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Using Assemblage Theory to analyse WhatsApp use among first-year students: Case of a South African University

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ABSTRACT

In this paper we analysed the use of WhatsApp among first-year students at the University of Technology in the context of South Africa. Drawing on Deleuze and Guattari's Assemblage Theory, the study analysed postings on a WhatsApp group and secondary data using content analysis. The findings showed that first-year students used WhatsApp for communication, sharing content and information related to issues affecting their studies. Further, WhatsApp was useful in the process of becoming first-year students in the new educational environment and in the creation of knowledge from multiple sources that was not confined to the lectures and classroom experiences. This study offers insights that can be useful when developing strategies for integrating Mobile Instant Messaging platforms in the context of higher education.

Keywords: *First-year students; WhatsApp; Assemblage Theory; Mobile Instant Messaging; University of Technology*

INTRODUCTION

Mobile Instant Messaging (MIM) platforms support communication, instant interaction, sharing of information in the form of text, images, voice and videos (Baulch, Matamoros-Fernández & Johns, 2020). Examples of MIM are Facebook messenger, WeChat, WhatsApp, Telegraph, and Hangouts. MIM platforms are designed in such a way that are easy to use and are a considerably cheap means of communication that are widely adopted and used in many contexts. Hence, MIM platforms are also being integrated into teaching and learning to improve the learning experiences of students and improve their academic performance (Mpungose, 2020; Pimmer & Rambe, 2018). We explored the use of WhatsApp (as an example of a MIM platform) among first-year students at a University of Technology (UoT) in South Africa where the transformation of higher education institutions is relevant to redress the apartheid past - for example, systematic racial segregation and inferior quality education among the majority of black people - (Ebewo & Sirayi, 2018; Spaull, 2013). UoTs have been promoting access to education to support inclusion, skills development and economic empowerment of students (Hemson & Singh, 2010). First-year students at UoTs come from diverse backgrounds including students from previously marginalised communities (Pather & Chetty, 2016). Integration into university life socially and academically to succeed has been a persistent challenge for the students. Studies show that first-year students face challenges including poor understanding of academic processes, lack of technology devices, high cost of Internet, lack of information, limited ICT skills, change of environment, poor performance, high dropout rate and inability to adapt (Pather & Chetty, 2016; Pather, Narodien-Fataar & Mkonto, 2017; Lekana & Bayaga, 2020). The problems of first-year students in higher education institutions can be complex and the solutions can emerge from multiple perspectives (Schrader & Brown, 2008).

WhatsApp is seen as a panacea that can remedy some of the challenges outlined above that first-year students face in their learning context (Abiodun, Daniels, Pimmer & Chipps, 2020). WhatsApp offers better means of communication, collaboration, users are always reachable and pervades personal and work environments. WhatsApp also supports the development of students' social

relationships and social bonding in new learning contexts (Ali, Khan & Kashif, 2020; Bano, Cisheng, Khan & Khan, 2019). While there is growing literature on first-year student's experiences and use of MIMs in the context of South Africa (Mpungose, 2020; Pather & Chetty, 2016; Pather, Narodien-Fataar & Mkonto, 2017), this study seeks to further understand the role of WhatsApp in supporting first-year students' experiences. The study was guided by the research question: How does WhatsApp support first-year students to enhance their learning experiences? To answer the question, the study used Assemblage thinking (Deleuze & Guattari, 1987) to understand the complex processes of learning and how students use WhatsApp to enhance their learning experiences. Assemblage thinking was considered appropriate because learning happens in processes that are linked together to generate knowledge and lived experiences that can transform the lecturers and learners (Buzzul & Kayumova, 2015; Tillman, Holland, Lorenzi & McDonagh, 2014; Waghid, 2013).

LITERATURE REVIEW

Mobile instant messaging applications such as WhatsApp have become a popular means of interacting, communicating, and sharing information in society (Yasuda, 2021). MIMs are also being used in education settings including universities. In this study, we review literature on the use of WhatsApp among students in education settings. We concentrated on the context of South Africa where first-year students face challenges in a new learning context where they have to adapt to new academic, social and cultural contexts (Black & Jamieson-Protor, 2018). The literature review describes the characteristics of WhatsApp, its uses and challenges in an education setting. The context of higher education in South Africa is summarized and we highlight knowledge gaps in the literature on use of WhatsApp among students.

Defining Mobile Instant Messaging

Mobile Instant Messaging "*is smartphone application that allows users to send and receive audio and text messages, images, and digital documents in real time via an internet signal*" (Yasuda, 2021, p. 22). MIMs are freely available on the Internet Applications (App) stores such as, Google Play store, Apple App store and Huawei App Gallery. Users can download and install MIM on their mobile devices and use them with less effort. Examples of MIM include WhatsApp, WeChat, Telegraph, Facebook Messenger and TikTok (Yasuda, 2021). WhatsApp is one of the popular MIM in use in South Africa. It is estimated that about 95% of the 41.9 million Internet users in the country use WhatsApp (Digital, 2022).

WhatsApp was founded by Jan Koum and Brian Acton in 2009 and later joined Facebook (now Meta) in 2014 (WhatsApp, 2022). WhatsApp users can download the application from the Internet and run the application on personal computers, smartphones and tablets running one of the following operating systems: Android, iPhone, Windows phone, Nokia s40 (WhatsApp, 2022). WhatsApp is ubiquitous, portable, collaborative, interactive and instant. WhatsApp can be used to communicate between individuals or a group. Users can communicate using voice, text, and audio recordings. Further, users can share documents, pictures and videos when connected to the Internet. The cost of communication when using WhatsApp is lower compared to the cost of phone calls and simple message systems (Makoza, 2020; Yeboah, 2014). The use of WhatsApp is popular among the younger generation as they often keep connected and interacting to share information, communicate and participate in groups (Baulch, Matamoros-Fernandez & Johns, 2020). WhatsApp is being integrated for work, leisure, studies, and social activities. Business organisations and higher education institutions are also attempting to find ways of formally incorporating WhatsApp in their processes and activities (Pimmer & Rambe, 2018; So, 2016).

WhatsApp uses and challenges in education settings

WhatsApp can support formal and informal learning and enhance the development of knowledge and experiences that can contribute to the success of first-year students. WhatsApp supports the development of students' social relationships and social bonding in new learning contexts (Abiodun, Daniels, Pimmer & Chipps, 2020). Further, WhatsApp can support the transformation of teaching and learning in the higher education context to accommodate new forms of learning such as remote learning and self-learning (Bano, Cisheng, Khan & Khan, 2019).

Gachago, Strydom, Hanekom, Simons & Walters (2015) reported the adoption of WhatsApp among lecturers to support their teaching practices. Their study highlights the advantages of using WhatsApp including sharing of content with learners, better communication and supporting collaboration among students. Their study noted challenges for lecturers in integrating WhatsApp including the balance between formal and informal use and sharing of content; and sometimes lack of control over the discussions - for social use or academic use. The study proposed future studies to investigate the use of WhatsApp among students. Similarly, Basitere & Ivara (2017) noted the challenges of student's performance when using WhatsApp in education settings. The study found that students used WhatsApp to cheat in assessments and obtained higher marks. The students did not gain the competencies compared to other students who did written assessment. The study offers caution on challenges of access to technology among students and inappropriate learning practices such as cheating using technologies.

Pimmer and Rambe (2018) noted that learners are finding it useful to interact in enhancing their learning activities using WhatsApp. However, the study indicated other challenges that have emerged when using WhatsApp including improper writing and distraction among learners which can affect performance. There are mixed views on the use of WhatsApp in the context of learning such as ambiguities, contradictions and social-cultural tensions. Similarly, Motaung & Dube (2020) analysed learners' experiences using WhatApp during the COVID-19 pandemic. The study highlighted challenges related to lack of devices among students, poor connectivity in remote areas and difficulties in understanding audio recording of tutorials. The study recommended training of tutors to enhance the use of WhatsApp in the learning context.

Mpungose (2020) analysed the preferences of first-year students on the use of WhatsApp or a learning management system. Some of the reasons for the preference of the students to use WhatsApp were easy to use as the first-year students had limited IT skills, convenience where the learners could use WhatsApp in both formal and informal learning activities and the freedom of the students to use the platform for discussing their issues. Their study highlighted the use of key differences in the use of formal and informal systems in teaching and learning and recommended the need for higher education institutions to integrate informal platforms such as WhatsApp in teaching and learning.

While WhatsApp use has become popular in the context of teaching and learning (So, 2016; Yasuda, 2021), other scholars have argued that the use of WhatsApp has become such a complex phenomenon that educators and administrators are trying to find better ways on how they can be integrated into education settings (Greenhow & Lewin, 2016). Integrating WhatsApp in the education setting is challenging, especially for educators that have not used technology in teaching and learning (Waghid, 2013). Greenhow and Lewin (2016) stated that emerging digital cultures in an education setting are difficult to plan for lectures because learning happens in informal ways including spontaneous, experimenting and incidental using technologies. Waghid (2013) stated that lecturers have limited resources to acquire state of the art teaching and learning technologies and knowledge to integrate the new technologies in teaching and learning. The situation may affect the confidence of lecturers to use new technologies. There is a loss of control of data and knowledge of higher education institutions because WhatsApp use is not confined to classroom or learning

platforms and for education purposes. WhatsApp has multiple uses including personal organisation, socialization and leisure (Barhoumi, 2015). Hence, lecturers and administrators are still struggling with new technologies and how they can effectively integrate the use of WhatsApp for education purposes and improve the learning experiences of students. Unfortunately, the use of WhatsApp among learners remains unclear in the context of their integration into the education setting (Gachago, Strydom, Hanekom, Simons & Walters, 2015; Romero-Hall, 2021).

Context of study: Higher Education in South Africa

The higher education sector in South Africa comprises 26 public funded universities, categorised into traditional universities and universities of technologies. There are also vocational and tertiary institutions of higher learning. Private universities and private training providers also form part of the higher education sector (Le Grange, 2020). The higher education sector is crucial for skills development and research to identify solutions required in the economic sectors and society. Further, the higher education sector is supporting the government agenda for transformation and redress of the apartheid legacy. The sector supports socio-economic inclusion of previously disadvantaged communities (Mabokela & Mlambo, 2017). Hence, enrolment of first-year students in the higher education sector has increased over the last decade (Mlambo, Mlambo & Adetiba, 2021).

In this study, first-year students experience is the process involving academic, social and emotional change when students from high school or from industry join a higher education institution to pursue academic programs (Black & Jamieson-Protor, 2018; Kift, 2015). First-year experience of students is crucial for student's development, engagement and success in the higher education context. The first-year experience includes undergraduate and mature students who are at university for the first time. However, studies showed that undergraduate students face many difficulties since it is usually their first time at a university and away from their parents or guardians (Kift, 2015; Pather, Narodien-Fataar & Mkonto, 2017). Some of the problems of first-year students are inability to cope in the new learning environment, student attrition, limited ability to engage with lecturers and peers, anxiety and stress (Ang, Lee & Dipolog-Ubanan, 2019; Arends & Petersen, 2018). Further, some of the first-year students lack financial resources, face limited support from academic administrators and management, poor integration into the university systems, lack of competencies in language and numeracy and limited digital skills, gender based violence and lack of support for students with special needs - students with learning difficulties, visually impaired and mobility challenges. These problems are contributing to limited academic progress (on average students take 5 years for a 3 year degree program), low throughput, overcrowding in classes and high dropout rate (Carpenter & Roos, 2020; Lyner-Cleophas, 2019; Matsolo, Ningpuanyeh & Susuman, 2018). The situation has led scholars to suggest further research to better understand the plight of first-year students. The scholars are encouraging researchers to explain and understand the academic and social challenges of first-year students; and to suggest recommendations to academic managers to address the challenges of first-year students (Matsolo, Ningpuanyeh & Susuman, 2018; Mabokela & Mlambo, 2017).

The government of South Africa is supporting higher education institutions to transform the education sector and society. The government enacted legislation and developed inclusive policies for the higher education sector. Examples of these laws and policies are the Education White Paper 3 of 1996, the Higher Education Act of 1997, and the National Student Financial Aid Scheme of 1999 (Mabokela & Mlambo, 2017). These laws and policies attempt to address issues related to social and human capital development to facilitate the development of quality education, knowledge, and graduates that can support the development of democracy and the development of South Africa (Dube & Ngulube, 2013). Part of the human capital development process is enhancing the integration of ICT in teaching and learning in higher education through initiatives

such as smart campuses, virtual labs, and data management. (Czerniewicz, Ravjee & Mlitwa, 2007; Moloi & Salawu, 2022).

Studies have shown that learning technologies can support learners to perform better in their studies (Jaffer, Ng'ambi & Czerniewicz, 2007; Pimmer & Rambe, 2018). Learning technologies include Learning Management Systems, Library Systems, and Student Records Systems. Higher education institutions procure these systems and have control over the way the systems are used for learning and supporting education administration activities. MIM are also finding their way into teaching and learning, where both lecturers and students are using MIM for communicating, sharing content, and collaborating in learning activities (Greenhow & Lewin, 2016; Pimmer & Rambe, 2015). However, formal policies and strategies for integrating MIM into teaching and learning are missing in universities and colleges (Ng'ambi, Brown, Bozalek, Gachago & Wood, 2016; Moloi & Salawu, 2022). One of the challenges is that MIM are owned by private companies, which makes it difficult for higher education institutions to control the use of MIM, which is often outside the control of departments responsible for learning technologies (Chen & Bryer, 2012). This often raises issues of control over knowledge generated in an informal learning setting, content ownership, privacy issues, and acceptable use of MIM to avoid moral hazards such as cheating in assessments, copyright of learning content, cyberbullying, and misinformation (Romero-Hall, 2021; Toofaninejad, Zaraii-Zavaraki, Dawson, et al., 2017). Hence, there is a need to understand how students are using MIM to enhance and improve their performance and learning experiences and have strategies in place to address unintended consequences of using MIM (Bidarra & Rusman, 2017).

Theoretical perspective: Assemblage Thinking

The study used Assemblage thinking, drawing on the work of Deleuze & Guattari (1987). In this context, a rhizome is a system of connected elements that are not arranged in a structure. For example, a rhizome has many lines that grow into different directions. Further, a rhizome has many assemblages, and they are always constantly connecting and mutating. Using the idea of the rhizome, the authors propose the connection and movement of ideas as a form that is made up of assemblages that are unstructured, multi-scaled, and emerge at different levels (Deleuze & Guattari, 1987). Assemblages can have elements including individuals, groups, humans, non-humans, materials, and non-materials connected together. Assemblages can be part of other assemblages, such as nature, science, technology, culture, politics, needs, emotions, needs and interests (Tillman, Holland, Lorenzi & McDonagh, 2014).

The concept of assemblage has been used in several studies for education (Bali, Honeychurch, Hamon, Hogue & Koutropoulos, 2016; Mackness & Bell, 2015; Tillman, Holland, Lorenzi & McDonagh, 2014). However, Deleuze & Guattari (1987) do not provide details on how the concept should be applied. Hence, the study attempts to operationalize the concept of assemblage in the context of learning.

Deleuze & Guattari (1987) suggest that assemblages are composed of horizontal axis and vertical axis. The horizontal axis defines the roles of an assemblage and has components or materials. The vertical axis are the processes of an assemblage and expressions. From these two dimensions, the concepts of machinic assemblage, collective assemblage, territorialization, and deterritorialization were operationalized in the study.

- ***Machinic assemblage or content:*** are the forms of materials that support "what is done" and can include objects, actions, human/non-human to support/corporate modifications (Deleuze & Guattari, 1987). We considered the various assemblages that supported the learning activities of first year students and how WhatsApp was used to support the activities.

- ***Collective Assemblage or expression:*** were enunciation related to expression or "what is said" and can include words, ideas and speech acts to support/incorporate transformations (Deleuze & Guattari, 1987). We considered the ideas that were expressed in the WhatsApp chat group and the actions that emerged from the discussions of the students related to their learning experiences
- ***Territorialization:*** An assemblage can have features that establish some form of stabilization through consideration of standardization, habits, identities, positioning, roles, and responsibilities. These features are not permanent but support the process of transition or movement into deterritorialization (Deleuze & Guattari, 1987). Habits, practices and identities of first-year students that emerged when using WhatsApp were identified.
- ***Deterritorialization:*** Assemblages are not permanent and defy some of their structures to allow change and establish new forms of knowledge and ways of being of the participants. Assemblages will also collapse over time and re-emerge in new forms (Deleuze & Guattari, 1987). We considered the formal and new forms of learning for first-year students that emerged when using WhatsApp.

The concepts from Assemblage will support better understanding of the learning activities where MIM are integrated in the activities of first-year students (Pather, Narodien-Fataar & Mkonto, 2017). In this context, the assumption is that learning happens in formal or informal contexts for first-year students. MIM such as WhatsApp support development of relations that are fluid, multiple, allowing exchange of ideas and new knowledge from multiple sources. The first-year students use of MIM is not limited to learning but in multiple functions for work and leisure and improves their transition into the university context.

RESEARCH METHODOLOGY

The study used a qualitative case study to understand how WhatsApp supports first-year students to enhance their learning experiences. The case study is used to understand the context of learning and processes for using technologies (Thomas, 2021). The case study was appropriate to generate insights on how first-year students used WhatsApp to support their learning activities and supported use of concepts from Assemblage thinking, data collection and analysis (Thomas, 2021). Purposeful selection of participants and documents that were relevant to the study were selected (Patton, 2014). The criteria were (a) students at a University of Technology (b) students who were in their first year in their academic program (c) documents that would provide relevant background to the context of the university and use of technology for teaching and learning. A sample of 152 students was used, of which 92 were females and 60 were males. The sample comprised local students from different provinces of South Africa and international students from other countries in Africa – Angola, Democratic Republic of Congo, Zambia and Zimbabwe. The students used mainly English for communication in their academic interactions and in a few instances used their mother language including Zulu, isiXhosa, Afrikaans and French. Data for the study includes WhatsApp chatgroup posts (text, images and video) covering the period February to November 2020. The posts covered issues related to learning, personal issues, entertainment, travel, safety, income generating activities, student grants, accommodation and copies of formal communication from students' representative council, lecturers and management. Secondary data were obtained from the University's Administration Department website and the documents were the university strategy on technology for teaching and learning and a faculty strategy document. The researchers were granted ethics approval from the university ethics committee and permission from the Head of department and the lecturer teaching the course. The students were informed about the research and given the option to leave the group if they did not want to participate. Names of individuals and departments have not been revealed in the presentation of the findings to maintain privacy.

The collected data was imported in a qualitative data analysis software (Altas.ti) to effectively manage text data in one repository. Content analysis was used to analyse the data (Erlingsson &

Brysiewicz, 2017). The process of content analysis began with reading and re-reading the data to understand the overall events, activities and processes. Key points and interesting points were noted. Codes were assigned to the text using the software. The codes were then grouped into sub-categories. The sub-categories were also grouped into themes that were related to concepts from Assemblage thinking. The content analysis process was iterative and at the end the report was produced to answer the research question guiding the study.

KEY FINDINGS

Machinic assemblage or content

Machinic assemblage constituted possibilities of learning for first-year students at a university of technology. Elements of machinic assemblage were resources, physical infrastructure, processes, and actions that formed part of the first-year students' experiences. The first-year students required formal submission and confirmation of their personal details during the registration process to ensure that the learners were granted access to different resources for supporting learning activities, including IT systems (email and learning management systems) and accommodation in students' residences. The first-year students required information on the venues where they could attend classes and the contact details of their lecturers. WhatsApp supported a quick means of sharing and accessing information among the first-year students about resources, physical infrastructure, and academic processes. The first-year students shared their knowledge and experiences. For example, students that had completed registration shared information with peers that had not completed the registration process. Sharing knowledge and experiences for registration was important for students because most of the students were new to the university and relied on information from their peers. Table 1 below summarises examples of statements that were categorised under the mechanic assemblage theme.

Table 1: *Summary of categories for machinic assemblage*

Category	Description	Example of statement
ICT systems	ICT systems that were necessary for supporting learning activities	*"I cannot login … Am I the only one experiencing problems with Blackboard [Learning Management System]?"*
		"I cannot even log into my emails. I was confused if it had anything to do with being excluded"
Registration	Formal submission of personal information and recording the information	*"How long does it take for the university to send proof of registration? … because that is the only thing left to do!"*
		"But am sure when it comes to registration you will have to go to Administration Building. There is a lady there that deals with international students only"
Accommodation	Students' places for living that is convenient to study	*"Can I please ask, where do you go when you are accepted for Residence?"*
		"You must first go to Red Department and ask for [Person Y]. They will give you a yellow form with a stamp of the Residence Department"
Students funding	Challenges in receiving students funding on time	*"I registered in 30ebruary, but I applied for NSFAS last year and also uploaded my bank details on that website link last week. Does that mean I am one of students who will receive their money in March?"*
		"I am also not receiving my grant."
Classrooms	Details of venue where learning takes place	*"People help me please, where is Sadernburg campus?"*
		"Where is the venue for communication[course]?"

Timetable	The schedule for learning activities	*"Anyone with a group D timetable? Please share."*
		"Anyone with a group C timetable? Please forward"
Content	Sharing content for the course and other related content	*"Can someone send me the chapter 3 outline slide please? … thank you for the slides"*
		"Ladies and gentlemen, with regards to Accounting calculations, please do check on YouTube for some tutorials…"

As can be seen in Table 1, WhatsApp was used to share information directly related to learning activities including sharing of course content, timetables and venues. Although there were formal systems where learning resources were shared such as the Learning Management System, the students also shared the learning materials on WhatsApp because (a) it was easy for students with limited IT skills to access the content (b) it was convenient for the students to access the materials on their own devices. Further, students shared additional learning materials (for example, YouTube links) that were related to the course, from other sources that supported their understanding of the topics covered in the course. WhatsApp supported peer learning where first-year students were able to ask their peers for support and clarification on topics and other learning activities.

Collective assemblage/Expression

Collective assemblages were the expressive role of WhatsApp use in the learning process where the components of the assemblages were used. From the various elements that emerged from the machinic assemblage, WhatsApp was used to express ideas that led to actions that supported learning activities. Relationship development, student representation, and student safety are just a few examples. According to the university setup (where the study was conducted), each class had a student representative who acted as a point of contact for the first-year students and lecturers. The class representative communicated the interests and concerns of the first-year students to the lecturers and the department. WhatsApp was used in the process of selecting the class representative. Students used WhatsApp to build better relationships amongst themselves. Good peer relationships were important to ensure that there was some form of consensus among the students, because the students came from diverse cultures and different linguistic backgrounds. For example, the class had students from South Africa and international students from other parts of Africa. The students spoke different languages, and it was important that all students use a language that was understood by all. Table 2 below summarises examples of statements that were categorized under the collective assemblage theme.

Table 2: *Summary of categories for collective assemblage*

Category	**Description**	**Example of statement**
Student representation	Student representatives engaging with other students to present their concerns	*"There are some of our classmates who are missing classes because they cannot afford to travel to campus"*
		"Remember the consequences of #feesmustfall [students protests], do not forget we have assignments to write ...on that note please make your decision wisely"
Relationships	Development of relationships among learners from diverse backgrounds	*"We all suffer from language barrier. I fully understand where you guys are coming from, you must also understand there are students from very disadvantaged backgrounds where they were taught English in isiXhosa."*
		"Could we just please have a level of respect for one another and be sensitive to the people in the group?"

Student's safety	Sharing information regarding safety in the learning environment and outside campus	*"Guys, please be careful. If you are driving and park your car in the parking lot, take caution."*
		"Class representatives notify our lecturers that there is a possibility that Shuttle's will not operate today due to strike. If we do not pitch up, class test can be cancelled. Some of us are staying off-campus residences which are in Belhar and Parow."

Collective assemblage was demonstrated in use of WhatsApp to express concerns of first-year students regarding the registration policies of the university (Deleuze & Guattari, 1987). For example, the issue of student debt and access to campus accommodation led to some students not being able to register and attend classes. The situation led to protests on campuses. Learning activities were cancelled because in some cases the protesting students used violence. The students used WhatsApp to share information regarding the incidents and their safety on the campuses.

Territorialization

The findings revealed a movement from machinic assemblage to collective assemblages. The machinic assemblage elements, comprising ICT systems, registration, accommodation, classrooms, and timetables, supported the movement to collective assemblages. Examples of collective assemblages were students' representation to the lecturers and department, good relationships among peers, and the sharing of safety information while on university campus. The collective assemblages led to some form of stabilization, identities, and roles of the first-year students. WhatsApp use supported the students to perform certain roles and responsibilities in the new learning environment. For instance, students used WhatsApp to appoint class representatives when they were divided into smaller groups to ensure that there was no overcrowding in the learning venues. Table 3 below summarises examples of statements that were categorized under the territorialization theme.

Table 3: *Summary of categories for territorialization*

category	**Description**	**Example of statements**
Roles	Leading in presenting the interest of the students	*"You need to appoint someone else to be class representative. There is need for a class representative for each group"*
		"We are majority stakeholders of this institution; we must be treated like one. If she insists that we look for those people, she is leaving me no choice to send email to Head of department and Dean of students."
Responsibilities	Assuming responsibility or being agents for change in the context of learning	*"I have created a chat group for international students . In the chat group, I would like you guys to state all the problems you are currently facing during this lockdown, that are somehow hindering your academic year"*
		"People must learn to speak out if they have issues. Otherwise, you will repeat the module next year that means an extra year of study"
Positioning	Taking various roles to enhance the process of learning	*"Let us stop relying on class representatives all the time because they do not know our challenges"*
		"If you have any questions but cannot attend the session right now, share them here. I will present to the lecturer during class."

The students also used WhatsApp to express their ideas and actions if their class representatives were not performing their duties in presenting the concerns of first-year students to lecturers and the department. The use of WhatsApp demonstrated that the student's roles were not fixed but changed as different issues emerged during the learning activities. Furthermore, students used WhatsApp to enhance their human agency in the context of learning. For instance, some of the first-year students required information technology devices to participate in remote learning during lockdown of the COVID-19 pandemic. Only local students (South African born) were offered information technology devices through the National Students Financial Aid Scheme (NSFAS). International students felt excluded, and the student representatives used their agency to raise the issues of international students (who had no information technology devices) to the lecturers and management.

Deterritorialization

While there were changes because of collective assemblages, identities and roles of the first-year students led to new forms of learning and ways of generating new knowledge. In a way, WhatsApp use among the first-year students supported new forms of learning that were not part of the formal delivery of the course. For instance, first-year students used WhatsApp to (a) share learning content that lecturers shared on the learning management system (b) shared learning content that they found from other sources such as YouTube (d) shared content that the students generated themselves while asking questions and explaining what they had learnt to their peers. Sharing of content and learning using WhatsApp complemented the use of formal ICT systems such as the learning management systems and e-mail systems, and face-to-face classes. Table 4 below summarises examples of statements that were categorised under the deterritorialization theme.

Table 4: *Summary of categories for deterritorialization*

Category	Description	Example of statement
New ways of learning	Remote learning	*"Can the class representative ask lecturers, when are we getting our timetable for remote learning?"*
		"You never registered for distance learning. Some students are struggling to adapt with this online learning, and we all have our different ways of learning"
New knowledge	Developing new knowledge from formal and informal learning	*"Yes, use WhatsApp web. I agree with what student [Y] shared yesterday. It makes life a lot easier."*
		"I sometimes wish our lecturers would take normal videos and send them via WhatsApp"

Remote teaching and learning were introduced during the year due to lockdown restrictions because of the COVID-19 virus. There were few face-to-face classes, and first-year student courses were taught using the learning management system. First-year students experienced challenges when accessing the learning management system. Some students failed to access the ICT systems due to poor quality of connection. Some lecturers used WhatsApp in addition to the learning management system to share recorded lectures. Management supported use of alternative means of learning in ensuring that all students should complete their studies despite the new forms of learning: "*Management is committed to ensuring that no student is left behind as a result of the COVID-19 crisis*". This meant that new ways of learning were introduced, and the first-year students benefited from the new ways of learning.

DISCUSSION OF RESEARCH FINDINGS

The study set out to analyse the use of MIM among first-year students at a university of technology. The study was guided by the research question: *How does WhatsApp support first-year students*

to enhance their learning experiences? Our findings showed that WhatsApp supported the first-year students' ability to navigate their new learning environment. WhatsApp was used to share information that supported students in registering, finding accommodation, accessing funding and planning learning activities. WhatsApp supported the sharing of information related to learning venues, timetables, and content. The students were able to share formal learning content that was shared by the lecturers on the learning management system through their WhatsApp group, along with informal content from other sources related to their studies. The students generated their own content on WhatsApp through their questions and discussions to enhance their understanding of the topics covered in class. The findings were consistent with other studies that have highlighted the use of WhatsApp in the context of higher education in South Africa (Gachago et al., 2015; Mpungose, 2020; Pimmer & Rambe, 2018; Willemse, Jooste & Bozalek, 2019).

Our findings further highlighted insights on the use of WhatsApp among first-year students to overcome the challenges of being in a new learning environment. The current study shed light on issues related to registration, accommodation, developing relationships, safety on campuses and protests at a university of technology in South Africa. Students used WhatsApp to request and share information on where they could find student accommodation and contact information for staff with responsibility for accommodation. For some of the students, it was their first time away from their homes and WhatsApp was used to develop new relationships with their peers. WhatsApp was also used to share information on events taking place on campus such as student protests related to academic debts and registration. This was important information for new students who were not aware of the potential safety risk during the protests while on campus. These findings extend our understanding of uses of WhatsApp among students beyond class activities that previous studies have highlighted such as sharing content, communication and interactions (Abiodun, Daniels, Pimmer & Chipps, 2020; So, 2016).

Another interesting use of WhatsApp highlighted in the study findings was useful peer support among the students. While students were at the university to learn, they also used WhatsApp to share ideas and support each other. The students raised concerns of their peers with whom they had developed relationships. The students used WhatsApp to enhance their agency in raising issues affecting their peers who could not raise concerns by themselves. In a way, the students developed the ability to use their agency and resilience in dealing with challenges that were affecting their studies and the marginalized peers in their cohort. The students influenced management to be aware of first-year students' concerns. Management addressed the issues raised by the students to improve their learning and teaching experience. For example, allowing students with debts to register and have a formal agreement to manage their debt.

From the theoretical perspective, the study demonstrated the application of the Theory of Assemblage (Deleuze & Guattari, 1987) in understanding the use of WhatsApp among first-year students at a university of technology in South Africa. Similar studies have applied the theory in curriculum development (Mackness & Bell, 2015; Willemse, Jooste & Bozalek, 2019) and sustainable learning (Tillman, Holland, Lorenzi & McDonagh, 2014). The current study contributes to a better understanding of the use of WhatsApp as an example of MIM and the complexities that first-year students experience in the new learning environment. The study has demonstrated that machinic assemblages (both human and non-human elements) can influence the use of WhatsApp. For instance, enhancing the use of formal systems for learning, such as learning management systems, when students have limited IT skills and knowledge of the systems. Collective assemblage was important because WhatsApp gave the students a platform for organising and presenting their voices on issues that affected their learning activities. Beyond learning, WhatsApp supported students in adopting different identities summarised as follows:

- ***Local students:*** students born in South Africa who were registered to study at the university.

- ***International students:*** students who come from other countries and were registered to study at the university.
- ***Registered students:*** students formally had their personal information recorded and had access to university resources.
- ***Student representatives:*** students who took leadership roles to represent the interest of fellow students.
- ***Academically excluded students:*** students who were not able to register at the university because of poor academic performance or owing fees to the university.

The abovementioned identities enhance the meaning of being a student at a university of technology, and the multiple roles that they could assume when using WhatsApp in the different environment they had to navigate in generating new knowledge. Further, it enhanced the responsibilities of being a first-year student in their learning activities and addressing social justice issues affecting the students. New ways of learning and gaining knowledge emerged from the various positions that the students took.

The study was not without limitations. The study concentrated on undergraduate first-year students. Our findings cannot be generalised to a large population but rather provide analytical generalisations - understanding of contextual issues and similar studies can be conducted to compare the findings (Patton, 2014; Thomas, 2021). From the findings of this study, further research can be conducted on first-year postgraduate students (Hoffman & Julie, 2012). It is often assumed that postgraduate students have undergone undergraduate programs and have considerable skills and understanding of higher education experience. It will be interesting to note the differences in the way WhatsApp can be used and the issues that the students in this group face. Another fruitful area of research is using focus groups to understand the students' experiences, such as following up on the different identities and positions of the students (local student, international student, registered student, student representative, and academically excluded student). Other studies can also look at lecturers' use of WhatsApp using Assemblage Theory (Deleuze & Guattari, 1987). The study makes the following recommendations for academic managers, IT services managers, and lecturers to collaboratively develop strategies for (a) WhatsApp integration in first-year student experience programmes so that students can benefit from using WhatsApp in both formal and informal learning (Kift, 2015) (b) supporting responsible and acceptable use of WhatsApp among first-year students and to avoid misuse of WhatsApp, for example, cyber bullying and exam cheating (Basitere & Ivala, 2017) (c) managing the content that first-year students generate on WhatsApp platforms to form part of institutional knowledge management (Moloi & Salawu, 2022).

CONCLUSION

In conclusion, the study set out to analyse the use of WhatsApp among first-year students at a university of technology in South Africa. The study confirmed that WhatsApp was used for communication, sharing content and information. The first-year students shared information related to registration, accommodation, learning venues, and timetables. Students used WhatsApp to discuss and share ideas to address issues that affected their learning activities. It was interesting to note that WhatsApp supported the sharing of information that influenced first-year students' relationships, identities, and responsibilities by enhancing their agency to raise and address issues that affected student's learning activities. The study contributed towards the literature on MIM that used Assemblage Theory in the context of South Africa.

We are inspired by the findings from the study to suggest areas for further work to look at larger samples of students, the use of multiple methods of data collection, such as focus groups; and studies involving first-year postgraduate students. Such studies can be useful to compare the

findings from this study and improve the theoretical understanding of using MIM in an educational setting and support the development of comprehensive strategies for technology use in education.

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