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WHATSAPP'S POTENTIAL TO BROADEN ONLINE TEACHING AND LEARNING: PERCEPTIONS OF UNDERGRADUATE STUDENTS FROM ONE SOUTH AFRICAN UNIVERSITY

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ABSTRACT

Aim/Purpose	Social media platforms have been increasingly incorporated into teaching and learning. However, studies using mixed methods to explore WhatsApp's potential to broaden online teaching and learning remain limited.
Background	This study reports the experiences and perspectives of undergraduate students in terms of their WhatsApp usage patterns and preferences during COVID-19 using a sequential mixed method.
Methodology	Through a quantitative survey of undergraduate students from the Education Faculty in one South African university, quantitative data were collected from 92 participants. Qualitative interviews were followed with ten willing participants to further explore their perceptions and preference.
Contribution	This study addresses the literature gap identified by Klein et al. (2018, p. 2) that "few studies that explore WhatsApp use in the natural environment of higher education" and the methodology gap Hashim identifies (2018) that the majority of the literature adopts a quantitative research methodology while only 10% use the mixed method.

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	Our intention is set specifically on WhatsApp's potential to broaden online teaching as the new norm beyond merely as a supplement teaching platform before COVID-19 or emergency remote teaching mode that WhatsApp serves since the onset of COVID-19.
	We triangulated the behaviors and perceptions of first-time WhatsApp users (scarcely separately discussed in the literature) and gender to ascertain lessons for more targeted strategies for more effective WhatsApp use.
	Another unique feature and novelty of this study is our separate analysis of active (e.g., initiating query or discussion) and passive use (e.g., receiving information).
Findings	Our findings confirm that COVID-19 has accelerated universities' digital transition as WhatsApp's usage has undergone a great expansion from informal to formal spaces. However, informal use among students remains strong, particularly among first-time WhatsApp users. Communication remains one of the primary functions of WhatsApp in teaching and learning, but content-related functions and student discussion activities are clearly feasible and prevalent. However, passive use remains slightly more prevalent than active use even amongst frequent WhatsApp users. WhatsApp's assignment-related usage is high but mainly limited to queries rather than assessment submissions or marking. Both WhatsApp's usage and perceived usefulness has surpassed that of e-mail and of the university's learning management system (LMS) where WhatsApp group functions seem to have contributed greatly to the perceived usefulness. Articulated advantages and challenges of WhatsApp largely corroborate with those identified in the literature, although our participants show some ambiguity concerning WhatsApp's low cost as its main benefit.
Recommendations for Practitioners	WhatsApp's usages are versatile. So are its perceived benefits. However, practitioners need to consciously encourage its usage beyond passive use and also consider how WhatsApp can be incorporated into marking.
Recommendations for Researchers	We found inconsistency regarding perceived benefits related to WhatsApp's cost. Cost is important in low resource context and this inconsistency merits further examination. Our finding regarding WhatsApp's limitation in terms of marking is not consistent with some literature. As marking functionality impacts broadening WhatsApp's usage in teaching and learning, how WhatsApp has and potentially can be incorporated into LMS should be further explored.
Impact on Society	WhatsApp has great potential to broaden online learning in higher education. However, it also has its limitation. This study demonstrates that WhatsApp can serve most teaching and learning functions in higher education. However, how these benefits and limitations impact different groups of users (e.g., 1st-time users, frequent users, gender, etc.) should be more consciously thought of, so is how more active use can be encouraged.
Future Research	Further studies should examine whether the low cost is an important consideration in students' preference for WhatsApp. Further studies should also explore how WhatsApp can be better used for marking.

Keywords WhatsApp, COVID-19, online teaching and learning, university, South Africa

INTRODUCTION

Since the beginning of the millennium, social media has become increasingly popular for people to connect, share, and collaborate worldwide (Bosman & Zagenczyk, 2011). Most social media applications were not developed for teaching and learning, but over time exploration of their potential to support or amplify teaching and learning has increased dramatically (Hashim et al., 2018). This is true for both the schooling and higher education sectors. Typical use of social media for teaching and learning includes searching and sharing resources or information, facilitating communication, collaboration or teamwork, and making or sustaining contacts (Dhawan, 2020; Liu, 2010; Manca & Ranieri, 2016).

Hashim et al. (2018) observe from their bibliometric analysis that the majority of publications on the topic tend to "focus on the use of social media applications in general … without specifying on any specific social media application" (p. 7). Among the specific platforms investigated, scholars (Kapoor et al., 2013) have categorized them into social networking applications (e.g., Facebook, Twitter), professional and academic networking services (e.g., Linkedin, Researchgate, Academia.edu), content-creating or sharing platforms (e.g., Youtube, Podcast, SlideShare, wiki, blogging, and social bookmarking sites) and virtual world or game (e,g. Second Life, World of Warcraft). Among these, social networking sites, particularly Facebook and Twitter, emerge as the most popular applications (Wodzicki et al., 2012), both in terms of featuring the most users (Al-Bahrani et al., 2017; Chen & Bryer, 2012; Cooke, 2017; Liu, 2010; Moran et al., 2012; Tess, 2013) and with most scholarly investigations (Hashim et al., 2018). Probably because WhatsApp was only introduced in 2010, a few years after Facebook (2004) and Twitter (2006), literature on WhatsApp for teaching and learning counts less than one-seventh of those on Facebook and Twitter (Hashim et al., 2018), although such investigation features in Mobile Instant Messaging (MIM) literature more often (frequently broadly discussed as M-learning).

The interest in the study reported in this article stems from the following observations. On the one hand, social media "as a supporting tool to help enhance the teaching and learning process receives the least attention by previous researchers" (Hashim et al., 2018, p. 15); more specifically, "there are few studies that explore WhatsApp use in the natural environment of higher education" (Klein et al., 2018). On the other hand, since the COVID-19 pandemic lockdown was imposed and contact classes were abruptly moved online, WhatsApp usage in the education space has increased exponentially. In this case, this study is similar to other studies published since the onset of COVID-19 that examine the innovative implementation of social media in teaching and learning or that report user patterns and attitudes towards these online tools, often used in resource-constrained contexts (including Indonesia, Cameron, Mauritius, Pakistan, Zimbabwe, Sri Lanka, Cyprus, Malaysia, Ghana, Saudi Arabia, etc.; see Adedoyin & Soykan, 2020; Akaloo, 2021; Alsharif et al., 2020; Bonsu et al., 2021; Enyama et al., 2021; Khan, 2021; Maphosa et al., 2020; Maddumapatabandi & Gamage, 2020; Mulyono et al., 2021; Mustafa & Yaakub, 2021).

What makes this study different from other studies is that our intention is specifically set on WhatsApp's potential beyond the emergency remote teaching mode that WhatsApp currently serves. Similar to Budianto and Arifani (2021), we recognize that social media is generally regarded as only serving the augmentation function. It is considered "a supplement … more of an added extra" (Cooke, 2017, pp. 262, 266), more suited to *support* or supplement traditional face-to-face learning (Zulfikar et al., 2018), often in a blended learning format (Gachago et al., 2015; Jamaldeen et al., 2018; Kacetl & Klímová, 2019). Our interest is to explore WhatsApps' potential to broaden online teaching during the remainder of the COVID-19 pandemic and beyond as it has evolved beyond merely supplementing teaching but has become an important primary platform during COVID-19.

To address this research question "what is WhatsApp's potential beyond the emergency remote teaching mode", this study sets out to explore students' WhatsApp usage patterns and preferences to understand how WhatsApp has been used and, more importantly, can be more effectively used both

in emergency remote teaching mode and as the new norm during the remainder of the COVID-19 pandemic and beyond. For this purpose, this study explores WhatsApp's current and potential use for the various aspects of teaching and learning, including communication (e.g., announcements or reminders), content delivery, discussions, group work, and assessments. Data were collected through a sequential mixed method (using a survey followed by interviews), addressing the methodology gap identified in Hashim et al.'s (2018) bibliometric analysis. We also triangulated the behaviors and perceptions of first-time WhatsApp users (scarcely separately discussed in the literature) and gender to ascertain lessons for more targeted strategies for more effective WhatsApp use. Another unique feature and novelty of this study is our separate analysis of active (e.g., *initiating* query or discussion) and passive use (e.g., receiving information).

This article is organized as follows: It commences with a literature review on the categorization of social media for learning purposes. It then proceeds to discuss reported user patterns, and the advantages and challenges of WhatsApp and social media in literature. Thirdly, the methodology of the empirical study is explained, followed by the findings and discussion of the data. The article concludes with a synthesis of the findings and a discussion on areas of attention to further fulfill WhatsApp's potential in broadening online education.

LITERATURE REVIEW

Literature on social media in education typically explores social media adoption and usage patterns, reasons for user adoption, attitude or preference, user experience, as well as their impact on performance (Hashim et al., 2018). Findings on social media's impact on performance are inconclusive; however, some point to positive influence (e.g., Lau, 2017), while others indicate negative influence (e.g., Kirschner & Karpinski, 2010; Paul et al., 2012). Typical advantages of social media in the learning space include simplicity, availability, easy accessibility, ease of use, low costs, and quick feedback, which promote student interaction, engagement, and motivation (Ajjan & Hartshorne, 2008; Bexheti et al., 2014; Budianto & Arifani, 2021; Chen & Bryer, 2012; Damayanti & Sibarani, 2020; Dewangga et al., 2020; Febriani, 2020; Liu, 2010). Obstacles and challenges that hinder the further expansion of social media in education have also been investigated and reported, which include (in)compatibility with pedagogical beliefs and practices, cognitive overload, distraction, privacy, and reliability of social media information (Ajjan & Hartshorne, 2008; Battrawi & Muhtaseb, 2010; Church & de Oliveira, 2013; Cooke, 2017; Schroeder et al., 2010).

One phenomenon that Cuban (2001) alerts to in his influential work on adopting new technologies in educational settings is that personal and professional use of technology often bears little direct relation to educational use where educational use is generally limited and low. One concerning observation is that technologies in education tend to be 'oversold' and 'underused' (Cuban, 2001) which applies both to students and instructors. Although attitudes toward the adoption of social media in teaching and learning are generally positive (among both instructors and students), actual or planned usage tends to remain suboptimal (Ajjan & Hartshorne, 2008; Hamid et al., 2010; Hew, 2011). Some scholars claim that social media is more appropriate for socializing rather than learning (Esposito, 2007). From the students' point of view, Jones et al. (2010) report that students tend to separate social life as pleasurable from their learning which is often viewed as painful. Other scholars have investigated the resistance or objection to using social media in teaching and learning and point out the importance of considering the context and setting, for example, the teaching and learning environment and culture, professional identity, structural incentives, and so forth to further broaden social media's use in education (Manca & Ranieri, 2016). MIM literature similarly reiterates the importance of sensitizing and differentiating the pedagogical reasons and practices to deliver content through traditional or mobile channels (Annamalai, 2019).

Literature on learning concerning social media categorizes learning into informal and formal use, where informal generally refers to situations not initiated or controlled by instructors but by students, usually outside the classrooms, and are more spontaneous (Greenhow & Lewin, 2016) while formal

represents the opposite. Social media, under this framework, tends to be associated with informal, unstructured, self-regulated engagement (Chen & Bryer, 2012) with loose behavioral norms (Papacharissi, 2009), often more concerned with participation rather than concrete learning outcomes. The relationship and integration of social media and course management systems (CMS, often the same as LMS) are usually more formal but generally are described to be poor, although "with good reasons," e.g., to establish boundaries (Taylor, 2015, p. 42). Trinder et al. (2008), however, have observed an increasing blur of the boundaries between the two where informal practices are increasingly included in the formal spaces although formal teaching and learning practicing using MIM remains under-researched (Pimmer & Pachler, 2014). Taylor (2015) proposes the following instructional usage and integration of social media into the formal learning space: class management (posting updates, notifications, or reminders); accessing, organizing, and distributing content; student discussion; and creating and sharing assignments (often using new software and applications). Dabbagh and Reo (2011) point out a further distinction between synchronous and asynchronous features where social media is generally reported to be preferred for asynchronous functions while LMS is preferred for synchronous functions (Hustad & Arntzen, 2013; Khoza & Mpungose, 2018). Comparing internet costs for MIM and LMS (or browsing the internet in general), Rambe and Bere (2013) also point out that MIM's data cost is generally much lower. Some subjects, particularly language learning, record more experiments and reports on social media's incorporation into teaching and learning (Ali & Bin-Hady, 2019; Budianto & Arifani, 2021; Damayanti & Sibarani, 2020; Mustafa & Yaakub, 2021; Tarighat & Khodabakhsh, 2016).

WhatsApp is a smartphone application for instant messaging. It was developed to substitute the SMS platform for real-time communication (Bouhnik & Deshen, 2014; Suryawanshi & Suryawanshi, 2015). The WhatsApp application has become increasingly popular over the years (Bouhnik & Deshen, 2014). Statistics from Statista.com (Ceci, 2022) list WhatsApp as the most popular mobile messenger application worldwide, with over 2 billion active users and 1 billion messages a day (Cathcart, 2020) in October 2020. WhatsApp penetration in resource-constrained localities is high too, with many countries achieving over 90% user penetration (GWI, 2022). People of all ages use the application, but WhatsApp is particularly popular among the youth, including university students (Devi & Tevera, 2014), many of whom use it daily (Ahad & Lim, 2014). Like other social media or social networking applications, WhatsApp can be used across various devices such as computers, smartphones, tablets, and other personal digital assistants (Gon & Rawekar, 2017). This application is also important in resource-restrained contexts where access to personal laptops and desktop computers or computer labs remains limited (Barhoumi, 2015; Gachago et al., 2015; Gasaymeh, 2017). In South Africa, where the empirical study is based, mobile digital media devices are said to have become "ubiquitous on today's university campuses" (Le Roux & Parry, 2017, p. 19).

"Despite the ubiquitous use of WhatsApp, only a few research studies have reported on its application for teaching and learning" (So, 2016, p. 34). Literature on WhatsApp for learning has reported on WhatsApp usage patterns, attitudes, potential benefits, and challenges, most of which are similar to those broadly applicable to social media; for example, WhatsApp usage tends to be primarily for social than academic purposes (Yeboah & Ewur, 2014). Bansal and Joshi (2014, p. 6) point out that students generally have positive attitudes towards WhatsApp, viewing it as a "valuable teaching method, a valuable learning aid and as a highly personalized instructional medium". With a more informal feel, students also tend to be freer when they express or engage on WhatsApp platforms (Bansal & Joshi, 2014, p. 5). WhatsApp's other learning benefits include "immediate feedback to the problem, learning on the move, deeper clarity on issues, revision of previously learned topics, and the availability of learning materials all the time" (Bansal & Joshi, 2014, p. 5). Other aspects that users often appreciate include its simplicity to use and easy accessibility (Bansal & Joshi, 2014; Bonsu et al., 2021; Damayanti & Sibarani, 2020; Gon & Rawekar, 2017; Li et al., 2019). Moreover, using the application is cheap: its subscription was one dollar a year and then free since its incorporation into Facebook, and its data consumption and usage are much lower than other platforms, including LMSs (Bouhnik & Deshen, 2014). WhatsApp enables collaboration and knowledge sharing (Yeboah &

Ewur, 2014), increased interactivity (Bansal & Joshis, 2014, p. 6) as well as a community of learning (Igbafe & Anyanwu, 2018). WhatsApp's functions that can support teaching and learning include messages, contacts, files, links, pictures, and voice notes sent individually or on WhatsApp groups (Ahad & Lim, 2014; Gon & Rawekar, 2017). Other advantages of WhatsApp are its ubiquity (enabling learning anytime and anywhere) and immediacy of content (Alsharif et al., 2020; Gon & Rawekar, 2017). Ahad and Lim's (2014) study reveals that students often use WhatsApp for "quick information retrievals and transfers," especially as a tool for their "group discussions and interaction" (p. 192).

WhatsApp's negative aspects are also similar to those generally applicable to social media, including distraction which leads "to addictive-like behaviors and the exposure to false unregulated information or media contents … damaging language spelling and grammar and lack of focus in lectures" (Ahad & Lim, 2014, p. 191, 192, also see Igbafe & Anyanwu, 2018). Yeboah and Ewur's (2014) study shows that 48% of students spend eight hours every day on WhatsApp, leading to less time on academic work and lower grades (also see Duke & Montag, 2017). Moreover, WhatsApp's group functions sometimes cause "message flooding and time consumption" (Gon & Rawekar, 2017, p. 24), which sometimes overwhelms both the instructors and students. One additional challenge is that some devices have small screens which cause eye fatigue (Annamalai, 2019; Gon & Rawekar, 2017).

METHODOLOGY

This study is not an experimental study, nor is it particularly interested in WhatsApp's impact on learning outcomes. Instead, the main interest of this study is on user patterns and preferences, with a particular aim of distilling lessons to amplify WhatsApp's potential for online teaching during emergency remote teaching and beyond. Similar to Ahad and Lim (2014), we incorporated questions about the user behavior of WhatsApp (e.g., frequency of use, usage types and features, and type of information disseminated). But our questions also specifically include WhatsApp's usage in the various aspects of teaching and learning to determine whether WhatsApp can effectively act beyond being a supplementary teaching and learning platform. Concurring with Dijgkmans et al.'s (2015) assertion that social media usage should be seen from the cognitive (being interested), behavioral (participation), as well as emotional aspects (feeling positive), both our survey and interviews incorporate questions on all of these three dimensions.

This is a mixed-method study, informed by the methodology gap identified in Hashim et al.'s (2018) bibliometric analysis, which reports that the majority (40%) of the literature adopts a quantitative research methodology (including data mining, social network analysis, and survey), 25% adopt a qualitative methodology, 10% use the mixed method and the rest use experimental designs. We believe that a combination of a quantitative survey and qualitative interviews is ideal to learn not only about the patterns and preferences but also the underlying reasons for such user patterns and preferences.

As the interest of the study is exploratory, the study used convenience sampling to target students in one faculty (Education) of one South African university. The majority of the student population in this university are first-generation African students with more than half of its undergraduate population being sponsored by the government's National Student Financial Aid Scheme (NSFAS). After ethics clearance was obtained from the faculty ethics committee, a google form survey was sent to BEd students registered for two undergraduate modules (one 2nd year and one 3rd year, approximately 700 students in total) through the two lecturers who facilitate the modules. They invited the students to participate and provided the survey link to their learning management system. Respondents were asked about their observations and perceptions of WhatsApp for all their modules (not limited to the two they were enrolled in). The survey instrument is attached as appendices. Demographic information was only collected in terms of gender and whether they had modules that used WhatsApp before COVID-19. The response rate to the survey was 19.92% and 73.9% were females. The last question on the survey asked whether the respondents were willing to participate in a follow-up interview. Seventeen students indicated a willingness to participate but only ten eventually participated in

the interviews (6 females and 4 males). These interviews further explored the questions asked in the survey with probes; e.g., the reasons that they provided a certain answer on the survey.

RESULTS AND DISCUSSION

EXPANSION OF WHATSAPP USAGE DURING COVID-19: USAGE PATTERN AND PREFERENCE

Of the participants who responded to the survey, 68.5% indicated that they have used WhatsApp before the COVID-19 pandemic (Q1 in the survey). However, before COVID-19, WhatsApp was mainly used for administrative or communication purposes only, often in tutorials rather than classes or initiated by lecturers. WhatsApp groups existed before too but were mostly initiated amongst the students themselves. For participant 6: "we've always had groups, but they were not facilitated by any lecturer. They're all facilitated by us …. where we share things … school things cause not everyone can access blackboard [BB thereafter – this is the LMS in the university under investigation] anytime. So, we shared information there so that everyone stays updated." Participant 5 also used it for group work. Participant 7 used it for communication such as announcements about class time. Participant 8's tutors "used to tell us what we gonna do and then send a tutorial activity then remind us that class will commence at what time".

Similar to Enyama et al.'s (2021) findings of significant expansion of WhatsApp usage since COVID-19, WhatsApp usage in this study's context has broadened greatly during COVID-19 and has clearly moved from informal to formal spaces (interview): many lecturers have joined or initiated WhatsApp usage. WhatsApp usage has also broadened to content sharing and other teaching and learning functions such as those related to assignments (Q4). Participants report frequent use of WhatsApp for teaching and learning during COVID-19: 78.3% use it more than once a day, 10.9% use it between once a day to once a week, the remaining (10.9%) use it fewer than once a week (Q5). More students report using WhatsApp for teaching and learning (Q6) during weekdays between 08:00 and 16:00 (32.6%) than on weekdays before 08:00 or after 16:00 (7.6%) or weekends (6.5%), indicating some separation of their social and academic use of WhatsApp. Some participants check WhatsApp when they expect new messages or information to be loaded (18.5%); others do so when they check WhatsApp for other purposes, e.g., social messages (12.0%). But the largest proportion of participants (44.6%) reports no specific pattern, probably because they can and do access WhatsApp at any time of any day.

One facilitating factor for this broadened use is the versatility of WhatsApp's functions. "It helps us because now the lecturers can send us documents, they can send us audios, and then we can always get those whenever we want them, you see ... they can get the necessary information" (Participant 10). Participant 3's lecturers "use a method of audio voice recording and text messages for the students as well as posting the assignments." Some of Participant 8's "lecturers conduct their lectures in the WhatsApp group and tutors send their voice notes recording the tutorial as well as lecturers so that's how they do it yeah, it's more like we are in class but online". Participant 1 also compares it with when they are on campus: "they do share slides … documents, assignments, clarification and all that. It's basically like we are on campus." Participant 7 also mentions that lecturers or tutors delivered content through WhatsApp voice notes. He gives one example: "for example when a tutorial starts at six o'clock 6:00 PM on a Friday …. the tutor will send a voice note that is 20 minutes long and then he will give us time to listen to it. Then he'll say can you please ask questions of what do you think about it and then he will also ask questions like define he will just ask to define anything and then give our input individually and then he would reply to our answers and make improvements or suggest some stuff".

Similar to Wijaya's (2018) finding, between WhatsApp's text and audio functions (Q2), messages and documents are reported to be slightly more useful than voice notes (VN) (52.7% vs 47.3%. The difference is statistically insignificant). Participant 5 specifically comments on the various documents he

receives on WhatsApp groups: "For me most of the things that work for me it's the text messages … like readings, novels, and some exercises, practice questions on WhatsApp."

Participant 7 explains why he prefers voice notes, although this might merely reflect different learning preferences and styles as he admits that he likes reading because "it is so easy".

> *I really like the voice notes … I'm just really focused whenever they send this on voice notes about the content that we have to study. Because it feels authentic and it feels like you are in a classroom. You understand because sometimes the tutor will only send like a long paragraph and then you have to reply to it. I don't like that, that much.*

However, the accent is sometimes an obstacle, especially "in terms of pronunciation when they pronounce some other words and then it becomes more difficult for me to understand." (Participant 5) He doesn't relate similar challenges to face-to-face classes, probably because VN doesn't come with any additional visual cues (e.g., mouth movement).

Passive and Active WhatsApp Usage

Distinguishing passive vs active usage in social media network platforms for teaching and learning or MIM literature is rare, but it indicates learning patterns, user satisfaction, and motivation, which are all important to discern more effective use of the platform. Informed by Wu et al.'s (2015) definition (on MIM but not limited to MIM for teaching and learning), we view passive use as "visiting without posting … just reading and browsing the content" (p. 4) and broadly receiving without further engagement. We acknowledge that receiving information or content is necessary for learning, but merely receiving without further engagement, such as queries or participating in discussions, hardly results in meaningful learning. Among our participants, the overwhelming majority (84%) use WhatsApp to receive announcements and messages, indicating a continuing trend to use it for communication (Q4). WhatsApp is also used for querying, asking questions, or engaging in discussing class content (76.1%); for example, Participant 10 indicated that she "sends audios to the lecturers and the tutors when we need help". Figure 1 shows the usage by frequency.

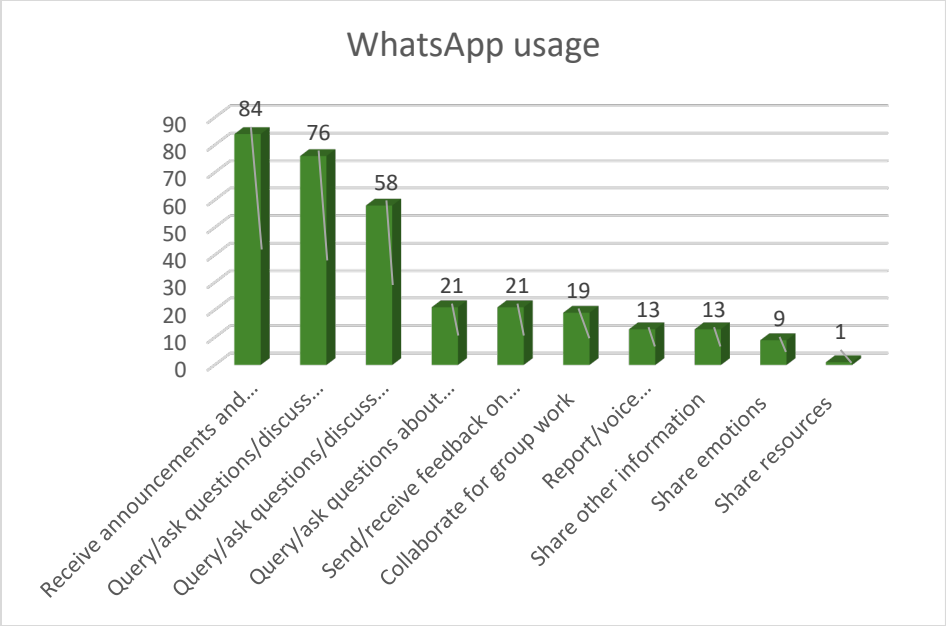

Figure 1. Reported WhatsApp usage by frequency (Q4)

Figure 1 shows that passive engagement on WhatsApp (*receiving* announcements or messages) is slightly higher than more active class engagement (class discussion or query for content), while active

engagement beyond class content (e.g., report challenges, sharing information, etc.) is even more limited. Assignment-related usage (including querying about assignments, marks, and feedback, although not for assignment submissions), on the other hand, is also quite high.

Cross-tabulation of passive or active use and frequency of use indicates that frequent users of WhatsApp (those who use it more than once a day) do not necessarily engage with active class engagement more: there are frequent WhatsApp users who use WhatsApp only to receive announcements or messages.

Collaboration on WhatsApp

Figure 1 indicates a fair amount of collaboration for group work on WhatsApp (21.7%). Indeed, participants report much greater use of the WhatsApp group function as compared to its individual functions (94.5% vs 5.5% respectively, Q2). WhatsApp groups are widely used among the students themselves, accounting for 2/3 of the group usage from communities of learning (Igbafe & Anyanwu, 2018). Interactions among the students are slightly higher than the interactions between students and the teaching team, including the lecturer and tutors (53.3% vs 46.6%, not statistically significant, Q3).

> *[WhatsApp] gives students options to decide which one do they go with for sharing the information. And secondly, those who are not confident enough to answer and ask questions in class can pose them on WhatsApp for everyone to answer and get assisted at the end of the day … You don't only share ideas, you share and receive other ideas from other people. There are so many of us that use WhatsApp and as well as having different thoughts, so it's like me getting to know what other people think of the topic sort of advantages and disadvantages of the topic and how to tackle the questions in the simplest manner (Participant 3)*

> *Very, very, effective … we have like more of the same interests for example we have students who would like to engage with the content that was discussed in class and then what we do is we create a group on WhatsApp we might be 10 or 12 in that group … We get to share what we think about the subject matter. Let's say we are discussing a certain theme in English or a certain character, and then in that group on that particular day will just discuss. Every person will say something about what they think about that certain character and then like you get different insights or ideas (Participant 5).*

WhatsApp vs Other Platforms: Usage and Perceived Helpfulness

Quite a number of lecturers use WhatsApp and other platforms (especially BB) concurrently, sometimes repeating the class content on BB and WhatsApp. Participant 5's lecturer posts practice questions on WhatsApp, "then we look at it and address it on Blackboard." For Participant 3, besides WhatsApp, "we are also using the collaborate session on Blackboard for extra resources and to get a clear explanation of the content."

The reported top three online teaching and learning platforms (platforms used the most during COVID-19) are WhatsApp, e-mail, and BB (100%, 96.7%, and 95.6% respectively, Q11). A small percentage (less than 10%) also report using Microsoft Teams, Zoom, or Google+ functions. Similar patterns are found in terms of how the participants find these platforms useful. In descending order, the most useful platforms (Q12) are WhatsApp groups (90.2%), BB (81.5%), WhatsApp chat (message, 81.5%), E-mail (80.4%), and WhatsApp chat (VN, 79.3%). This reported preference for WhatsApp groups is similar to Wargadinata et al.'s (2020) finding that the WhatsApp group is also found to be the most effective learning platform. Only 3.2% to 9.7% of participants find none of BB, WhatsApp, and e-mail helpful. The perceived usefulness of the other platforms (Teams etc.) is much lower, ranging from 16.3% to 17.4% of the participants, while 54.8% to 77.4% perceive them as unhelpful.

Cross-tabulation of usage and usefulness reveals a high correlation between frequent usage of a platform and those reporting the platforms to be helpful: between 71.6% and 90.2% of those using BB, e-mail, or WhatsApp find them helpful or very helpful. Although because the number of those finding them unhelpful is so small that the chi-square test's assumption is violated, therefore chi-square test results are not reported here. The helpful perception is also highly skewed towards 'very helpful' as compared to 'helpful' or 'neutral' ($p \leq .001$), especially for BB, e-mail, and WhatsApp's frequent users (those used more than once a day).

Advantages of WhatsApp

Students appreciate WhatsApp for various reasons (Q7) (Figure 2). Quick responses are mentioned by most of the participants (82.6 %), similar to Bansal and Joshi's (2014) finding. Participant 6 explains that the students often "instantly reply or send audio like I'm doing now sending one-minute audio for clarification. It could go through within a second."

Concurring with the literature (Bansal & Joshi, 2014; Bonsu et al., 2021; Damayanti & Sibarani, 2020; Gon & Rawekar, 2017; Li et al., 2019), a large number of our participants (79.2%) also appreciates WhatsApp's easy access and use. This ease of use is also often commented on in the interviews. Participant 3 thinks that WhatsApp is the simplest platform "because you only login and read text. It's not like compared to slide share where you have to go and search for presentations and others". Students are also familiar with it as "WhatsApp is something that we use like every day, so it's easy for us to like to get the information whenever we wanted" (Participant 10). WhatsApp also "sends notifications to you even if you are not online for as long as your data is on. Compared to Blackboard where you have to log in and search for the announcement yourself. Some of us spend the whole day without login in on blackboard and miss some of the important information. But with WhatsApp, as long as your data is on, you will forever be updated with any new information sent to us or in the group" (Participant 3).

WhatsApp messages/recordings are always there to access at any time (77.2%), similar to the literature (Alsharif et al., 2020; Igbafe & Anyanwu, 2018; Gon & Rawekar, 2017). However, this asynchronous feature is not unique to WhatsApp but applies to other online platforms that have storage functions as well.

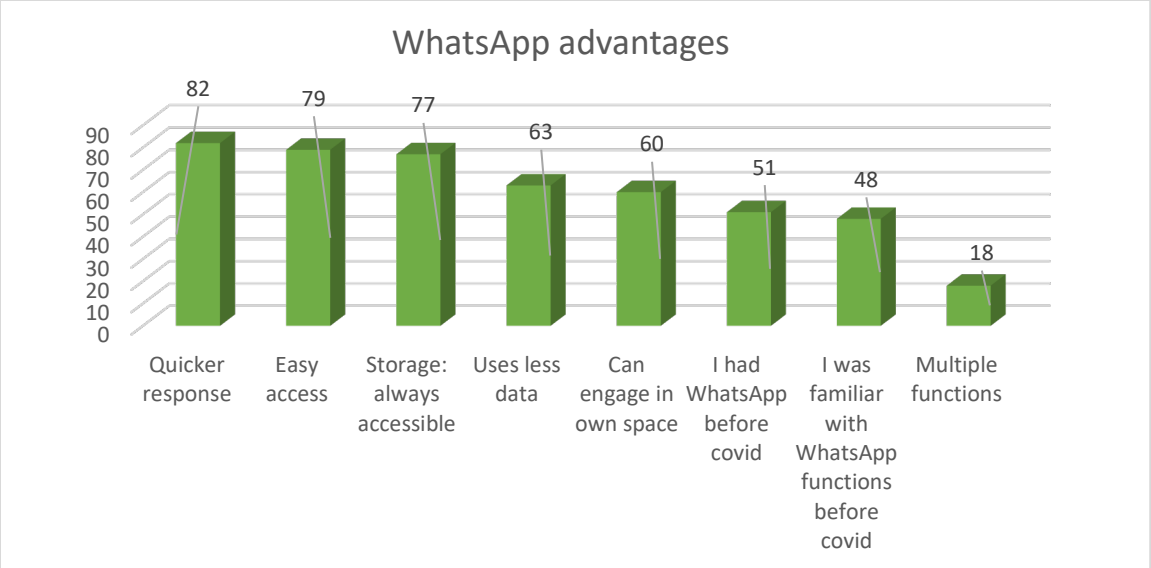

Figure 2. Perceived WhatsApp advantages by frequency (Q7)

WhatsApp's low data consumption is clearly one of the reasons why some lecturers use the WhatsApp platform. Participant 3 comments on WhatsApp's "data saving" and also reveals that his lecturers specifically use WhatsApp "for those who have less data to access Blackboard". This refers both to WhatsApp using less data and the cost of buying a WhatsApp bundle. Other participants also repeatedly refer to this in the interviews, especially when they compare it to BB or other platforms such as slide share, Zoom, and Socrative (Participants 2, 3, 6, 11, 15; Participant 5, similar to what is found in Bouhnik & Deshen, 2014). It, therefore, came as a surprise that this reason only comes up as fourth with 63.0% of students choosing it.

Challenges with WhatsApp

Figure 3 shows the overall perceived challenges of WhatsApp ordered by frequency.

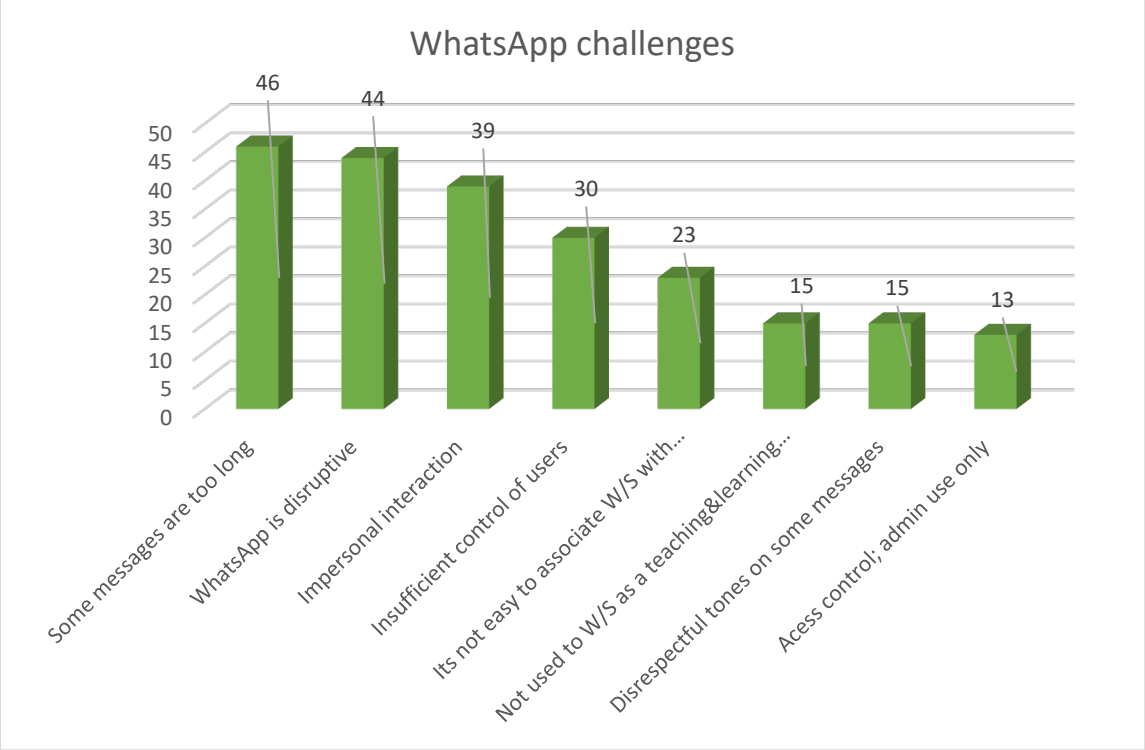

Figure 3. Perceived challenges by frequency (Q8)

It is important to note that the overall perception of challenges is lower than the overall perceived benefits. Among the reported challenges, the top one is the overwhelming amount of information on WhatsApp (55.4%), concurring with Gon and Rawekar (2017). Many interviewees discuss this in length too:

> *Using WhatsApp as a learning platform had its own day sometimes it would get overwhelming cause you would wake up to a lot of messages now you have to read and read. Sometimes it happens that someone is still typing so you have to thread up and scroll up all those messages trying to catch up. (Participant 6)*
>
> *we are having a tutorial [of 70 students]… if the tutor is asking a question we get to have a problem whereby everyone is posting messages a lot of messages like so the flooding of messages can be overwhelming because you can miss some …. Some things and when you try to follow up, there is another question. (Participant 5)*
>
> *You log out for a second then when you come back you find like 67 messages, and then you get up like getting left behind... you can come back and review the messages when you have time, but it's kind of time-*

> *consuming, cauz you know sometimes the learners they just post unnecessary stuff … GIF's, memes. That's very challenging for me. (Participant 10)*

Some students also post irrelevant information on class WhatsApp groups, exacerbating the amount of information on the group and acting as a distraction "with a poor signal to noise ratio" (Chen & Bryer, 2012, p. 97; also see Yeo, 2014). Relating to Voloaca et al.'s (2011, p. 45) observation that social media "represents an 'anything goes' communication channel" with looser norms, Participant 3 observes that "some people will be advertising that they are selling, for example, herbal life and other things for the benefit for weight loss and stuff". Others used it to vent: "it ended up escalating more into a ventilation platform where students getting out all their frustrations, not only to the lecturer and the tutoring team but also just to you know ventilated to other students" (Participant 2).

A considerable number of students (44.6%) believe that WhatsApp is disruptive because the messages, which often comes from participants' social life, get delivered during their class time. Sometimes those messages are urgent, but often the participants find themselves not able to ignore them even when it is not an emergency. Self-control, in this case, becomes more paramount (Participant 1).

> *Let me just put it in a personal context: I have 200 contacts on my phone…at some point I feel like no I shouldn't reply to this person because I'm in class only to find that there is an urgent message that the person was sending to me, so when that message pops up and I see that it's urgent, and there is a tutorial... You might be in a tutorial and someone is video calling me already. (Participant 5)*

Related to this, 23.9% of students see the WhatsApp platform as a social networking site, and 15.2% similarly find it not easy to associate it with teaching and learning. This is similar to Yeboah and Ewur's (2014) and Chen and Bryer's (2012) finding that "students do not perceive these as learning tools, therefore, they do not approach them or use them in a way that will facilitate learning" (p. 96). With memes and emojis, Participant 5 claims that WhatsApp is more like a "playground … the level of seriousness is very very low", probably an unintended consequence of WhatsApp's informal feel and association (Bansal & Joshi, 2014). While acknowledging that using WhatsApp during COVID-19 is necessary, Participant 6 offers that "the purpose of WhatsApp in general is just to socialise, so there's not much to be done using in terms of … school". This might also be related to the informal feel and association.

Close to half (46.7 %) find the length of some messages/voice notes on WhatsApp too long. Participant 8 recalls a class of 2 hours where the lecturer records and posts the whole class on WhatsApp, indicating a need to break information into smaller chunks as suggested by Annamalai (2019). Other perceived challenges include impersonal feelings with complete online learning (39.1% of the participants), similar to Bansal and Joshi's (2014) findings. Lastly, 15.2% of the participants reported that students were using disrespectful tones in the WhatsApp group. This sometimes led to access control of the WhatsApp group by switching to admin mode outside class time and only allowing limited open discussion times. Even though access to the WhatsApp group was controlled, 30.4 % of the participants think that the control of these disruptive behaviors or users was often insufficient.

First-Timer WhatsApp Users and Gender Differences

Close to half of our participants only started to use WhatsApp for learning purposes after the beginning of COVID-19 (Q1). We specifically triangulated these first-time WhatsApp users' experiences and preferences. We found that first-time users use WhatsApp much less than more experienced users: 20.7% of them use it fewer than once a week (vs 6.3% who have used WhatsApp before), although the difference is not significant. Of them, 69% used WhatsApp more than once a day for teaching and learning, while among those who used WhatsApp before, 82.5% use WhatsApp more than once a day.

Other differences include that first-time users use more message functions than VN (60.7% vs 49.2% for those who have used WhatsApp before, the difference is insignificant). First-time users interact

with fellow students a lot more (69.0% vs 46.0% for those who have used WhatsApp before) than the teaching team (31% vs 54%, the difference is close to a significant level with continuity correction of 0.068 and likelihood ratio of 0.038). First-time users are significantly more likely to query or engage in discussing assignments as one of the top 3 usages of WhatsApp than those who used WhatsApp before (75.9% vs 50.8%, $p = 0.041$).

In terms of gender differences, contrasting the result from Miller et al. (1996) where male students are found to be more interactive and active in group discussions in the web-based learning environment, this study finds that female students' passive engagement on WhatsApp is higher while male students' active engagement on WhatsApp is higher, but this difference is not statistically significant. Instead, similar to the finding from Alsharif et al. (2020), we found no significant relations in all aspects of usage, attitude, and reported challenges or benefits relating to gender.

WhatsApp's Potential for Future Teaching and Learning

None of the participants (0%) find WhatsApp unfit for teaching and learning (Q8), but a small number (2.2%) consider that WhatsApp has limited use and would not recommend it to be used as a teaching and learning platform. Close to 10% of participants suggest that WhatsApp in its current form has limited use, but it has potential if its disadvantages are addressed. Of the participants, 34.8% find WhatsApp useful, but only during extraordinary times such as COVID-19, while the majority (55.4%) recommend that WhatsApp can be used beyond COVID-19. For Participant 6, "WhatsApp doesn't accommodate learning in total, but it's a great use of learning for this COVID situation." Beyond COVID-19, 53.3% of the participants think that WhatsApp *can* be used as a teaching and learning supporting platform, followed by 34% who state that WhatsApp *should* be used beyond COVID-19.

Close to half (46.7%, Q10) think that WhatsApp can only supplement other platforms (for example, BB). An almost similar percentage of participants (45.7%) suggest that WhatsApp is only suitable for communication or queries (e.g., deadlines), although the responses for these two questions are not related; for example, those that think WhatsApp can only be supplementary do not necessarily agree that WhatsApp is only suitable for communication or queries. Of the participants, 55.4% think that WhatsApp can be used to deliver or engage in teaching and learning content, while 38% also agree that WhatsApp can be used for assessment-related functions. The relationship between WhatsApp being suitable for communication only and suitable for content delivery is again not perfectly negatively correlated. Although 2/3 to 3/4 of the participants who choose one would not choose the other, there is a considerable number of those who think these two responses are compatible with one another. Participant 2 explains what he thinks is the ideal combination: "lecture slides etc. posted on blackboard and also on WhatsApp in order to reach students … also urgent announcements on WhatsApp. WhatsApp should also be used as a tool to engage with students outside of the lecturing time in terms of addressing the queries etc. … we don't necessarily engage with the lecturers privately but more on the group chat where everyone can see our interactions". This preference to use WhatsApp for communication is similar to the student participants in Jankauskaite (2015) who "express the wish to communicate not through university system or e-mail" but social media because they use it "in their daily life and would see [it] sooner" (p. 56).

Conclusion

This small-scale study involves only a limited number of participants and, therefore, the results might not be generalizable. However, the findings are informative as we found evidence that COVID-19 has become a catalyst in accelerating the digital transformation of universities (Mulenga & Marbán, 2020). In an attempt to address the literature gap of inadequate research on the role of social media in digital teaching and learning, specifically WhatsApp, and answer the research question "what is WhatsApp's potential beyond the emergency remote teaching mode", the study explored WhatsApp's user patterns and preference in one of South Africa's universities where WhatsApp almost became a

primary teaching platform during COVID-19. We observed a great expansion of WhatsApp's usage during COVID-19, particularly from informal to formal spaces, although the informal use of WhatsApp among students themselves remains strong. Most students access WhatsApp frequently, without a specific pattern (days or times), although a few access WhatsApp for academic purposes before 08:00, after 16:00, or during weekends. This separation of their social and academic use of WhatsApp only seems to apply in terms of time; however, participants also report inappropriate posting of information that is irrelevant to their learning, as well as difficulties in separating their social and academic life on WhatsApp.

WhatsApp's usage and perceived usefulness has surpassed that of e-mail and LMS where WhatsApp's group function seems to have contributed greatly to the perceived usefulness of WhatsApp as a whole, similar to Wargadinata et al.'s (2020) finding. Students show a slight preference for text (messages and documents) functions more than voice notes, particularly among first-time WhatsApp users.

The best technology is what one already has, knows how to use, and can afford (Trucano, 2013). Similar to the literature, this study confirms the perceived advantages of WhatsApp in terms of its immediate responses, availability, and simplicity of operation (Alsharif et al., 2020; Bansal & Joshi, 2014; Bonsu et al., 2021; Damayani & Sibaranti, 2020; Gon & Rawekar, 2017; Li et al., 2019). Quick response time is appreciated the most, probably because this potentially alleviates the uncertainty and stress many students experienced during COVID-19. Costs associated with WhatsApp as a potential advantage are somewhat ambiguous as interview data support this while the survey only lists this as the fourth perceived advantage. This might indicate slight changes in priority in terms of WhatsApp's perceived importance and advantages during COVID-19, but it requires further investigation. Perceived challenges with WhatsApp are also generally in line with what the literature has pointed out, where information overload, often on WhatsApp groups, is highlighted. This might undermine the perceived usefulness of the WhatsApp group. This is also exacerbated by the inadequate separation of social and academic use.

The aim of this article is achieved in terms of supplementing the literature gap identified by Klein et al. (2018) that "few studies that explore WhatsApp use in the natural environment of higher education" (p. 2) and the methodology gap (Hashim et al., 2018) that the majority of the literature adopts a quantitative research methodology while only 10% use the mixed method. The result from this study confirms the usefulness of adopting a mixed method where quantitative and qualitative data (sometimes contradictory) are triangulated.

For our intention to explore WhatsApp's potential to broaden online teaching as the new norm beyond merely an emergency remote teaching mode, what we find is that WhatsApp has clearly been beneficial during the COVID-19 emergency remote teaching mode. Although communication remains one of the primary functions that WhatsApp can serve in teaching and learning, content-related functions are clearly feasible. Recorded innovative ways of using WhatsApp to deliver content or encourage student interaction suggest an increasing role of modifying or redefining the role of social media in the teaching and learning space (Puentedura, 2010, 2014). In addition to considering ways to address the challenges students experience, such as providing content in small chunks, and minimizing information overload within WhatsApp groups, for WhatsApp to move beyond an emergency remote teaching platform would require a more careful re-examination of the teaching content. Merely replicating the face-to-face mode of delivery wouldn't unleash the advantages of virtual delivery. Instead, to broaden online teaching and learning, learning activities should be conceived with virtual delivery from the onset (Gatti et al., 2020; Hodges et al., 2020). One additional challenge that could further hamper WhatsApp's further use for online learning seems to lie in its suitability to accommodate assessment tasks, particularly in terms of assessment marking. Although the literature has recorded the successful use of WhatsApp for assessments (e.g., Tarighat & Khodabakhsh, 2016), how to process assessments and marking on WhatsApp calls for further exploration.

The triangulation of the behaviors and perceptions of first-time WhatsApp users (scarcely separately discussed in the literature) and gender is also fruitful although we found no statistical significance between genders. What we did highlight is that first-time users generally go through a familiarising period before other WhatsApp functions are fully used; they also seem to prefer the most basic functions (messages rather than VN); they focus more on assignment-related activities; and they interact with fellow students more. This suggests a natural adaptation process, although awareness of such can assist lecturers to be more cognizant of balancing messages and VN and encourage or facilitate student engagement.

Concerning the instructional usage and integration of social media into the formal learning space, Taylor (2015) proposes class management, accessing, organizing, and distributing content, student discussion, and creating and sharing assignments. In terms of our last unique feature and novelty of this study is our separate analysis of active (e.g., *initiating* query or discussion) and passive use (e.g., receiving information), we found WhatsApp used in almost all the learning spaces. Similar to earlier findings on social media's usefulness to "help managing schedules and making announcements" (Jankauskaite, 2015, p. 55), class management (communication) functions are prevailing, but we also found content distribution and student discussion activities quite widespread. Passive receiving of information is slightly more prevalent than more active class engagement on WhatsApp, even amongst the frequent use of WhatsApp. We also found that assignment-related usage on WhatsApp is high but mainly limited to queries rather than assessment submissions or marking. This is similar to conclusions made by Chen and Bryer (2012) where social media is found to be "generally conducted to facilitate learning, not necessarily for grading purposes" (p. 96). This aspect is generally found to be preferred through the formal channel of LMS (Khoza & Mpungose, 2018)

As this is a small-scale study using convenience sampling, the findings should be interpreted with caution. We invite further research to verify our findings or explore the applicability of our findings to other contexts.

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APPENDICES

WHATSAPP SURVEY

We would like to invite you to participate in a study (completing an online survey) about your experiences and perspectives on WhatsApp as a teaching and learning supporting tool during the last months. This study has been approved by the Education ethics committee. Kindly note that your participation is voluntary. You will not be penalized if you do not wish to participate. But your views are valuable for us to understand better the potential and challenges of using WhatsApp for teaching and learning, so we would sincerely hope that you are willing to share your view.

This survey will take about 10 to 20 minutes to complete. It is anonymous, your identity will not be exposed.

Do you give consent to participate in this research?

- Yes
- No

1. Has any of your modules ever used WhatsApp to support teaching and learning before COVID-19?

   A. Yes. The module name is_____.
   B. No.

2. Which WhatsApp platform has been more useful to you?

   A. WhatsApp group (messages/documents)
   B. WhatsApp group (voice notes/chat)
   C. WhatsApp individual (messages/documents)
   D. WhatsApp individual (voice notes)

3. With whom have you used WhatsApp the most?

   A. Fellow students (in WhatsApp groups)
   B. Fellow students (in WhatsApp individual chats)
   C. Individual tutors
   D. Teaching team including the lecturer and tutors
   E. Other (please specify_____)

4. Please select the top 3 WhatsApp usages for teaching and learning mostly applicable to you. It can be with any of the groups you interacted as in question 3.

   A. Receive announcements and messages (including voice notes)
   B. Query/ask questions/engage in discussing class content
   C. Query/ask questions/engage in discussing assignments
   D. Query/ask questions about marks

E. Send/receive feedback on assignment drafts
F. Collaborate for group work
G. Report challenges/problems (e.g., data concern)
H. Share other information (e.g., UJ updates)
I. Share emotions (e.g., frustration)
J. Other (please specify_____).

5. How often have you used WhatsApp for teaching and learning?

A. More than once a day
B. Between once a day to once a week
C. Fewer than once a week

6. What time have you been on WhatsApp for teaching and learning? (You can choose more than one response).

A. Weekdays between 8:00 and 16:00
B. Weekdays before 8:00 or after 16:00
C. Weekends
D. When I expect new messages/information to be loaded
E. When I check WhatsApp for other purposes, e.g., social message
F. What I need to send messages
G. No specific pattern

7. What do you like about WhatsApp for teaching and learning? (you can choose more than one response)

A. WhatsApp uses less data
B. WhatsApp is easier to access
C. Responses on WhatsApp are usually quicker than on other online platforms
D. WhatsApp have various functions useful for teaching and learning
E. I have already had WhatsApp on my device before COVID-19
F. I was already familiar with WhatsApp functions before COVID-19
G. The messages/recordings are always there for me to access any time
H. Can engage in the comfort of my own space
I. Other (please specify_____)

8. What do you dislike about WhatsApp for teaching and learning? (you can choose more than one response)

A. I am not used to WhatsApp as a learning and teaching supporting tool.
B. The amount of information on WhatsApp sometimes overwhelms me.
C. The length of some message/voice notes is too long.
D. WhatsApp messages come any time of the day, disrupting my other work.
E. Control of disruptive users on WhatsApp is insufficient.
F. The tones on WhatsApp are often disrespectful.
G. Interaction on WhatsApp is and not as good as interaction in person.
H. The lecturing team allows admin only most of the time.
I. I normally use it as a social networking site and it's not easy to associate it with teaching and learning.
J. Other (please specify_____).

9. Overall, how will you rate WhatsApp for teaching and learning? Select the most applicable:

   A. Not useful at all.
   B. Limited use, but it has potential if challenges above are addressed.
   C. Limited use. I do not recommend for it to be used as a teaching and learning tool.
   D. Useful. I recommend that it should be used beyond the COVID-19 lock down.
   E. Useful. It should be used more beyond COVID-19.

10. Please select the statements you agree with (you can choose more than one)

   A. WhatsApp can only supplement other platforms (for example BB) for teaching and learning purposes.
   B. WhatsApp is only suitable for communication/queries (e.g., deadline etc.).
   C. WhatsApp can be used to deliver/engage with teaching and learning content.
   D. WhatsApp can be used for assessment related functions.
   E. WhatsApp is useful only with certain user(s)/group(s) for specific purposes during certain times (e.g., COVID-19).
   F. WhatsApp is only not fit for teaching and learning purposes at all.

11. Please select the top 3 online teaching and learning platforms you used the most during COVID-19. It can be with any who you interacted with.

   A. Blackboard (including all BB functions)
   B. Email
   C. WhatsApp (group or chat)
   D. Microsoft Teams
   E. Zoom
   F. Other/Google documents and collaborate functions of google

12. Please Rate how helpful you find the following online platforms for teaching and learning during COVID-19. It can be with your lecturer, tutors or fellow students. (1 very helpful, 2 helpful, 3 neutral, 4 unhelpful, 5 very unhelpful, 6 Not applicable)

   A. Blackboard
   B. Email
   C. WhatsApp group
   D. WhatsApp chat (message)
   E. WhatsApp chat (voice note)
   F. Microsoft Teams
   G. Zoom
   H. Other

13. What is your gender?

   A. Male
   B. Female
   C. Prefer not to say

14. Would you like to chat to us more about WhatsApp to support teaching and learning?

   A. Yes. Here is the contact number. I can be reached. _____
   B. No

WHATSAPP SEMI-STRUCTURED INTERVIEW SCHEDULE

Pre-COVID 19:

If participants' response is that they have used WhatsApp in other modules as a teaching and learning tool, then ask the following.

1. Explore how WhatsApp was used (for what, how often, which function/for what purpose; group, individual, voice etc.
2. With whom did you use WhatsApp with, discuss on what, broad perceptions. 1031 3. What were the benefits and challenges, of using WhatsApp as a teaching and learning tool? Compare with other platforms.

During COVID-19:

How did you use WhatsApp as a teaching and learning supporting platform during the Covid 19 lockdown?

1. Explain what you used WhatsApp for, how often (Did your use of WhatsApp as a teaching and learning tool increase during covid-19) which function/for what purpose? group, individual, voice, doc, etc, with whom, discuss on what, broad perception,
2. What are the benefits and challenges for using WhatsApp during Covid-19 (benefits and challenges, compare with other platforms)?
3. Which module used WhatsApp most effectively? Please explain why.

Post COVID-19:

1. Can you suggest better ways of using WhatsApp as a teaching and learning supporting tool?
2. Do you think WhatsApp should still be used or abolished as a teaching and learning supporting platform after Covid 19 lockdown, please substantiate your answer with reasons?

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