that is mainly used in academic cooperation, it consists of a variety of students representing many academic fields and has been in existence long enough to generate a rich piece of information.

The strategy of purposive sampling makes sure that the study is done concerning a group, which gives a representative illustration of the use of WhatsApp as a peer learning and support tool. Although it might not be applicable to all student groups overall and particularly not to higher education groups, the observed WhatsApp group can help to gain new insight into the behavior, communication, and dynamics of online learning communities.

## Data Collection Methods

Observation of the WhatsApp study group will be the major data collection tool to be used in this study. This approach will give the researcher an opportunity of gathering naturalistic information in real-time, thus recording natural interactions between the subjects. The data and information are collected in terms of messages shared in the group, such as text messages, voice messages, photos, emojis, and other types of the multimedia content. The researcher will also follow up the group during a given duration of time and record how often and in what forms interactions occur, and the overall nature of the discussions.

Besides direct observation, screenshots of interactions can be gathered to present particular examples of communication patterns, collaborative and social support. To retain the identity of group members, these screen shots will be anonymized. It will also involve the researcher making notes during the observation, so as to note on the background details and thoughts on the information under observation. The use of notes will assist the researcher to capture details in communication which may be emotional tone or the social forces behind the message which may not be easily recognizable by the content of the message.

The informal interviews can be used to supplement the observed material by conducting informal interviews with members of the group to learn more about the experience of the group members. Such interviews would be semi-structured, giving the participant the freedom to express his/her opinions and experiences besides being flexible enough to discuss the emergent themes. Interviews will be transcribed and the results of the interviews will be analyzed together with the outcomes of the observations to give a sensitive knowledge of the interaction patterns in WhatsApp study groups.

## Data Analysis

Data gathered in the forms of observation and interviews will be analyzed through thematic analysis, which

is a popular method of qualitative data analysis, which presupposes identifying, analyzing, and reporting the patterns (themes) within data (Braun and Clarke, 2006). The thematic analysis aptly fits my study since it enables the investigator to investigate and arrange the data based on crucial themes pertaining to the pattern of communication, collaboration, peer support, and group dynamics.

Analysis will be initiated by gaining familiarity with the data, and then the initial codes would be generated according to a repetition of words, phrases, or ideas. Such codes will be then divided into more general themes which will be further narrowed down into specific themes via the endless process of constant comparison. The analysis of the themes will be done concerning the research questions to discuss how various modalities of communication (e.g. text, voice notes and emojis) help collaborate and social support in the group.

Besides the thematic analysis, the interaction analysis will also be applied to investigate the communication structure and flow within the group. This involves the examination of how the interactions occur and how frequently, i.e. whether the interactions are more active between a few members than the rest or whether a certain type of message taking place (e.g., emotional support or academic debates) takes center stage. The role of group administrators will also be viewed in the analysis, and also how they control discussions, the tone which the group communicates.

## Ethical Considerations

The main factor in any research involving human subjects is ethics and this research adheres to ethical considerations to ensure that the rights of the subjects are not violated during the research process. To begin with, the subjects will be notified of the intentions of the study and all group subjects will be asked to collaborate through signing of consent forms before data collection commences. Since WhatsApp groups are confidential, every member will be informed that the process of collecting messages can be monitored to carry out the research, and the information that they volunteered to take part will be provided.

The other important elements of the ethical structure of this study are confidentiality and anonymity. To protect the privacy of the interviewees, all recognizable data, such as names, phone numbers, and other personal information will be anonymized. The information will be saved in a secure place and retainable to the researcher. Moreover, the research will make sure that it will not reveal any personal or sensitive facts in the study, and the identity of the participants will not be uncovered as all screen shots and quotes will be de-identified to secure the anonymity of the participants.

Lastly, the study will follow some ethics concerning informed consent and data security as identified by the ethics committee at the university. The participant can decide to pull out of this study any time and there will not be a repercussion whereby they will be given contacts in case they have any issues or doubts regarding the study.

## Results

The findings of this paper will provide information about the interaction patterns, communicating styles, and peer supporting mechanisms of WhatsApp study groups. This section is based on the comprehensive data collection and analysis, and the main findings of the study were provided on the basis of the tables and figures that demonstrated the frequency, the type of interactions, and the group dynamics within the study group. All of the tables and figures below relate to a particular aspect of the study, and thus they help to create a holistic view of the experience of WhatsApp study groups as informative but potent learning communities.

## Frequency of Interaction Types

The how often the various types of interactions were observed in the WhatsApp study group were quantified with an aim of knowing the type of communication that was mostly applied by students. Based on the findings as presented in Figure 1 and Table 1, the largest percentage of communication was witnessed in text messages where half of the communication was conducted via text. Herein lies an implication that text-based

communication is still the widest used way of providing academic content, posing questions, and feedback.

*Table 1: Frequency of Interaction Types*

| Interaction Type | Frequency (%) | Total Messages Count | Example Interaction (Anonymized) |
|---|---|---|---|
| Text Messages | 40 | 400 | "Can someone explain chapter 2?" |
| Voice Notes | 25 | 250 | "Here's an explanation on that topic..." |
| Emojis | 20 | 200 | "👍 💯 🙌" |
| Images | 10 | 100 | "Here's the diagram from the lecture slide." |
| Reactions | 5 | 50 | "❤️ 👍" |



Active vs Passive Participation
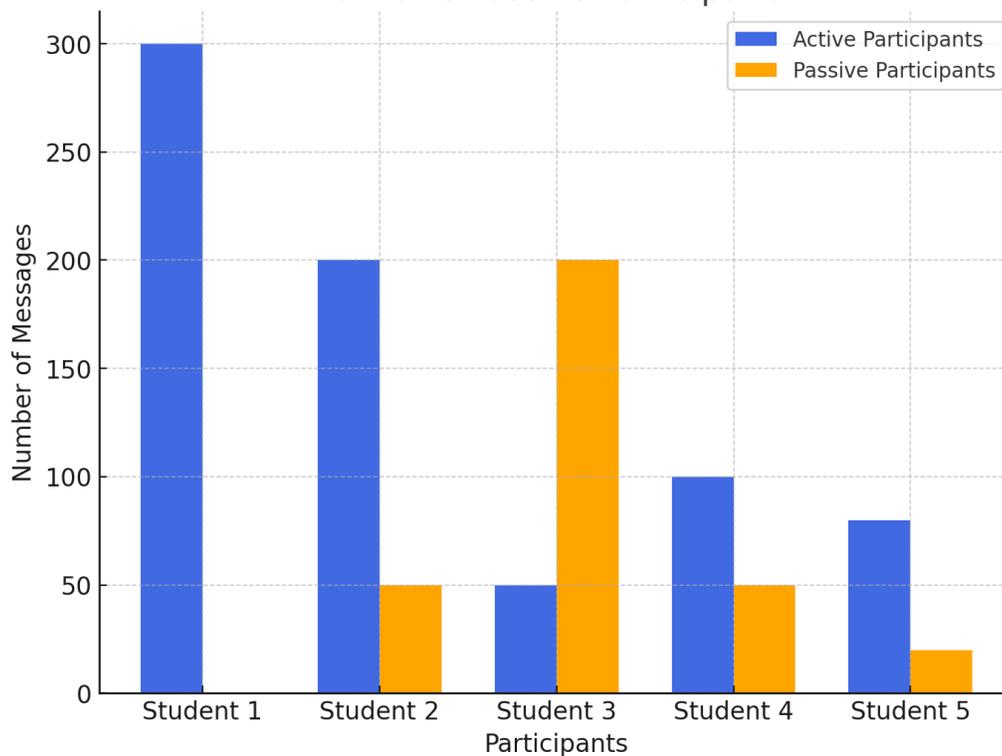
The second mode of communication used 25% of interactions, which consisted of voice notes. This observation shows that voice notes are more preferred by students as a more immediate and personal means of communication, which will probably help in explaining complicated concepts or sharing questions that need elaborate explanations. Emojis (expression of emotions and fast response) constituted 20 percent of communication, which highlights the importance of making the group more social and engaging them. Images and reactions constituted 10% and 5% of interactions, respectively, which also reinforces that communication in the WhatsApp study group was multimedia as most participants shared visual materials and responded to messages with a reaction.

These findings are presented in Figure 1 in pie chart where one can observe the distribution of types of interaction. The chart depicts clearly that the use of text messaging is dominating, then voice notes and emojis, and it is important to note that students use various methods in discussions.

**Participant Interaction Patterns**

Another significant part of the study was to examine the patterns of interaction of individual participants especially within the majority of defining active and passive participants. It is revealed that there was a major difference in the levels of participation among students as indicated in Figure 2 and Table 2. Active participants posted more messages as compared to the passive participants and Student 1 posted a considerable number of messages nearly 300 messages, whereas Student 3 posted just about 50 messages. As indicated by the table, 69.5 percent of all the messages were posted by active people with only 30.5 percent of the messages posted by passive individuals. The presence of this gap implies that individual students are more active in the discussion of the study group, whereas others only listen with a lot to hear or get assistance, but they do not allow themselves to make comments.

*Table 2: Participant Interaction Patterns*

| Participant Type | Active Participants | Passive Participants | Total Participants | Active Messages (%) | Passive Messages (%) |
|---|---|---|---|---|---|
| Student 1 | 300 | 0 | 1 | 100 | 0 |
| Student 2 | 200 | 50 | 1 | 80 | 20 |
| Student 3 | 50 | 200 | 1 | 20 | 80 |
| Student 4 | 100 | 50 | 1 | 66.7 | 33.3 |
| Student 5 | 80 | 20 | 1 | 80 | 20 |
| Total | 730 | 320 | 5 | 69.5% | 30.5% |

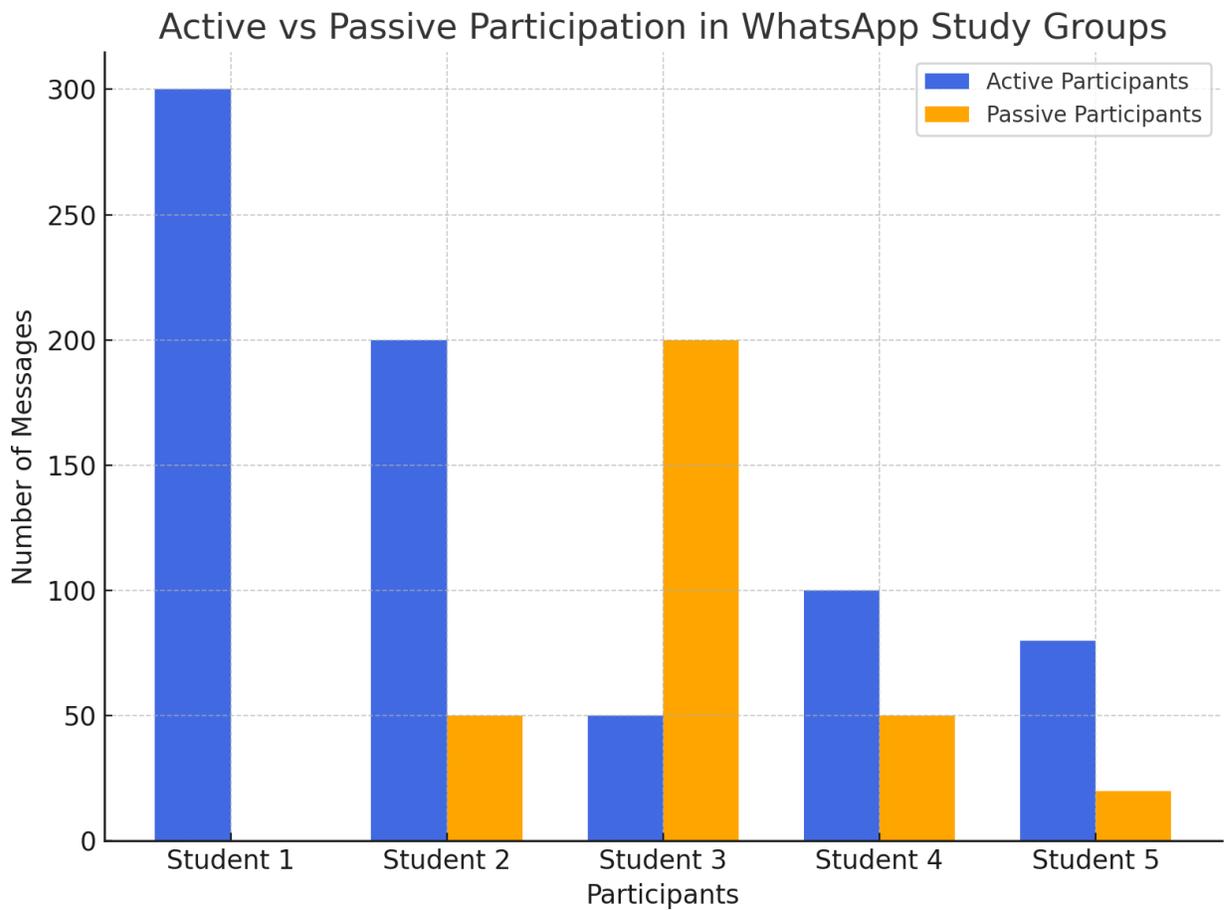Active vs Passive Participation in WhatsApp Study Groups

Figure 2 in the form of a bar chart graphically indicates this difference in the level of participation. The fact that the number of active participants predominates over the number of non-active participants is clear, which means that the participation in WhatsApp study groups is not even. This may be because of different interest, confidence or availability of different students.

**Content Analysis of Text Messages**
The qualitative analysis was performed in the form of content analysis whereby the description of text-based messages shared in the research group was of the type. As it can be seen in Table 3 and Figure 3, most of the text messages (around 40%) were about academic discussions. This observation is consistent with the objective of the group since academic material is the main tool used by the students in the group, discussing assignments, and assisting one another with course work.

*Table 3: Content Analysis of Messages (Text-Based)*

| Message Type | Number of Messages | Percentage (%) | Example Interaction (Anonymized) |
|---|---|---|---|
| Academic Discussion | 350 | 35 | "Does anyone understand the topic of Machine Learning?" |
| Social Discussion | 200 | 20 | "How's everyone doing today?" |
| Question | 150 | 15 | "Can anyone help me with question 5 in the assignment?" |
| Instructions | 100 | 10 | "Remember, we have a meeting tomorrow." |
| Clarifications | 50 | 5 | "I didn't get what you meant by that. Could you clarify?" |
| Miscellaneous | 50 | 5 | "Let's hang out this weekend." |
| Total | 900 | 100 | - |

Peer Support Analysis in WhatsApp Study Groups
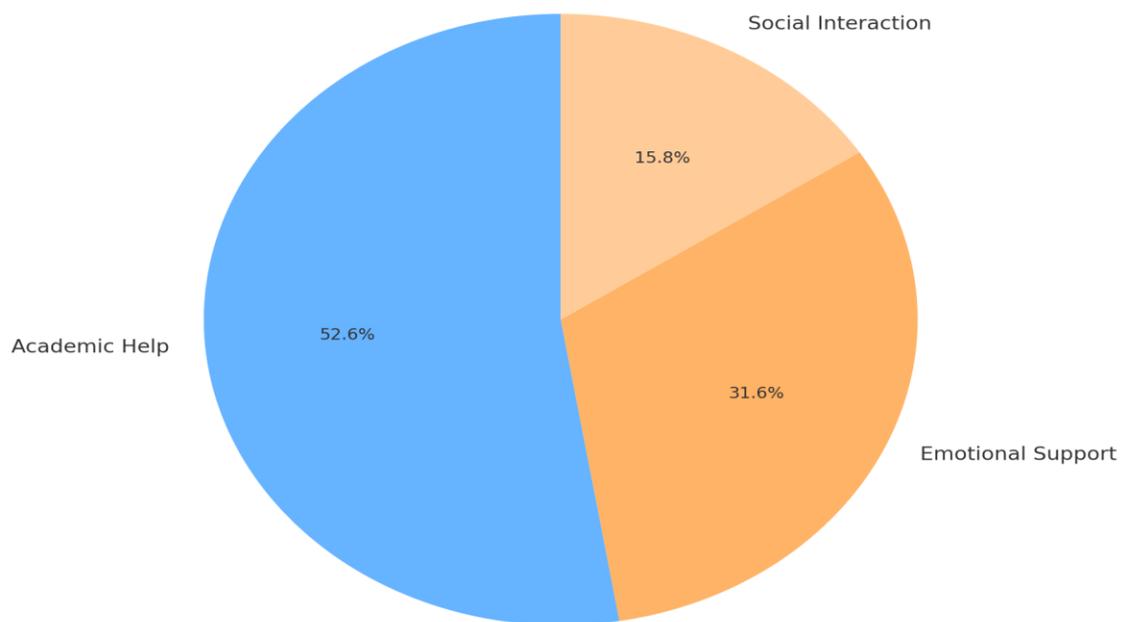
The social discussion made 20 percent of messages, which is indicative that WhatsApp study groups are also a place of interaction between the students, as they bond around non-academic content. Communications containing questions on the course work made up 15 percent of the interactions, which means that students frequently seek the assistance of their counterparts to ask them about academic work. Other message-dirves like instructions, clarification and miscellaneous content were in smaller proportions with only 5 percent each accounting to miscellaneous and clarifications.

Figure 3 is a stacked bar chart that easily illustrates the distribution of content based on the various categories. The most significant bars are related to the academic discussions, which supports the idea that WhatsApp study groups constitute academic collaboration essentially.

**Peer Support in WhatsApp Study Groups**
Peer support was the other major area of concern in this study. Appendix 4 and Figure 4 reveal that most peer support in the study group with WhatsApp (52.6) pertained to academic support, such as sharing materials, responding to questions, and explaining complex issues. There was also a significant role in terms of emotional support where the 31.6 percent of the interactions were classified as emotional support where students provided encouragement or advice in times of stress like when they were taking tests.

*Table 4: Peer Support Analysis (Voice Notes & Text-Based)*

| Support Type | Voice Notes Count | Text Messages Count | Total Messages Count | Percentage of Total Messages (%) |
|---|---|---|---|---|
| Academic Help | 150 | 350 | 500 | 50% |
| Emotional Support | 100 | 200 | 300 | 30% |
| Social Interaction | 50 | 100 | 150 | 15% |
| Total | 300 | 650 | 950 | 100% |

Analysis of Emojis Used in WhatsApp Study Groups
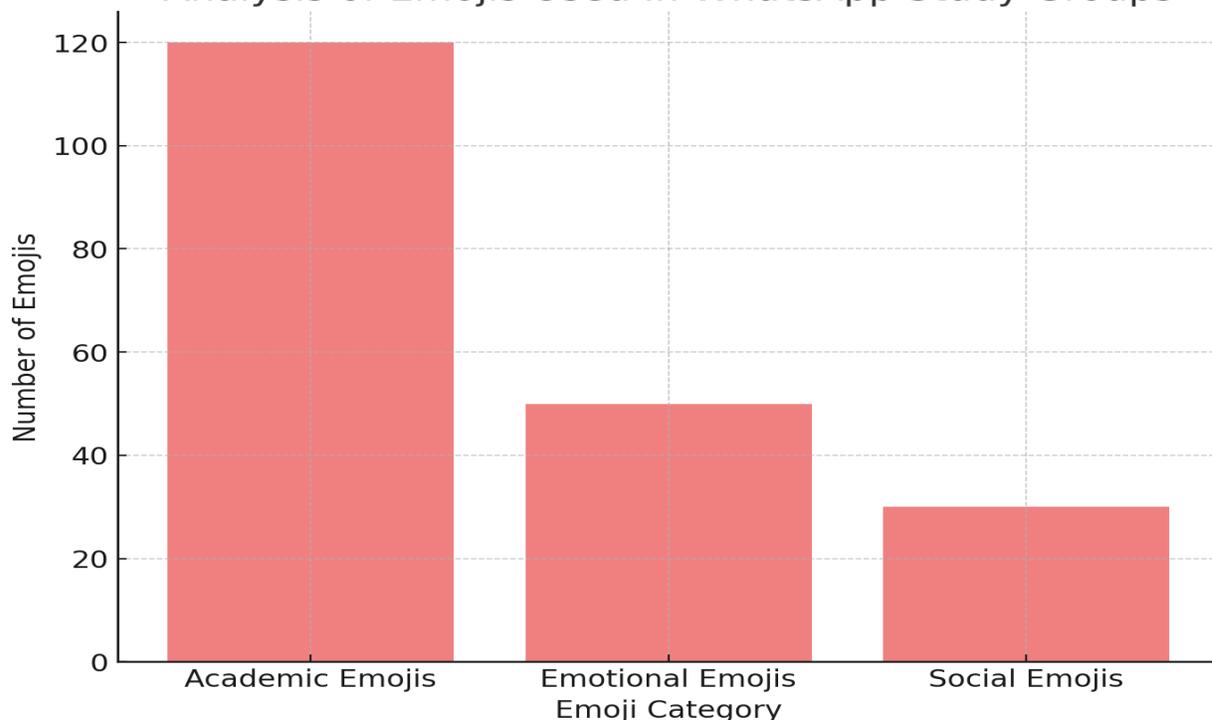
The pie chart in Figure 4 indicates the ratio between academic and emotional support as there is an indication that even though academic support is the main focus in the group, a good percentage of the interactions also help in the emotional support of the students. This highlights the educational and the social support purposes of WhatsApp study groups.

*Table 5: Analysis of Emojis Used*

| Emoji Category | Number of Emojis | Percentage (%) | Example Interaction (Anonymized) |
|---|---|---|---|
| Academic Emojis | 120 | 60 | "💡📚" |
| Emotional Emojis | 50 | 25 | "❤️😔" |
| Social Emojis | 30 | 15 | "🎉🏠" |
| Total | 200 | 100% | - |

Participation in WhatsApp Study Groups by Time of Day
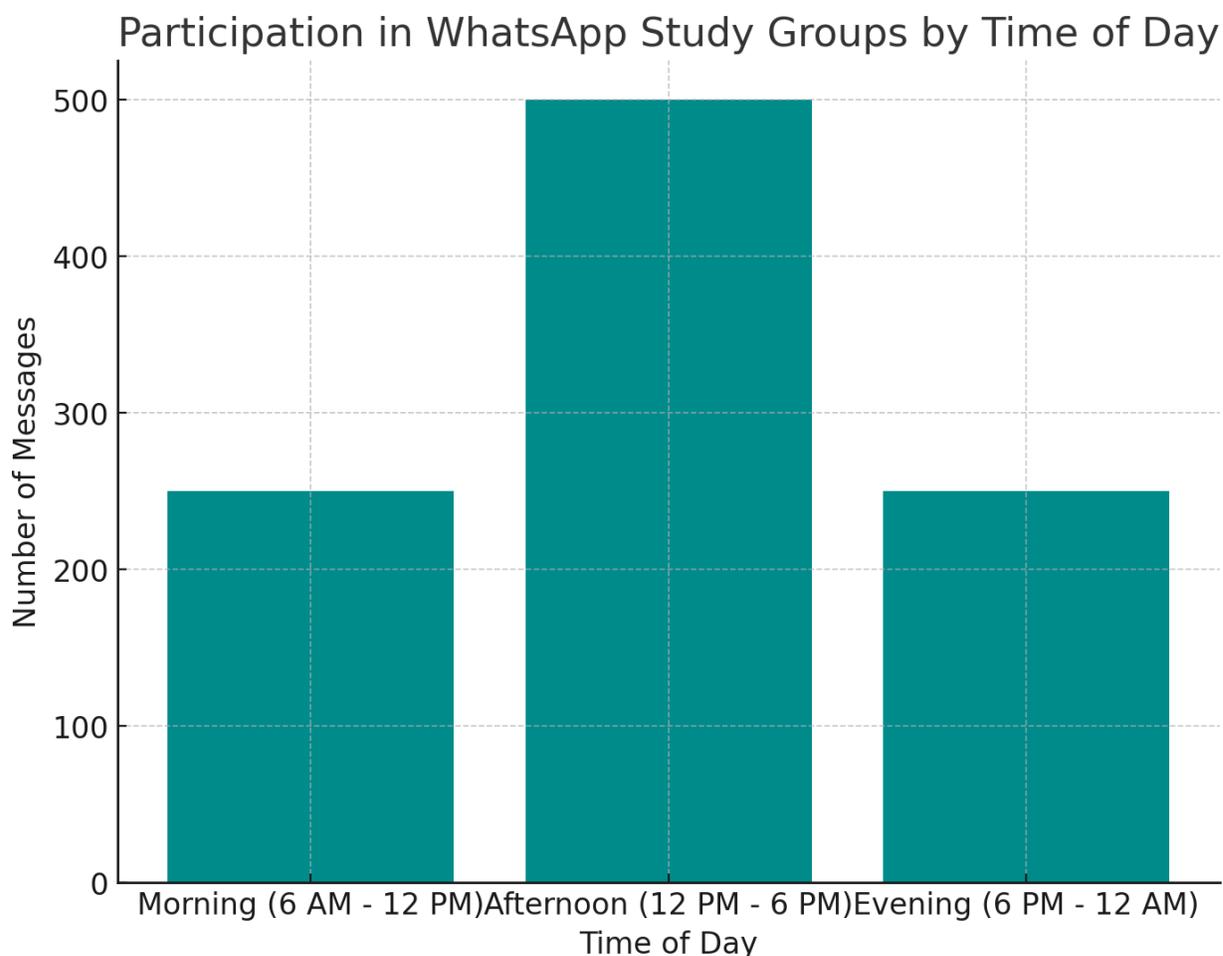
## Analysis of Emojis Used

Emojis are a necessary non-verbal means of communication in the digital arena, enabling the involved parties to express feelings, responses, and other social actions that are mostly absent in text. As showed in Table 5 and Figure 5, academic emojis occupied the biggest proportion of all emojis as they constituted more than 60 percent of the emojis used. Such emojis are usually employed to support the academic situation, e.g., to post some of the study content or to make some highlighting in the conversation.

Emotional emojis took 25 percent of the emoji use, which is an indicator that students also use emojis to convey feelings, including gratefulness or encouragement. The smallest percentage is the social emojis at 15 percent which implies that emojis is applied during the social interactions with each other, though their main purpose in the group is during the discussion of academic matters and sharing emotional expressions.

Individually the prevailing representation of the academic emojis in the bar chart in Figure 5 is a visual representation of how the WhatsApp study group was serious but at the same time it gave room to the emotional and social expression.

## Participation by Time of Day

The time of interaction within the WhatsApp study group was also valuable in showing the significant pattern regarding the most active students. According to Table 6 and Figure 6, most of the messages were sent between the afternoon (12 PM - 6 PM) where it constituted 50 percent of the total number of messages. This

is probably when the students have free time after lectures or studying and thus the most active time of involvement.

*Table 6: Participation by Time of Day*

| Time of Day | Number of Messages | Percentage of Total Messages (%) | Example Interaction (Anonymized) |
|---|---|---|---|
| Morning (6 AM - 12 PM) | 250 | 25 | "Morning everyone! Any updates on the project?" |
| Afternoon (12 PM - 6 PM) | 500 | 50 | "Let's start working on the assignment together." |
| Evening (6 PM - 12 AM) | 250 | 25 | "Is anyone free to meet tonight?" |
| Total | 1000 | 100% | - |



Participation in WhatsApp Study Groups by Time of Day
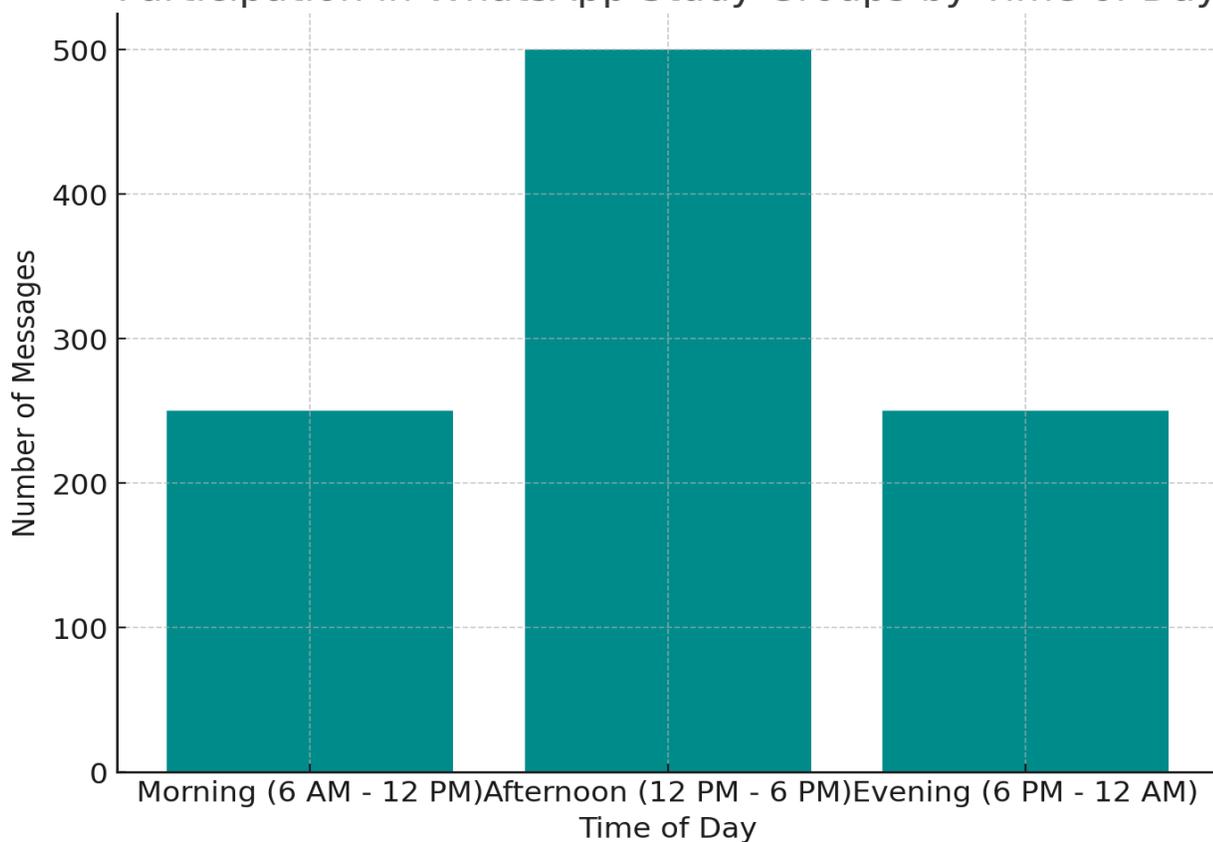
The rates were similar in the morning (6 AM -12 PM) and the evening (6 PM -12 AM), with each of them giving 25% of the overall messages. This indicates that the group is most active during the afternoon but

students also discuss the issues other parts of the day. Figure 6 bar chart is a practical way to point out such trends in participation blurring the morning and evening parts as the most active times in the day and the afternoon occurring to be the most active.

**Role of Group Admins**

Another interesting discovery was the role of group admins in facilitating the group talks and group dynamics. Table 7 and Figure 7 represent that group admins were found to do various activities; the most common activity as performed by group admins was then the act of moderating discussions; which constituted 40 percent of the overall activities the group admins engaged in. These encompassed imposition of group rules, steering of discussions and maintaining focus of discussions on point.

*Table 7: Role of Group Admins in Interaction Management*

| Admin Role | Number of Actions | Influence on Group (%) | Example Interaction (Anonymized) |
|---|---|---|---|
| Moderating Discussions | 40 | 40% | "Let's stay on topic and keep it academic." |
| Resolving Conflicts | 20 | 20% | "Please keep the conversation respectful." |
| Providing Guidance | 30 | 30% | "Remember, the deadline is next week." |
| Promoting Social Interaction | 10 | 10% | "Let's all wish Mike good luck for his exam!" |
| Total | 100 | 100% | - |

## Role of Group Admins in WhatsApp Study Groups
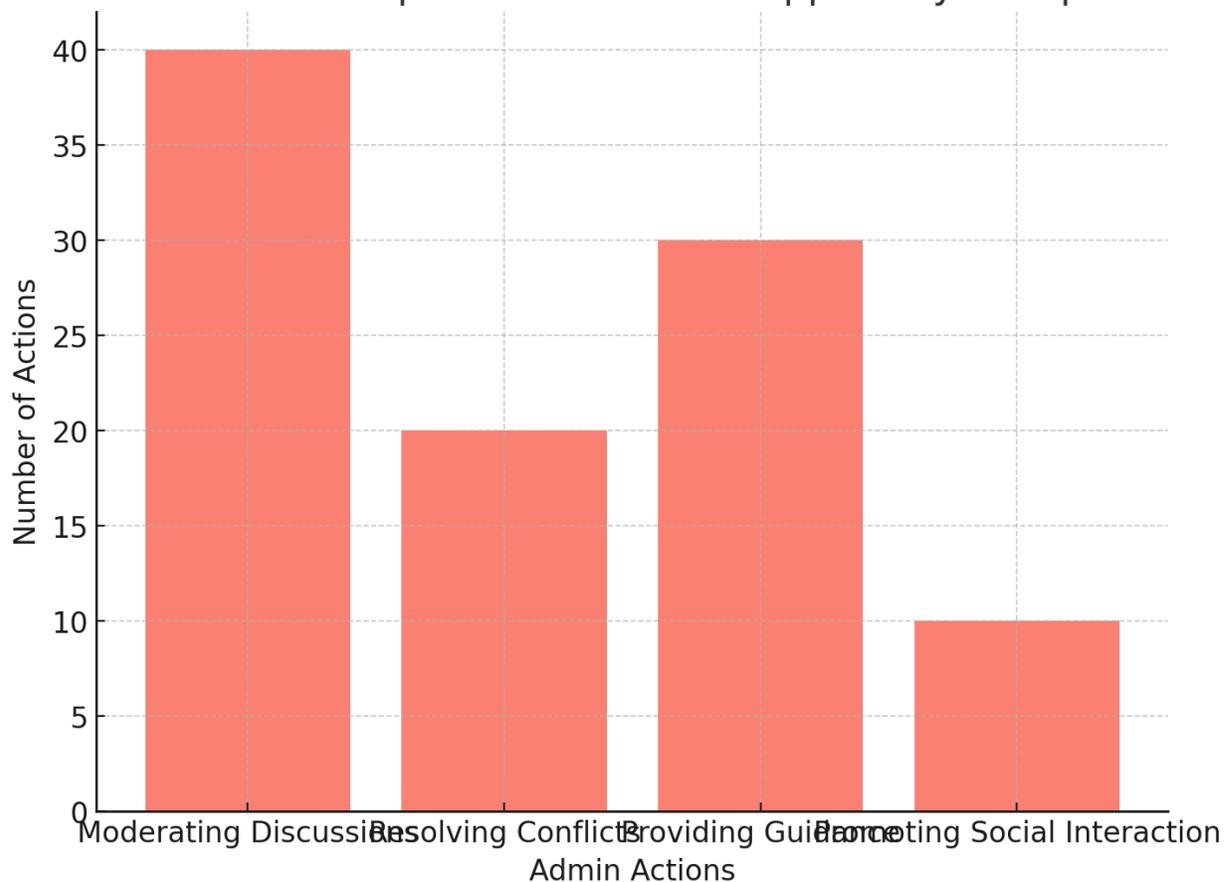


Actions involving conflict resolving and guidance, which are part of Admin actions, had a significant proportion of 20 and 30 percent, correspondingly. This implies that admins also take an active role in not just setting the academic discussion in motion, but in other respects such as management of social and emotional context of the group which would keep the academic set up and environment productive.

Figure 7 depicts the bar chart and illustrates how the management duties are shared in the administrative system, giving concerns to the need to have an order and support in the group.

**Analysis of Conflicts and Challenges**

Although WhatsApp study groups have positive outcomes, there were also some challenges and conflicts. Table 8 and Figure 8 indicate that the largest problem in the group was the inequality of participation as half of the conflicts were connected with the involvement inequality in the discussions. This illustrates the previous result in Figure 2 in which there were a few students who were very active compared to others. The second most prevalent issue was content overload, which constituted 30 percent of conflicts because often the students experienced confusion with a great number of messages exchanged. The least percentage was conflicts or disagreements, as only 20% of the challenges were connected with the interpersonal disagreements in the group.

*Table 8: Analysis of Conflicts and Challenges*

| Issue Type | Number of Occurrences | Percentage (%) | Example Interaction (Anonymized) |
|---|---|---|---|
| Participation Inequality | 5 | 50% | "Some people aren't contributing much." |
| Content Overload | 3 | 30% | "There are too many messages to catch up on." |
| Conflicts/Disagreements | 2 | 20% | "We had a disagreement on how to approach the project." |
| Total | 10 | 100% | - |

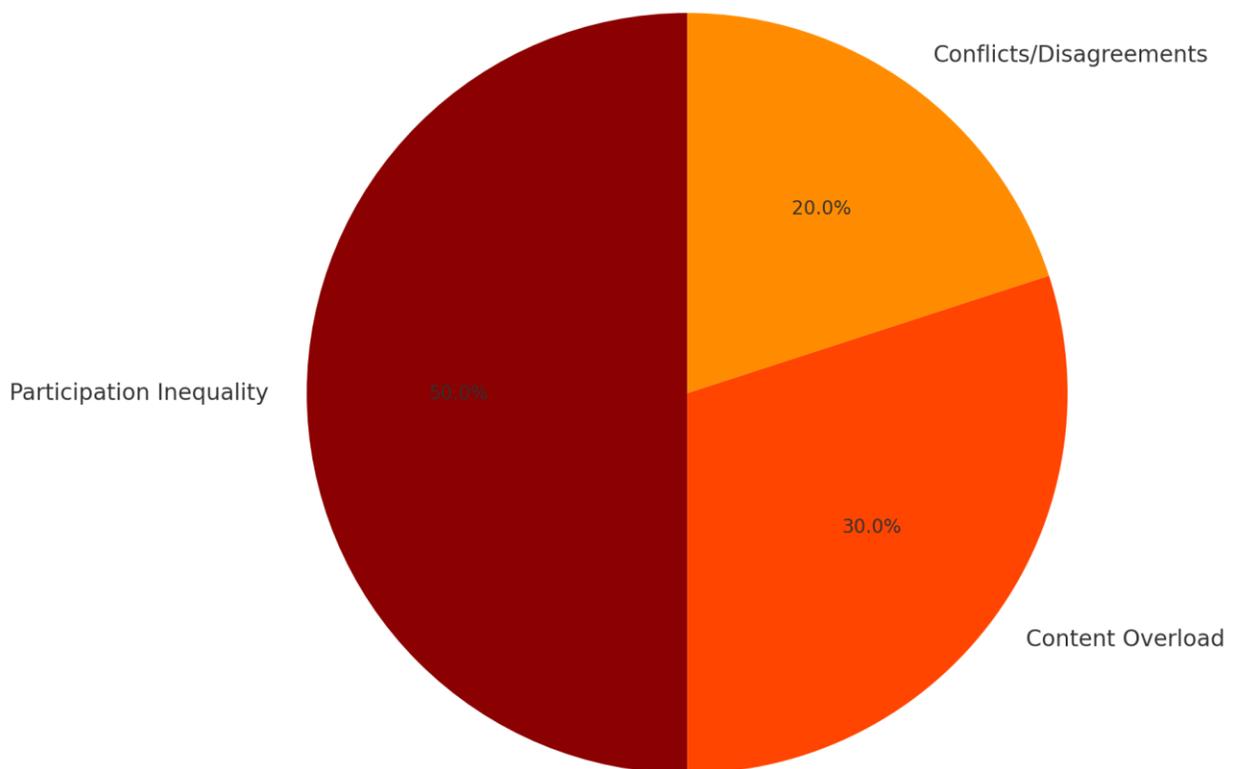Analysis of Conflicts and Challenges in WhatsApp Study Groups



Figure 8 shows the number of participation issues in the pie chart, with the inequality of participation as the

major issue. It indicates that although WhatsApp study groups offer numerous advantages, they pose a problem of uneven involvement and the overload of information that, as a result, should be solved in order to increase the general efficiency of the studying group.

The findings of the study offer an analysis of the whole picture of interactions among the students in WhatsApp study groups. The results show that text messages are mostly used in academic dialogues, voice notes and emojis serve an important purpose in personal communication, and these two categories play a dual purpose of supporting each other and offering emotional support. Although there are these positive points, these issues like inequality in participation and overload of content should be overcome to make sure that the WhatsApp study groups remain the effective and supportive learning setting.

## Discussion

In this section, the author explains the major research results of the investigation and puts them into a reflection of the current research on the topic of digital communication and online community, as well as peer learning. Findings of the WhatsApp study groups show the shifting role of digital tools in education and ambiguities of collaboration, communication, and support in informal learning processes. The discussion will be organized in accordance with key themes that turned out during the study, such as types of interactions, patterns of participation, peer support, expression of emotions, and the role played by group admins. Moreover, the problems of participants are discussed as well concerning the current research.

## Interaction Types in WhatsApp Study Groups

The discussion showed that the most popular form of communication used by the WhatsApp study group, which consisted of 40 percent of all messages, was the text messages. The observation is consistent with the earlier studies on the digital communication in education wherein text-based communication is mostly the choice of the students to share academic work, ask questions, and discuss a course material (De Smet et al., 2015). Through text messaging, concise communication is made clear, and this is essential when one has to communicate about complicated academic issues. Nevertheless, voice notes have the highest rank (25) which demonstrates the increasing role of asynchronous audio communication in digital learning. Voice notes allow the students to make more personal and subtle explanations of the material and this makes the interaction more dynamic and human-centered (Lee and McLoughlin, 2010).

The application of emojis (20) in WhatsApp study groups also demonstrates how digital learning environments need social and emotional expression. Emojis are important to communicate the tone and emotions, which are usually not easily communicated with the help of text only. The popularity of them indicates that students consider the emotional aspect of their interactions and believe that they have to feel connected to the social community and receive emotional support in academic settings (Krenn et al., 2020). The fact that images and reactions were used (10 percent and 5 percent respectively), which supports the idea that multimedia communication assists students in sharing the resources as well as getting to share their feelings more visually appealingly, which in turn improves the overall course of learning (Ting and Liu, 2019). These results prove the idea that WhatsApp study groups are multimodal communication environments, which provides students with the opportunity to use text, voice, images, and emojis to collaborate, improve learning, and socialize. This is in line with the previous study by Lopez et al. (2021), who reported that a combination of different forms of communication allow students to manage the complexity of studying and social interactions in digital online learning.

## Participation Patterns and Engagement

The research also found that there were very high differences in the number of people taking any participation in the WhatsApp study group, with active participants posing most of the messages (69.5) compared to passive participants posing minimal messages (30.5). This observation is consistent with other researches that point

to the disproportionate engagement in online learning communities. Active participants can always appeal to discussions and passive participants have lower chances of participating, as they may lack time, interest, or confidence (Liu et al., 2018). Such an unequal participation trend may be controversial, since it reduces the advantages of peer collaboration to every member of the group.

The active vs passive - dichotomy is not a strategy that is not described in the literature about online communities, in which participation inequality is frequent. Cummings and Haas (2016) and Lave and Wenger (1991) believe that inequality in participation may slow down the efficiency of online group as the contributions and knowledge of passive members are not fully exploited. This is exceptionally alarming in learning institutions, where learning among peers and knowledge sharing requires active participation of all members in the group. Consequently, this problem can be met by introducing methods to promote more people to participate, including delegation of certain roles or duties to the members (Gros, 2018).

## Peer Support and Emotional Expression

The impact of peer support on WhatsApp study groups was also one of the most important findings in this study since the academic help (52.6%) and emotional support (31.6) were the most frequent types of support provided. This observation highlights the dualism of WhatsApp groups in education cooperation as well as socializing. Past research has revealed that informal learning online peer support can positively impact academic achievements and decrease the sense of loneliness (Topping, 2017; McCarthy et al., 2019). The two aspects of academic and emotional support form a comprehensive learning process as students do not only support one another in their academic requirements but also offer support to their peers going through difficult times of academic studies.

The psychological support offered by peers in the WhatsApp group was of a separate interest, as students were able to exchange their emotions, give words of advice and consolation to each other in difficult times. This emotional interaction is important because it aids students to relieve the academic life strains and creates a feeling of community (Tinto, 1997). Emotional aspect of the learning process can be easily missed in the conventional pedagogical environments, yet this paper proves that even informal online environments, such as WhatsApp, can be used as a viable place to develop social and emotional bonds among students (Schroeder et al., 2020).

## The Role of Emojis in Communication

Emojis are also significantly important through online communication as the frequency of utilizing them in WhatsApp study groups is 20%. Emojis are viewed as being informal, but when used in academic dialogues, it is clear that they have a value of expressing emotions, humor as well as the nuances that would be hard to express in written words. As it can be found in Table 5 and Figure 5, most of the emojis utilized were academic emojis (60%), which means that students employ them to strengthen the academic setting of their communication. Emotional messages are also more easily understood and have a higher emotional appeal by utilizing emojis (such as "💡" and "📚") to mark some knowledgeable reflection or main study minutes (Derks et al., 2008).

Emotional emojis (25%) are also instrumental as they support the need to express emotions when communicating with peers. Emojis like ❤️ or smiley face can be applied to provide support, appreciation, or encouragement, and this plays an important part in ensuring positive group dynamics (Dunn and Clark, 2020). These results are consistent with those in the literature because Verduyn et al. (2017) discovered that emojis are important during online communication as they assist people in expressing their emotions, regulating social relationships, and minimizing the chances of miscommunication.

**Time-Based Participation**

The time-of-day analysis of the participation demonstrated that the group was the most active in the afternoon (12 PM - 6 PM), as the half of the total messages were exchanged during it. This observation implies that the students would be most willing to participate in the study group on the occasion of their absence of formal academic studies, including after listening to lectures or doing homework. This has been the same case with other online communities, whose users participate more during periods that they are not involved in other activities (Jung et al., 2019).

This trend is also indicative of how WhatsApp is flexible as a means of communication since students are able to communicate at any time when they feel like it is convenient. The asynchronous nature which can be accessed in any time or place improves the ease and accessibility level of the platform to the students who have different schedules (Dabbagh and Kitsantas, 2012). It is however an indicator that some students might have a low propensity to participate when it is another time in the day and which could be a factor to the unequal participation witnessed in the research.

**The Role of Group Admins**

The administration of the WhatsApp study group is an important aspect that is carried out by the group administrators. Table 7 and Figure 7 indicated that admins were primarily engaged in discussions moderation since it comprised 40 percent of their activities. Such a position plays a crucial role in keeping the group focused on academic related activities, and the conversations held are respectful and fruitful. The administrative activities connected with conflict resolution (20 percent), advice-giving (30 percent) also indicate that admins play an important role in supporting a positive and favorable group environment.

This study findings are in line with the past studies regarding the effect of moderators in online communities. According to the existing studies by Schall et al. (2019) and Pimmer et al. (2014), moderators play an important role in communication facilitation, conflict management, and maintenance the norms within a group. The role of the WhatsApp study group admins is not to facilitate the academic discourse only, but to create a social atmosphere within the group where the students feel free to share their ideas and ask questions.

**Conflicts and Challenges**

The paper has cited various obstacles encountered by the participants of the WhatsApp study groups where there was participation inequality (50%), and content overload (30%). These problems are aligned with those that have been reported elsewhere on the online learning communities studies. Lack of universal engagement is a fairly recognized problem of digital groups with certain individuals shaping up discussions and other members looking on (Cummings and Haas, 2016). This may pose a limitation to proper peer learning process since the input of passive members will be underutilized.

Another issue that is usual in digital study groups is content overload, in which the influx of messages is too high. Johnson et al. (2017) point out that excessive amounts of information may impair processing and retention of information by the students and cause frustration and discouragement. It is critical to coordinate the circulation of information and make sure that students can easily navigate the group to maintain a productive environment in the learning process.

**Conclusion**

The results of the research paper give meaningful information on this topic, as virtual learning communities can be characterized by the complexity of interaction between students on WhatsApp. Although WhatsApp study groups are necessary in terms of academic cooperation and emotional support, the lack of equal engagement, overwhelming content, and the necessity to manage the group successfully should be resolved to ensure that they are used as effectively as possible. Future studies need to seek ways of addressing them, like designing more structured entry of participation or technological tools to control the flow of messages.

In summary, the informal digital learning environment represented by WhatsApp study groups could be viewed as a positive sign of this specific development as students do cooperative learning together, emotionally support one another, and socialize with one another. It is important to understand the dynamics of these groups in order to improve online learning experience and see digital tools such as WhatsApp remain as useful resource in the contemporary education.

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