

*Effectiveness of Using Smartphone Instant Messaging (IM) App for Academic Discussion in an Undergraduate Chemistry Course*

Mei Xuan Tan, Singapore University of Technology and Design, Singapore  
Eng Ying Bong, Singapore University of Technology and Design, Singapore

The Asian Conference on Education 2020  
Official Conference Proceedings

**Abstract**

In this study, the effectiveness of using a smartphone instant messaging (IM) app (WhatsApp) for academic discussion for a first year half-credit Chemistry course in SUTD was examined. Academic discussion during and after instructional teaching is an integral part of learning. However, only 32% of the student participants had used online platform, such as Piazza and forums in Learning Management System (LMS), for after-class academic discussion with their instructors and peers. At the end of this study, over 83% of the participants felt that WhatsApp was a more effective platform compared to other online forum. The study also looked at the challenges of using WhatsApp for academic discussion and its effect on face-to-face interaction between instructors and students. In conclusion, the use of IM platform for academic discussion was desirable for the students, but it should not be the only channel as face-to-face consultation and online forum for lengthy discussion are still important for after-class learning of students.

Keywords: Pedagogical Tools, Student Engagement, Academic Discussion, Smartphone App, Instant Messaging, Undergraduate

**iafor**

The International Academic Forum  
[www.iafor.org](http://www.iafor.org)

## **Introduction**

Academic discussion during and after instructional teaching is an integral part of learning. Such discussion between the instructor and student or peer-to-peer discussion can be in several different forms. It could be face-to-face discussion, via email, use of online discussion forum or instant messaging (IM) platform such as WhatsApp (Bere, 2012).

Many universities and education institutes have taken advantage of the easy accessibility of smartphones and convenience of smartphone apps to enhance their teaching (Jimoyiannis *et al*, 2013). Smartphones apps can be used in addition to traditional classroom or lecture teaching for sharing of information, files and discussion (Barhoumi, 2015; Ally & Prieto-Blázquez, 2014). In a study by Gon and Rawekar, they found that the learning outcomes of mobile-learning (or m-learning) through text, photos, audio and small video clips via WhatsApp is as effective as traditional instruction through lectures (Gon & Rawekar, 2017). In addition, students attributed their heavy use of WhatsApp to its ease of use, speed, real-time communication, sharing media content (e.g. images, videos etc.) and low cost (Ahad & Lim, 2014).

The use of smartphones has become ubiquitous and most university students in Singapore possess a smartphone (Tan & Teo, 2015). Smartphones have increasingly become part of our lives and students who own smartphones spend a considerable amount of time on their smartphone devices (Lin, Chiang, & Qiang, 2015). When teaching the Chemistry courses of Freshmore (Year 1) in SUTD, we noticed lower activity in online forums for academic discussions. These include forum features in Learning Management Systems (LMS) and specialised online forums used by instructors for their course. We attribute the lower activity in online forums to being a more formal platform, being less accessible and requiring login info on web browser. We seek to find a frequently accessed and less formal platform for academic discussion with the students. Instant Messaging (IM) apps are popular amongst smartphone users. The most widely used IM app in Singapore during the period of this research is WhatsApp, with 70% of the Singapore population being users (Hootsuite, 2018). The use of WhatsApp in education does not require special infrastructure as students own the hardware (i.e., smartphones) and they can download the software (i.e., WhatsApp) for free. In this study, we examine the effectiveness of using WhatsApp for academic discussion for a first year half-credit Chemistry course that runs over 6 weeks during the Term.

## **Methods**

### **Use of WhatsApp**

The Chemistry course is a core module for first year students. About 450 students enroll in the course each year. This study was run over two years with two different batches of students. Participation in the study was voluntary and were recruited within the first week of the term. They signed a consent form and given a choice to remain anonymous by removing their WhatsApp profile photo and profile name during the activity. Participants provided their contact details and were added to a WhatsApp group that is managed by the course instructors. For the study, the number of

participants for each run was capped at 50. The study was announced at the start of the term, and students sign up on a voluntary basis. A total of 15 students volunteered in the first year of this study and 24 students volunteered in the second year. The activity of the WhatsApp group was monitored by two instructors, who are also the moderators of the group chat. The instructors responded to questions and encouraged discussion amongst the students. Students could respond to any discussion or the instructor could also prompt answers from specific students by replying to specific message in WhatsApp. Practice questions in the form of files and images were also shared via WhatsApp by the instructors to encourage and motivate active discussion among the students. Solutions to the practice questions were released at the end of the discussion. The additional practice questions are supplementary; students could choose not to study the materials if they felt they were familiar with the topics. This platform is not only limited to academic discussion, but also extended to any form of administration of the course such as homework due date and course announcements.

## Survey

At the end of the course, the students participated in an online survey to evaluate their experience of using WhatsApp for academic discussion. There are a total of 26 questions. The survey has a total of four sections with regards to the use of WhatsApp for academic discussion: 1) Familiarity with WhatsApp, 2) Effectiveness of using WhatsApp for discussion, 3) Challenges and 4) Overall Experience. There are five questions related to the familiarity of the students on the use of WhatsApp. These questions include asking for their frequency of usage prior to this study, previous use of WhatsApp in education setting and their preference of the type of discussion forum. Ten questions, including one open-ended feedback question, were asked to evaluate the effectiveness of using WhatsApp as a discussion forum. The questions include asking participants if the group chat and use of multimedia (photos, files, hyperlinks) helped them in better understanding of the concepts and clarifying the questions asked. They also had to evaluate if this platform has encouraged or hindered face-to-face interaction with their instructors during and after class. In the section of Challenges, students are asked if their participation in this study affected the time spent on mobile devices and whether it has distracted them during lesson time. Other challenges being evaluated include whether participants have difficulty referring back to a previous discussion and whether they find some discussion irrelevant to them. Lastly, for overall experience, five questions including an open-ended question were asked to evaluate the overall effectiveness of using WhatsApp as a discussion forum, whether they have actively participated during the study and whether they would recommend this form of discussion forum to other courses and their peers.

## Results and Analysis

### Familiarity with WhatsApp

Based on the survey results, all the participants have installed and used WhatsApp on their smartphones prior to the study. Over 85% of the participants use WhatsApp frequently, more than 8 times a day or every 1 to 2 hours. 23% of the participants have previously used IM platform for academic discussion between instructors and students; 50% have used IM platform for relaying course information, but not for

academic discussion; while the remaining 27% have not used IM group chat with their instructors before. (Figure 1a)

32% of the participants have used other online platform, such as Piazza and forums in LMS, for after-class academic discussion with their instructors and peers. This is a low percentage considering that some courses use such online platform as their main forum amongst instructors and students. 83% of the participants felt that WhatsApp is a more effective platform compared to other online forum. (Figure 1b)

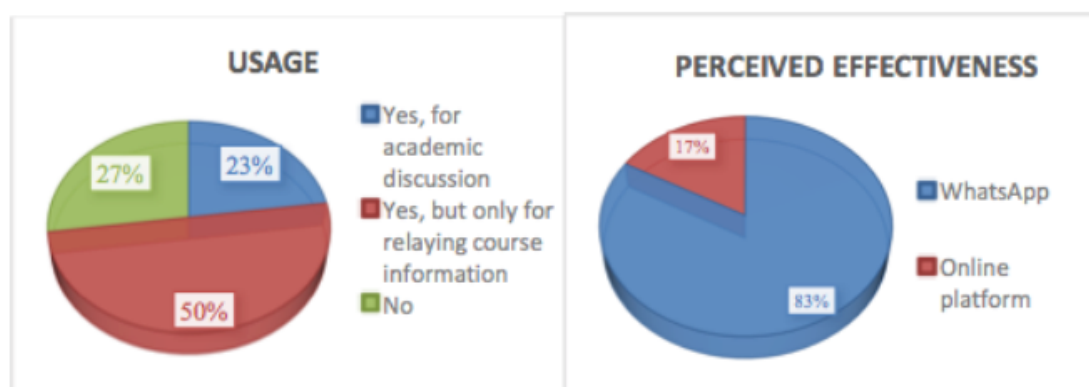


Figure 1. Responses of participants in survey: (a) Section 1 on Familiarity with WhatsApp, Question 3: “Have you previously used WhatsApp or other smartphone instant messaging platform for academic purposes between faculty/ teachers and students?” (b) Section 2 on effectiveness of using WhatsApp for academic discussion, Question 5: “Which of the following platform do you feel is more effective as an educational tool for after-class academic discussion?”

### Effectiveness of Using WhatsApp for Discussion

The main purpose of using an IM platform for academic discussion is to encourage after-class discussion amongst the students. 59% of the participants agreed that after-class discussion on WhatsApp has helped them better understand certain concepts taught in class. 31% were neutral about this and 10% disagreed. 37% of the participants agreed that WhatsApp group chat has facilitated them to ask more questions or participate in more discussion than without the group chat. 55% were neutral, which indicated that the use of WhatsApp did not change the frequency of their participation throughout the course.

Previous studies have found that the use of IM has increased the face-to-face interactions between instructors and students in a lecture-based course (Cifeuentes & Lents, 2010). To find out if the WhatsApp group chat has affected how the students interacted face-to-face with their instructors, participants were posed two survey questions. The first question (Question 9) asked if their participation in WhatsApp has encouraged them to approach their instructors for face-to-face interaction. 18% disagreed while 27% agreed or strongly agreed that they were encouraged to approach their instructors. A second question (Question 10) asked if after-class academic discussion on WhatsApp has reduced the frequency of face-to-face interaction that they could have with their instructors. Interestingly, a total of 36% strongly disagree or disagreed with this, 27% were neutral and 36% agreed or strongly agreed with having reduced frequency of face-to-face interaction with their instructors. This result

is an interesting aspect of this study. 27% of the students agreed that the use of WhatsApp as a discussion forum has encouraged them to approach their instructors during or after class. 55% of students answered neutral. This can be interpreted that the use of WhatsApp has not affected the frequent (or lack of) face-to-face interaction with their instructors. The 18% who disagreed found that they were not encouraged to approach the instructors with the use of WhatsApp. A second question, similar but phrased differently from the first, was asked to evaluate the aspect of face-to-face interaction with instructors. 36% disagreed that the use of WhatsApp had reduced the frequency of face-to-face interaction. This could imply that the frequency remained the same or might have increased. A similar portion of 36% who agreed to a decrease in face-to-face interaction have either asked the questions in WhatsApp or had their questions answered by a query from another student in the group chat. These outcomes suggest that the use of technology aids and complements face-to-face interaction between instructors and students.



Figure 2. Responses of participants in Section 2 on Effectiveness of Using WhatsApp for Discussion of survey: (a) Question 9: “After-class academic discussion on WhatsApp has directly or indirectly encouraged me to approach my instructors for face-to-face interaction.” (b) Question 10: “After-class academic discussion on WhatsApp has reduced the frequency of face-to-face interaction that I could have with my instructors.”

## Challenges

There were some challenges with using WhatsApp as a platform for academic discussion. The main challenge was the messaging layout, which was not designed for Question & Answer format. Despite having a search function in WhatsApp, 45% of participants agreed that they find it hard to refer back to a previous discussion in the WhatsApp group chat, while 32% were neutral regarding this. 23% did not find it difficult to refer back to a previous topic. At the start of the study, instructors were concerned about students’ privacy issues. However, we found that a vast majority of participants were comfortable (24% strongly agreed, 62% agreed and remaining 14% neutral) with revealing their identity or contact number in the WhatsApp group chat. Regarding the relevance of discussion, 64% did not find the discussion topics irrelevant. 13% were neutral, while 23% agree that most of the discussion was irrelevant. 77% disagreed that WhatsApp discussion caused distraction during lesson time, while 14% were neutral and 9% found it distracting.

## Overall Experience

The overall experience from the participants were positive. Most students found themselves actively participating in the discussion, with about 23% of students not actively participating. (Figure 3a) A majority of participants indicated that they would recommend the use of WhatsApp as an academic discussion platform for other courses. (Figure 3b)

On the overall effectiveness, 27% strongly agreed that WhatsApp group discussion was effective for academic discussion, 50% agreed to this, 18% were neutral and 5% disagreed. (Figure 4)

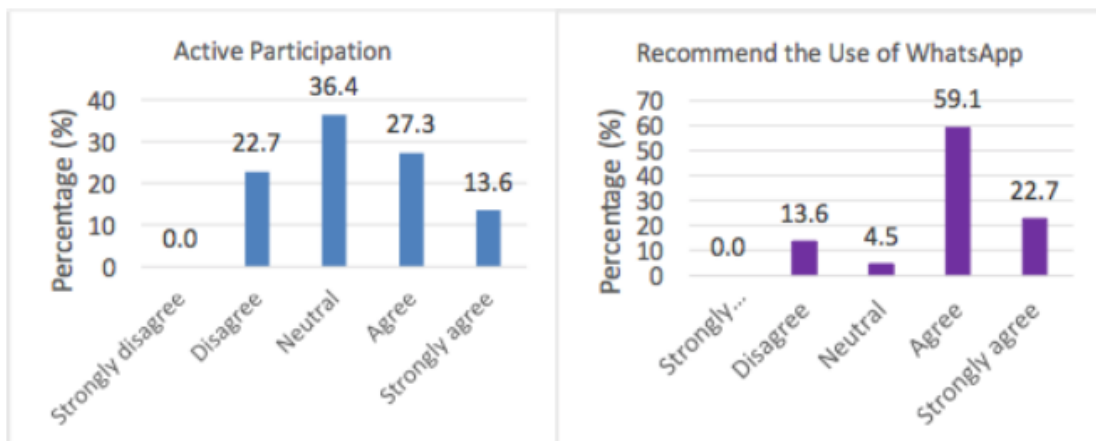


Figure 3. Responses of participants in Section 4 on Overall Experience of survey: (a) Question 23: “I would recommend the use of cohort-based WhatsApp in SUTD for other subjects.” (b) Question 24: “I actively participate in the after-class academic discussion on WhatsApp.”

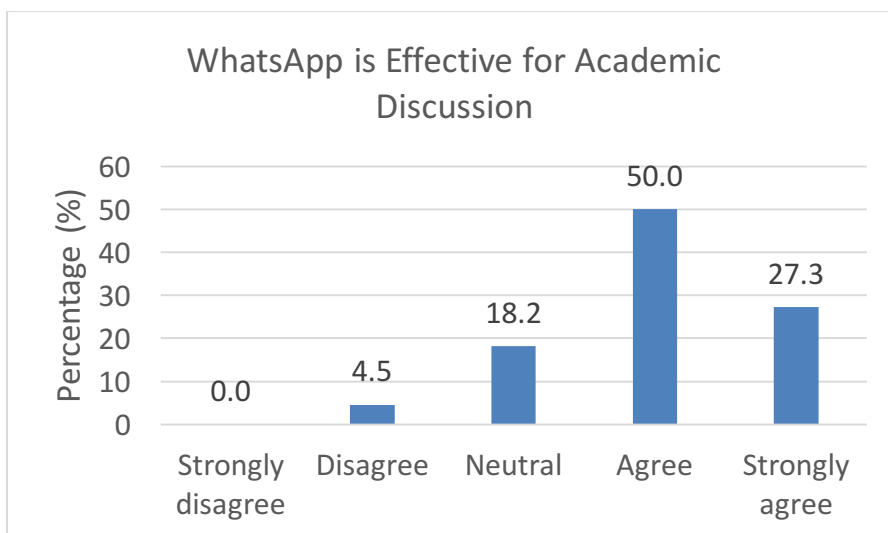


Figure 4. Responses of participants in Section 4 on Overall Experience of survey. Question 22: “I find the use of WhatsApp effective for academic discussions.”

## Discussion

### An Informal and Effective Channel for Academic Discussion

From this study, we found that using IM platform for academic discussion provided an informal channel for students to clarify theoretical concepts. This format of discussion is also easily accessible via their smartphone. There is an added advantage to use an app that is already installed and in frequent use by the students, as studies (Tan & Teo, 2015) have found that not all students would install a new app for academic discussion unless it is compulsory to do so. Besides academic discussion, the IM platform is also used by students to check course related information with the instructors and their peers. Practice questions in the form of files and images were also shared through WhatsApp to initiate engagement and discussion among students. Additionally, the advantage of IM platform using smartphone was that users could easily take a snap shot of written work/solutions and shared it through WhatsApp. It was a convenient alternative compared to typing out the solutions using keyboard.

Some of the downsides of using IM platform would be getting spammed with messages and sometimes the discussion may not be relevant to all students. Although there is a search function in the app, participants had to scroll through long messages, and instructors were not able to group or classify queries into specific topics unlike in discussion forums. There were certain cases where a student expected an instant reply to their queries or found the reply of an instructor to be slow, although the participants had been informed in the beginning that replies from instructors are expected within a day. We also found that the discussion in IM platform tends to be more concise; there were seldom heated discussion as both the instructors and participants felt that messaging was not the best platform for lengthy discussion. As with most platforms, there were active participants (about 41% in our study) and some silent observers. In terms of privacy, students were unable to remain anonymous when they post questions through WhatsApp as their contact number is revealed.

### Effects on Face-to-Face Consultations

Although the participants agreed that academic discussion is made more easily accessible and indicated their preference to have IM platform for other courses, this mode of communication has not significantly changed the extend of face-to-face interaction that a student would have with his instructors. Those who prefer face-to-face consultation indicated that they continued to have face-to-face consultations with their instructors, while those who are silent observers in discussion platforms remained as observers most of the time.

### Advantages and Disadvantages: Instructors' Perception

The two facilitators of the group chat are also instructors teaching the course. The instructors evaluated the use of WhatsApp as a tool for academic discussion during and after the study. The main advantage of using WhatsApp that the instructors experienced over online forum is convenience. Students have easy access to WhatsApp on their smartphone and could post questions as and when it comes to their mind. Unlike in an online forum, students do not have to login through a browser in order to post a question. The setting of a WhatsApp group chat is also less formal than

an online forum. This could improve the perception of the approachability of the instructors and also encourage students to clarify any concepts. One of the disadvantages of using WhatsApp for academic discussion is the layout and user interface. As the app is designed for instant messaging and not forum discussion, topics cannot be organised and grouped together. Users have to scroll through or use the search function with keywords to refer back to a previous topic. Instructors found that not all students are active in the group chat and often, they have to prompt students to ask more questions. As such, in the second run, a short lesson summary that highlighted the main topics was posted by the instructor after each lesson. Extra practice questions were also shared via pdf files through WhatsApp. The use of instant messaging app for academic discussion has its benefits of easy access and encouraging more interaction between instructors and students. And this extends to other aspects such as face-to-face interaction as the students find the instructors more approachable.

## **Conclusion**

With the increasing popularity of IM apps such as WhatsApp and Telegram, the frequent use of an informal channel such as IM platform, could provide a channel for students to clarify concepts learnt. 59% of participants agreed that using WhatsApp for academic discussion had helped them better understood concepts. Such informal platform could improve the visibility of instructors. Instructors are more approachable and instructors could get to know the students more personally. Instructors could also monitor students learning progress throughout the course of the study. The use of the chat group had encouraged face-to-face interactions for one group of students. Another group of students had reduced face-to-face interactions after their questions were answered through WhatsApp. The main challenge was difficulty in referring back to a previous discussion topic. Overall, 87% of participants found WhatsApp effective for academic discussion.

In conclusion, the use of IM platform for academic discussion is desirable for the students, but it should not be the only channel as face-to-face consultation and online forum for lengthy discussion are still important for after-class learning of students.



## References

- Ahad, A. D., & Lim, S. M. A. (2014). Convenience or Nuisance?: The 'WhatsApp' Dilemma. *Procedia-Social and Behavioral Sciences*, 155, 189-196.
- Ally, M. & Prieto-Blázquez, J. (2014). What is the Future of Mobile Learning in Education? Mobile Learning Applications in Higher Education [Special Section]. *Revista de Universidad y Sociedad del Conocimiento (RUSC)*, 11(1), 142–151.
- Barhoumi, C. (2015). The Effectiveness of WhatsApp Mobile Learning Activities Guided by Activity Theory on Students' Knowledge Management. *Contemporary Educational Technology*, 6(3) 221 – 238.
- Bere A. (2012). A Comparative Study of Student Experiences of Ubiquitous Learning via Mobile Devices and Learner Management Systems at a South African University. *Proceedings of the 14th Annual Conference on World Wide Web Applications; Durban*.
- Cifuentes, O. E.; Lents, N. H. (2010). Increasing Student-Teacher Interactions at an Urban Commuter Campus through Instant Messaging and Online Office hours. *Electronic Journal of Science Education*, 14(1), 1–13.
- Gon, S. & Rawekar, A. (2017). Effectivity of E-Learning through Whatapp as a Teaching Learning Tool. *MVP Journal of Medical Sciences*, 4(1), 1 –25.
- Hootsuite (2018). 4 Million Singaporeans Say WhatsApp is their Most Used App. <https://www.messengerpeople.com/whatsapp-is-singaporeans-most-used-app/> (last accessed Nov 2020)
- Jimoyiannis, A.; Tsiotakis, P.; Roussinos, D.; Siorenta, A. (2013). Preparing Teachers to Integrate Mobile in School Practice: Toward a Framework for Pedagogy 2.0. *Australasian Journal of Educational Technology*, 29(2), 248–267.
- Lin, T. T. C.; Chiang, Y.-H.; Jiang, Q. (2015). Sociable People Beware? Investigating Smartphone Versus Nonsmartphone Dependency Symptoms Among Young Singaporeans. *Social Behavior and Personality: an international journal*, 43(7), 1209-1216.
- Tan, E. S. Q. & Teo, D. J. L. (2015). Appsolutely Smartphones: Usage and Perception of Apps for Educational Purposes. *Asian Journal of the Scholarship of Teaching and Learning*, 5(1), 55-75.

**Contact email:** meixuan\_tan@sutd.edu.sg