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Investigating the quality of online discussion forums for Life Sciences courses

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Date: 23 September 2021

Course Code: EDUC7031A

Supervisor: Dr. Mpho Mosabala

A research report to submitted to the University of Witwatersrand in partial fulfilment for a Masters (M.Ed) degree in Science Education coursework and research.

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Investigating the quality of online discussion forums for Life Sciences courses

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Abstract

Most online discussions are barely covered within a given time frame, than they would have been, if the content was taught in a face to face setting. Due to time constrains, if students skipped a session or perhaps the lecturer had to skim over the content; students had to do their own research at their own time in order not to fall behind with the content taught. Moreover, one of the lecturers' strategic roles was to ensure that students participate meaningfully in online discussion forums during the teaching and learning process. This study pursued to establish how the quality of online discussion forums is vested between the lecturers and the students, in other words, how lecturers conduct online discussion forums. Five lecturers took part in the interviews, and further data from the BigBlueButton app including recordings were used to analyse how students and lecturers interacted in online discussion forums. The findings of the study indicated the common and major challenge of the online discussion forums as being the issue of internet connectivity. Online discussion forums, on the other hand, benefit both students and lecturers who are exploring new digitalised ways of teaching and learning.

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Dedication

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Chapter 1: Introduction

Introduction and background to the study

This study aimed to investigate the quality of online discussion forums for Life Sciences courses. The online discussion forum is one of the methods used in teaching students. This method has always been an option that lecturers could use but is currently emphasized in their current teaching due to covid-19 regulations. Studies by Jelodar, Wang, Orji, and Huang (2020); Reich, Tingley, Leder-Luis, Roberts, and Stewart (2014) and; Wong, Li, and Lai (2021) have identified this use of online discussion forums as a challenge at times, particularly when dealing with enormous volumes of messages posted on the forums, while it is also important for both students and lecturers to interact meaningfully in discussion forums. Consequently, the use of online discussion learning has increased worldwide, with little, or no contact teaching and learning.

According to Nandi, Hamilton, and Harland (2012) teaching and learning when using online discussion forums can be characterised by numerous key interactions. These interactions are student-student interactions, students-lecturer interactions, students-content interactions and student-course material interactions (Pollacia & McCallister, 2009). Interactions that occur between students and their classmates are influenced by how the lecturer structures the online discussion forum by attempting to get students to consistently interact with one another, while liaising with each other's patterns of thinking (Wong, Li, & Lai, 2021). Fundamentally, the lecturer initiates this learning situation by guiding and monitoring the students on how these interactions should take place between students themselves. To posit this student-to-student interactions, the use of collaborations is one of the methods used while learning. This collaboration could either be in pairs, classroom discussions, where students work individually but respond to each other (using various techniques to get to the best answer) but aiming to a common goal towards the end of a given online activity (Johnson & Johnson, 1985). Moreover, these approaches attempt to motivate students to feel comfortable with their peers, confident with their level of analysing, and understanding what is being discussed during the discussion forums (Nandi et al., 2012).

Furthermore, interactions between the students and the lecturer are pivotal because the lecturers' responses serve as a form of catalyst to students' sense of satisfaction and

achievement of learning outcomes (An, Shin, & Lim, 2009). For instance, if students' discussion topics are broad and they have misconceptions, the lecturer might have to step-in, and guide the students through intervention, in order for these students to feel confident about their efforts. One of the most influential methods for asynchronous learning is for lecturers to request feedback from students (Poston, Apostel, & Richardson, 2020). This could be done either by instructing students to constructively give feedback to their peers through posting on the platforms of the online discussion forums (An et al., 2009). Lecturers should also play a key role in giving feedback to the students' responses by ensuring momentous engagements. In a simplified form, the student-online lecturer as cited by Nandi et al. (2012, p.8) should be involved in the following:

- asking follow-up questions while answering one;
- introducing new concepts or new ways of thinking about solutions;
- answering questions as soon as possible;
- providing feedback; and
- discussing the student solutions from different dimensions or angles.

The interactions could be categorized into three participation levels as mentioned by Nandi et al. (2012). Firstly, there are students who hardly participate, but rather learn from reading or listening to other students' contributions and use these contributions, to apply in their online coursework. Secondly, some students participate less when interacting on the online discussion forums as they attach their own agenda (only viewing what seems useful to them). Lastly, some students fully take advantage of the useful interactions occurring on the online discussion forums by participating fully based on the given course content.

One of the strategy to overcome ineffectiveness of online discussion forums could be the idea of creating a social atmosphere (An et al., 2009). In other words, allowing the building up of knowledge in an environment where individuals feel comfortable to share and exchange ideas amongst themselves. An et al. (2009) further argued that social aspects are quite significant and impactful in the quality of online teaching and learning forums. So, both the lecturer and students are significant and relevant to the successful proceeding of online discussion forums. Moreover, online discussion forums can emphasize exploration by skillful critical thinkers who embrace self-efficacy (Yang & Baldwin, 2012). In other words, quality online courses promote the art of building relationships between participants (students and their lecturers). Such

relationships are meaningful both inside the classroom environment and in society, in contributing to knowledge construction. The online discussion forums can be made effective by lecturers strategically using students' background contexts and experiences encountered during and after online interactions among participants (Tengepare, 2020).

1.1. RATIONALE AND SIGNIFICANCE OF THE STUDY

Why online discussion forums

This study aimed at contributing to the limited literature concerning the quality of online discussion forums. Studies such as Bolliger and Martin (2020); Wong, Li, and Lai (2021); Nandi et al. (2012) and; Tengepare (2020), have indicated low quality (lack of interaction, low engagement) in discussions taking place in forums. This raises concern if the fruitful learning that is supposed to take place in the discussion forums is limited by low quality discussions. This study therefore focused on exploring the benefits and difficulties experienced by lecturers and students in the online discussion forums at a University level. In exploring the benefits and difficulties experienced, an already existing framework adapted from de Lima, Gerosa, Conte, and Netto, (2019) was used to gauge the benefits and difficulties of online discussion content.

As an emerging researcher the framework mentioned above provided a useful starting point to explore this problem, including expounding coding categories. I do attempt to claim that this study rigorously investigated online discussion forums, which numerous studies by An et al. (2009); Nandi et al. (2012); Poston et al. (2020); de Lima et al. (2019) and; Bolliger and Martin (2020), that did in-depth analysis of online discussion forums' content painted a dismal picture of the quality. This study was embarked on from the context of the pandemic which forced different learning institutions, including the one where this study was conducted, into distance online learning situations with university and school closures during lockdown. This unanticipated, forced transition to online learning has accelerated the need for research in online learning approaches such as discussion forums. Hence, due to covid-19 lockdown the Life Sciences courses participants (the lecturers and the students) at the university level, with little warning or preparation were forced into an online setting and were separated by a distance (Bolliger & Martin, 2020). This made it difficult for students to stay involved and connected. As a result, lecturers with little training experimented with various engagement tactics to engage the students. Such tactics are required and essential in online courses to keep students connected and engaged (Bolliger & Martin, 2020).

1.2. RESEARCH PROBLEM

Research into the quality of online discussion forums is quite vast, and as a research topic, it can take many directions, because a lot can be going on simultaneously while an online lesson is being conducted. Huang (2002); Marra (2006) and; Aduba and Mayowa-Adebara (2020) have all argued that the main objective of online interactions is to encourage problem solving strategies, critical thinking, and successful knowledge construction. However, this can only happen if the lecturer is appropriately using the course materials, assessment strategies, and platform guidelines that have clarified what is expected from students during online discussions. Furthermore, the online discussion forums give students the opportunity to actively take ownership of their learning process (An et al., 2009). In most universities, the shift to online teaching and learning caught both lecturers and students unprepared (Fatonia, Nurkhayatic, Nurdiawatid, Fidziahe, Adhag, Irawanh, & Azizik, 2020). Therefore, it is not clear at this moment whether these discussions in the forums are of good quality. Not much research has been done about quality of discussions in the forums since teaching and learning has been shifted to online teaching in this unprecedented time.

1.3. AIM OF THE STUDY

The purpose of this study was to explore the quality of online discussion forums between lecturers and students at a South African university. The objectives of this study were fourfold. Firstly, to explore how lecturers and students participated in the discussions, what lecturers perceived as the educational benefits, and difficulties of using online discussion forums, what strategies were used by the lecturers to mediate discussions in these online forums. Lastly, the roles played by lecturers in online discussions.

1.4. RESEARCH QUESTIONS:

The following research question guided this explorative study:

"How do lecturers conduct online discussion forums for Life Sciences courses?"

The following sub-questions helped explore the perceived online discussion forums:

SUB-QUESTIONS:

i. How do the lecturers and students participate in the discussions?

ii. What benefits and difficulties of using educational discussion forums are perceived by lecturers?

iii. What strategies do lecturers use to mediate discussion forums?

iv. What roles do lecturers play in online discussions?

Chapter 2: Literature Review

2.1. Introduction

This chapter draws from various reviews (studies) of literature and focused on the quality of online discussion forums in terms of how lecturers conducted the online discussions, which is strengthened by expounding through sections and subsections. It unfolded by distinguishing online discussion forums (what a discussion forum is and how it is used, and how lecturers and students participate in discussion forums), which occurred between the lecturers and students. This section also addressed the benefits and challenges faced by lecturers and students during the online participation period. Moreover, guided by the conceptual framework taken from studies by Nandi et al. (2012) and de Lima et al. (2019).

2.2. Online Discussion Forums

What a discussion forum is and how it is used

Giacumo and Savenye (2020), asserted that an online discussion forum is a frequent tool used in learning management systems (LMS) to encourage academic interaction and learning. A LMS is a software that assists students and lecturers in the online learning process (Simanullang & Rajagukguk, 2020). The Life Sciences courses participants in this study, for example, employed a learning management system like BigBlueButton, which has video sharing, private chats, and discussion forums for successful formal education instead of the traditional face-to-face teaching and learning technique (Simanullang & Rajagukguk, 2020). When compared to face-to-face communication, the discussion forum may be more convenient. Face-to-face conversation might be intimidating for students but speaking through an online discussion forum is not. When disturbances on campus or long lines to the lecturer's office makes it difficult to meet face-to-face with the lecturer, discussion forums are a good place to start. According to studies by Mtshali, Maistry, and Govender (2020), spoken word does not appeal to all students in face-to-face lectures, as some students are motivated to study when learning is done in writing through discussion forums for various reasons. Some people prefer to express themselves by the spoken word in English, while others prefer to express themselves through the written word in a discussion forum because they are not articulate in English or are bashful. Because communication with the lecturer is no longer limited to face-to-face consultation, the discussion forum as a medium for engaging with the lecturer makes the

lecturer considerably more accessible. In these cases, the online discussion forum provides more hesitant students with a protective screen behind which they can communicate their opinions to the lecturer while remaining unnoticed (Mtshali et al., 2020). Therefore, it could be said, that the online discussion forums encourages students to collaborate and share their learning experiences, showing a transition from surface to deeper learning as they interact in the discussion forum.

There are a number of interactions that occur during online discussion forums. Wickersham and Dooley (2006), for example, mentioned the significance of using the necessary tools to distinguish the development of the quality of online discussion forums. These include the procedure used when students participate, monitoring the process and analysing the quality of online teaching and learning. Zhou, Wang, Zhou, and Fan, (2019) asserted that such intensive practices are significant because the online discussion forums ought to be meaningful for students through interacting or engaging with their peers. So possibly: Yip (2020) and; Palet, Smaldino, Mayall and Luetkehans, (2009) suggest, for example, ensuring that activities are authentic, that students are part of a community of practice and that students use situated learning to share intellectual ideas with each other through collaboration. Consequently, socialising (learning to adapt and convert ideas), is necessary when using online discussion forums. Neuwirth, Jović, and Mukherji (2021) suggest that students should engage in online discussion forums after hours. Consequently, collaboration and discourse become important skills they will use to meet social needs (Neuwith et al., 2021) and can freely share academic information without the presence of the lecturer but between students themselves. Drawing from Nasir's (2020) study, these social needs revolve around affective expressiveness, open communication, and group cohesion, for example, among students after hours in order to improve interactions in online discussion forums.

2.2.1. Lecturers and Students participation

The quality of online discussion forums cannot be successful without promoting the ideas of responsibility and belonging. Belonging, not only to the community with their peers, but also the classroom community of the lecturer and the students. In Potter's (2018) article, the need for dialogical communication and mediation between the students themselves and between the students and their lecturer, during the online discussion forums is highlighted. Socializing systems are shaped by exploring how participation activities in online discussion forums are carried out. Zou, Luo, Xie, and Hwang (2020) looked at Biology discussion forums and saw

that the lecturer determines the time spent for students to participate in online discussion forums, which could include student presentations and comments or feedback from peers, so both primary and secondary interactions. Wickersham and Dooley (2006) pointed out several adaptable ways of interacting online. These included the specific tactic used to deliver structured content and digital content interactively. Another related to actual participation within the online discussion forums such as; through collaborating with peers, or creating conversations with other students, and finally correspondence with the lecturer who would ensure students promptly receive feedback, which motivates students. Wong, Li, and Lai (2021) also highlighted that part of a lecturer's task is to ensure students receive a rubric with explicit participation content criteria to guide their online engagement.

Good practice for online discussions: lecturer feedback when giving presentations; helping students make sense of multimedia resources provided to stimulate discussions, including pedagogical tools to add instructional value, integrating various techniques of communication such as verbal, and written instructions (de Lima et al., 2019). This enables learners to remain focused while remaining active throughout. Consequently, collaborative and interactive online discussion methods have been granted opportunities to integrate various techniques to get across communication during the online discussion forums as mentioned in Al-Fraihat, Joy, and Sinclair (2020)'s studies, for example, chats or audios support and guide both students and lecturers to speed up the communication process. There has to be some form of flexibility (Zou et al., 2020) during online discussion engagements due to a wide variety of technological devices that keep evolving over time. The above helps ensure a welcoming and conducive environment for creativity. So, lecturers must have a backup plan (especially in developing countries like South Africa with connectivity and infrastructure issues like electrical supply) when conducting lessons just in case the system used for the online discussions becomes unreliable, perhaps due to unforeseen connectivity issues. Huang (2002) accentuated that students can use technologies as cognitive tools to expand on their thoughts and engage in meaningful learning.

As a result, when participating in online discussions, students intellectually adapt technological tools when articulating prior knowledge of the content presented to them. Using the tools to support their core intervention of meaning making as a form of reflection. That is, creating subjective representations of meaningfulness to aid in intentionality and careful thought.

A study was conducted on university students in Malaysia by Chung, Subramaniam, and Dass (2020) to determine students' readiness for online learning. On the other hand, students preferred listening to pre-recorded lectures uploaded on google classroom and YouTube (Chung et al., 2020). Mpungose (2021) conducted a study in South African universities that included success stories and failures. The success stories involved student centred approaches where discussion forums focused on authentic real-world problems, where students discussed problem-solving and shared resources through collaboration. Failures were often inevitable when teaching styles were imposed and when lecturers had approaches foisted on them, creating frustration, concern, and resistance. And he asserted that the teaching process is student-centred, with authentic learning marked by real-world problem-solving tasks, and that students are willing to share their materials and knowledge. In contrast, technological adaptation may fail because it is frequently foisted on lecturers, who sometimes are excluded from the planning process of online learning while receiving insufficient training. This may imposition lecturers teaching styles, causing them to be frustrated, worried, resisting, and ignoring the use of technology that has been accepted as the new norm of teaching and learning (Mpungose, 2021). Additionally, lecturers tend to become demotivated with lack of effective online training. Meaning that it is necessary for them to be included when strategically planning the mode of technological delivery of teaching, by nurturing their ability to use online discussion forums effectively. Because at the end of the day it is lecturers and students who interact with each other during online discussions. A further study was conducted in Delta State University, Abraka, in Nigeria and it was found that students preferred receiving lectures on the WhatsApp application. WhatsApp Group Discussion is a WhatsApp feature that allows you to create a group to discuss a specific topic. WhatsApp's capacity to form and connect with groups of 3 to 256 members is one of its unique features (Aduba, & Mayowa-Adebara, 2020). Interestingly, studies by Fauzi (2019) and Aduba et al. (2020) conducted in Indonesia also highlighted the relevance of WhatsApp group discussions, concluding that it is feasible to use a technology like WhatsApp in overcoming the limitations faced when using the online discussion forums.

2.2.2. Benefits and difficulties of online discussion forums

Some of the benefits of online discussion forums that have been explored, are rooted in scaffolding and intellectual development (Potter, 2018). One such support scaffold is outlining the participatory level of students (Wong, Li, & Lai, 2021) from what is being presented to

them in the subject matter; to the ability for students to socialise outside the online discussion forums. It must be emphasised that the online discussion forum should ensure students apply the same critical thinking skills during a formal meeting (where their lecturer is available) to other students and their lecturer. As a form of promoting in-depth online discussion forums through socialising and purposefully embracing cognitive skills development (Kew & Tasir, 2021). The ability for students to mutually interact with Life Sciences course materials, other students, and with their lecturer; through identifying, defining, exploring, evaluating, and integrating problems are all important in online discussions (Huang et al., 2020).

The difficulties experienced during the online discussion forums happen at different levels. For example, Potter (2018) mentioned that students taking responsibility of their own learning from a face-to-face setting to asynchronous might be challenging, and the difficulty is experienced by students. With online learning, for example there might be a lack of motivation to attend early classes whereas, with contact classes there is that motivation. So, students might lack the initiative to constantly motivate themselves and promptly engage in the course content, especially online discussion forums that require that engagement (Jelodar et al., 2020). Additionally, the lecturer's time resources to find a suitable balance between reading initial posts, student feedback to peers, and analysing the quality of students learning would be thinly stretched (Potter, 2018). These processes mentioned might be strenuous due to the given limited online discussion time frames. Additionally, some students may have longer responses, which are not meaningful, yet another student responds in few meaningful words. Lecturers need to be able to weed through these, which is time demanding (Fatonia et al., 2020). On top of all this the lecturers voice is necessary for contributing to the students efforts.

Kew and Tasir (2021) conducted a study that indicated how challenging it is to measure the quality of online discussions. Lecturers would need to try more creative methods on how to guide and instruct students' interactions when using online discussion forums. For example, discussions are necessary in Life Sciences courses. Lecturers need to hear how their students pronounce certain words because Life Sciences consists of difficult terminology hence, the lecturer needs to find ways in showing the students on how to break words, yet sticking to the same pronunciations. On the other hand, students posting terminology or responses on the discussion forums does not qualify to be taken as a technique for quality online discussions (Keiper, White, Carlson, & Lupinek, 2021). Moreover, more effort and hard work is required

for the success of the online discussions (Kew & Tasir.2021). Another example that lecturers could consider as addressed by Keiper et al., (2021) is, introducing quizzes or online games that might trigger students' critical thinking skills through verbal interactions, than just posting the answer A, B, C, or D, on the discussion forum. In contrast, alphabets could be posted but students should be willing to verbally share their ideas on how the answer came about, before the lecturer hops in, to verify or add to the correct answer.

When it comes to elaborating knowledge construction statements, students with a lower level of cognitive engagement tend to fail at expressing the content under discussion, whereas students with higher level of cognitive engagement have more confidence in elaborating and giving examples to their statements, or content under discussion (Kew & Tasir, 2021). Sometimes what determines students' behaviours towards their participation depends on the content being discussed, or the time of day that the online discussion is held. In a study conducted at the state University in New York College at Westbury (SUNY-OW), it was found that most students share similar patterns of online learning, in that maintaining appropriate behaviours in online learning has been difficult across nations (Neuwirth et al., 2021). For example, if the topic is about female evolution, some students might feel uncomfortable expressing how they feel about the topic, based on various morals and standards from different family background contexts. Another example could be the notion of concentration span, some students engage more in the morning, whereas some students' energy level gets more activated in the afternoon. So, cognitive level patterns from various individual students does play a major role in the face to face teaching and learning process, as much as equally needed when using online discussion forums.

One of the major challenges restraining the quality of online discussion forums as perceived from universities in South Africa; similarly, Chung et al. (2020) study mentioned that the major challenge university students in Malaysia faced with online learning was internet connectivity which somehow interrupted with the concentration span, for those who were willing to learn. Meaning that, understanding the course content would also be challenging if issues related with internet connectivity keep arising. In terms of measures to improve subject matter understanding, the university is liable to hold additional training sessions in order to equip lecturers with the skills they need to offer online learning content more effectively (Chung et al., 2020). The university's web platforms used for online teaching and learning must be synchronized to save students from dealing with many platforms utilized by lecturers of various

discipline topics. This could go a long way toward easing students' concerns about online learning. Conversely, social media enhances blended learning by assisting students in developing positive contextual learning in relation to pedagogical goals (Aduba et al., 2020). For example, WhatsApp allows both lecturers and students to be more creative with their responses, share knowledge at any time of day or night, adapt to new ways of thinking and reuse course content, engage in digitalised dialogues and collaborations as addressed by Aduba et al. (2020), and such communication strategies and access to information motivates students to continue with their learning experience during online discussion forums.

2.3. Conceptual Framework:

This study uses Nandi et al. (2012) and de Lima et al. (2019) as a conceptual framework. This framework focuses on the quality of student interactions and roles of lecturers in online discussion forums. Below are categories of this framework:

- **Participation types**
    - Asking questions
    - Answering questions
    - Justification
    - Clarification
    - Critical discussion of contributions
    - New ideas
    - Posting opinions
    - Providing feedback
    - Sharing knowledge
    - Relevance using social cues

- **Facilitation activities**
    - Material and instructional design
    - Pedagogical
    - Technical
    - Facilitator
    - Social roles

The lecturers ideal role is in initiating and carrying the online discussion forums forward (Nandi et al., 2012). And according to Nandi et al. (2012) analysis, periodic feedback from the lecturer is often valued extremely by students and encourages the students to be in alignment with the course materials, and thus, this feedback mechanism is essential. Meaning that for discussions to be meaningful and effective during the online discussion forums, the lecturer must be in control of the proceedings. If not, the students might diverge from the main discussion or may not have succinct answers to their questions.

2.4. Participation Types

2.4.1. Asking questions

Asking questions is shaped in various forms such as enquiry based questions, follow up questions, or just to gain more information. Nandi et al. (2012) mentioned that "Asking questions refers to queries regarding the course material or management of the subject" (p. 14). The emphasis is that once the students begin to ask questions, it is an indication of active online discussion forums participation, and shows the willingness of participants to explore dialogical interactions through cognition development.

2.4.2. Answering questions

Answering questions can be categorised into various classifications such as: sharing through posting or verbally in online discussion forums using straight and detailed strategies to reinforce knowledge depth; the lecturer sharing tips with students during the online learning perhaps to work around an answer, test, assignment, or examination; bringing into conjunction the art of practicing theory and the practical together. In other words, when answering questions both the lecturer and students should reinforce the notion of linking real-world experiences with theory, for meaningful teaching and learning (Nandi et al., 2012).

2.4.3. Justification

During the online discussion forums, questions and answers are enhanced through interactions. Such interactions are validated by the weight of feedback from the comments or solutions (Naledi et al., 2012) posted by the lecturer or other students. Conversely engaging in such

discussions brings both students and the lecturer to acknowledge a common ground for understanding reasoning perspectives from different grounds.

2.4.4. Clarification

Misunderstandings and misinterpretation of posts during the online discussion forums is ficid so, clarification of certain posts is needed for logicality of sense in order to accommodate everyone's cognition level in the online discussion forum (Nandi et al., 2012). For example, if someone spoke about the cell structure, *what details should others take note of when studying about cells?* Meaning that, participants must pay attention to such details for meaningful and effective online discussions.

2.4.5. Critical discussion of contributions

"Critical discussion of contribution covers agreement or disagreement with posts providing a logical explanation of the reasons" (Nandi et al., 2012, p. 17). That is, taking advantage of the in-depth subject matter content underway during the online discussion forums, where students practice the art of reflection and at the same time being open to new ideas of problem solving, and linking that with contributions from other students and their lecturer.

2.4.6. New ideas

Interactions among students themselves and their lecturer during the online discussion forums breeds new ideas because participants gain new knowledge from each other. And this new knowledge creates room for thinking skills needed (Nandi. et al., 2012) in asking questions and answering questions.

2.4.7. Posting opinions

Online discussion forums based on posting opinions does not indicate successful learning but rather reinforces depth into the discussion. Hence, such posting-based opinions require students to be competent, on track, and willing to share ideas of new knowledge with one other (Nandi et al., 2012).

2.4.8. Providing feedback

As feedback is shared, knowledge is generated through a community of practice through online discussion forums (Nandi et al., 2012). For example, lecturers providing students' feedback on a discussion forum topic.

2.4.9. Sharing knowledge

From a Marxist sociocultural point of view, sharing knowledge is more focused on sharing ideas. Sharing knowledge could be drawn from daily competencies while actively interacting in the online discussion forums (Nandi et al., 2012) and solving questions from different angles.

2.4.10. Relevance using social cues

Learning is a combination of formal and informal learning. Formal, meaning that the online discussion should focus on the given subject content (Nandi et al., 2012) and informal that is, the discussion forums should balance the tension of serious learning with a little bit of quizzes. Something that will help students react to posts in the discussion forums freely without fear of being wrong. Directly re-enforcing students to improve on the discussed relevant subject content as a community of practice in developing cognitive skills.

2.5. Facilitation Activities

2.5.1. Management and Instructional Design

Nandi et al. (2012) mentioned that "…clear and detailed guidelines can assist the students to become accustomed to the fully online mode of learning early on" (p. 23). Meaning that the Life Sciences course instructions for postgraduate students should be clear from the beginning of the course. In other words, students must know what to expect, how to participate, how marks will be awarded, and how to be consistent in their responses in relevance to the online discussion forums (Nandi et al., 2012). Henceforth, detailed guidelines gives room for students to be competent, to build meaningful and trusted relationships among themselves, and to express themselves freely.

2.5.2. Pedagogical

Pedagogy enhances teaching and learning approaches and de Lima et al. (2019) perspectives on pedagogical online discussion forums are as follows:

- Clarifying questions and problems
- Periodic intervention to direct and extend discussion
- Promoting deep learning
- Raising new questions

The pedagogical aspects mentioned above can only be attained from a clear and supportive relationship between the lecturer and the students, and the students themselves. Studies such as de Lima et al. (2019) and Nandi et al. (2012) have argued that comments or answers posted online should be accurate and backed up by justification or clarification. So, when students share their ideas during the online discussion forums, it promotes more depth in learning. And by applying their cognitive skills to questions and answers through dialogues or interactions, will justification and validation of the quality of online discussion forums be attained in Life Sciences courses among students.

2.5.3. Technical

Online teaching and learning is primarily technical however, the axiological tension between pedagogical discourses and digitalization needs to be re-examined. That is, there is so much contextualised rich content given online which robs individuals from exploring real-life experiences that add more value to the quality of online discussion forums. Nandi et al. (2012) argued on "Themes such as justification of posts, clarification of ideas, critical discussion of contribution, and suggestions of multiple solutions were valued and exercised by the students regularly" (p. 22), and that not all the criteria's such as 'prioritizing' and 'interpretation' occurred to be evident during the online discussions. So, in actual sense, online discussion forums seems to pay more attention to the idea of the *questioning* and *answering* approach of learning.

2.5.4. Facilitator

The facilitator enhances the quality of online discussion forums through providing adequate answers and giving feedback to students, because students become more motivated with support from their lecturer (Nandi et al., 2012). Execution of online activities facilitated by the lecturer is depended on the participation level of students. For instance, when the lecturer gives feedback to the students, there should be some form of integration using the students' discussion ideas as examples for the Life Sciences course content analysis.

2.5.5. Social Roles

Social roles do add value to the quality of online discussion forums but to a certain extent. The quality of online discussion forums seeks to create a community of online frequent and valued relationships between participants through social realism, through integrating pluralisation and heterogeneity (Naledi et al., 2012). Because online discussions are fashioned by numerous links from online content that has not been experienced in a real-life context by most individuals and could be vague exegesis.

2.6. Summary

Quality of online discussion forums focuses on building mutual relationships (Potter, 2018). Studies such as de Lima et al. (2019) and Nandi et al. (2012) also emphasised on the power of building online community discussion forums. In other words, critical thinking skills and creativity as mentioned further up in the literature review; are what shapes the lesson outcomes of each student, with the motivation from their lecturer.

In the next chapter, the focus will be on the research methodology, followed by its components and applications relevant to this study.

Chapter 3: Research Methodology

3.1. Introduction

This chapter expounded on the research design and methodology that was used for this study. Techniques for data collection, research sampling, and participant data analysis are all explained. Lastly, ethical considerations are also discussed.

This study was centred around the qualitative approach and case study method with the notion of synthesising informative approaches contained in exploring the online learning. Smedley and Coulson (2021); Bolliger and Martin (2020) indicated that, to make it easier in following posts on the online discussion forum, concise design, multimedia resources, small snippets of information, and clear classification of contents are all encouraged and are significant in online courses. For example, using strategies such as, collaborating, communicating, and building trustworthy participating relationships in online learning is important. When using asynchronous conversations in online courses, lecturers should organize the discussions in such a way that they stimulate student engagement while also demonstrating their knowledge on a certain topic (Chen & Liu, 2020). In other words, lecturers should come to a level where providing strong evidence is visible in case there is an occurrence of students' deterioration in behaviourisms.

3.2. Research Design

This study made use of the qualitative research design produced through recordings, interviews, and content analysis. Nassaji (2020) posited that qualitative research is a type of inquiry that is naturalistic and deals with non-numerical facts. It aims to understand and investigate rather than explaining and manipulating circumstances. It is contextualized and interpretative, highlighting the development process or patterns rather than the study output or outcome Nassaji (2020). Consequently, the conceptual framework of this study draws from de Lima et al. (2019) and Nandi et al. (2012). Research design is defined as a form of blueprint on how the study was carried out (Mouton, 2001). It is an arranged plan of action intended to acquire sensible information through a qualitative approach. Due to differences in qualitative paradigms, the concept of reliability in qualitative research can be difficult to grasp; however, the essence of reliability in qualitative research is consistency, whereas validity in qualitative research refers to the appropriateness of the tools, processes, and data used in analysis (Chen, Cho, Teng, Chu, Demiris, & Zaslavsky, 2021). The main justification for the researcher's

decision to adopt a qualitative research strategy was that this study did not rely on numbers. As a result, qualitative data gathering methods were used in this study, including recordings, interviews, and data analysis. ***Table 1*** below is a sample representation of the participants approached in this study. This was significant for establishing the results:

Table 3.1a sampling technique

Sample characters: Lecturers interviewed	**Students level (Life Sciences courses)**	**Topic**	**Recorded session (sample technique/case study)**
Lecturer A	Honours	• ICT in Life Sciences (focused on sharing thoughts in the discussion forums).	• No recordings • Only one session in online discussion forums with honours students was discussed.
Lecturer B	Honours	• Evolution	• Sakai
Lecturer C	Honours	• Genetics	• Online discussion forums
Lecturer D	Honours	• Male and Female transmitted disease • Teaching Life Sciences (Diversity and inclusive education)	• Online discussion forums
Lecturer E	Masters	• Enzymes	• Online discussion forums

Source: own table database

3.3. Research Methodology

3.3.1. Case Study method

The strategic plan of this research was primarily based on the concept of a case study. When '*how*' and '*why*' questions are asked, when the investigator has minimal control over

occurrences, and when the focus is on a current phenomenon in a real-life environment, case studies are the chosen technique (Yin, 2009). This study was used as a form of contribution to the quality of online discussion forums. As a result, the efficacy of online discussions learning is determined by not only individual efforts in their day-to-day operations, but also by the rules, norms, and institutional environment in place (Seyfried, & Pohlenz, 2018). In relevance to various phenomenon's in knowledge development amongst lecturers and students, particularly in Life Sciences courses, with the notion that the researcher does not have *much control over* the quality of the online discussion forums but is curious on *how* lecturers manage quality learning as students participate (Tengepare, 2020).

The researcher cannot dictate real-life status quo such as that of quality online discussions (Kew & Tasir, 2021). This is the reason why a case study research method was used as preference to approach this current study. The study collected data using various methods. Reason being that case study research accommodates a variety of collected data based on evidence (Yin, 2009). Data was collected through recorded participants' interactions via BigBlueButton discussion forums and interviews.

3.4. Data collection techniques

3.4.1 Content analysis of participants in online discussion forums

The term *content* is an umbrella of creativity explored in a particular study and it can either be participant or media focused, enhancing understanding of diverse interactions (Zhou, Wang, Zhou & Fan, 2019). Herein, the researcher gathers various information in the form of writing and further analysis it for knowledge development and critical thinking as Marra, Moore, and Klimczak (2004) mentioned. For instance, content can be drawn from various recordings, live situations, other writings, or observations. Participants' content analysis can be either private or public, which both require time and effort (Ledford & Anderson, 2012). Discussion forums are key to getting learning activities achieved. In other words, through intervention lecturers help students to understand better at a given pace. So, studies by Nandi et al. (2012) and de Lima et al. (2019) were used for this content analysis, to evaluate effects of the quality of online discussion forums and to measure their causes (benefits and difficulties) during the online learning process (Marra et al., 2004).

3.4.2. Semi-Structured interview (adapted from de Lima et. al., 2019)

This study focused on semi-structured interview transcripts (private content) relevant to online discussion forums. Semi-structured interviews occur in a set meeting where the interviewer probes questions to the interviewee using a well-organized interview schedule. Such interviews as accounted by de Lima et al. (2019) consist of open-ended questions thus, permits a further follow-up if needed. The interviewer may also take the lead in asking more questions conditional to the interviewee's responses with respect to time. Qualitative research extensively uses semi- structured interviews to identify the *why* factor in individuals behaviors, in this case it is directed to the participants' experiences, attitudes, and perceptions (Harvey-Jordan & Long, 2001). Semi-structured interviews contribute to generating new ideas in relevance to upgrading organizations' systems. Such interviews are used in data collection; therefore, validation and reliability as mentioned in Harvey-Jordan and Long's (2001) article must be reinforced against any form of bias. Moreover, the notion mentioned was made possible by safely documenting interviews and recordings, ensuring that they were well kept as proof for future study referencing. The participants approached were five lecturers from the Life Sciences courses. Two of the five lecturers recorded their online discussions each time they had a session with students, but the other three lecturers did not dwell much (seldom recorded) in online discussion forum recordings. It is not uncommon for the interviewer to be far more knowledgeable than the interviewee, in which case, as proposed by Zhou et al. (2019), the interviewer must think critically and imaginatively. Moreover, semi-structured interviews are more direct, and time bound (Harvey-Jordan & Long, 2001). In other words, semi-structured interviews cannot be generalized, and more time was utilized in the transcribing and analysing stage.

Rabionet (2011) mentioned that semi-structured interviews are shaped by the following stages:

- **Selecting the nature of interview** – with existing literature the researcher was able to distinguish which type of interview is suitable for this study. In drawing from various literature studies such as Nandi et al. (2012); de Lima et al. (2019); Zhou et al., (2019) and; Seyfried, and Pohlenz (2018) etcetera, it appeared to the researcher that semi-structured interviews are generally used in case study research frameworks.
- **The establishment of ethical frameworks** – through this study it came to the researchers' attention that participants' lives need to be respected, as posited by studies

(Voltelen, Konradsen, & Østergaard, 2018). The institution and participants who are involved in this study were informed about the ethical considerations and morals that are linked to the interviewing process.

- **Constructing the interview procedure –** the researcher explored that the interview process must be clear from the beginning. In other words, declarations of consent, withdrawal options, scopes, and confidentiality are key points. Moreover, all these were established with the backup of the literature review and any useful resource that served as guide to formulating interview schedules and follow-up questions.
- **Piloting and recording the interview –** there is a need to ensure quality in the type of questions formulated with a touch of sensitivity for an effective outcome. To ensure the quality of the responses, the researcher piloted the study with five lecturers from the science division in Life Sciences courses. After the interviews, the researcher discovered how most lecturers need to creatively prompt students' online participation levels.
- **The analysis and summary of the interview –** the researcher believes this was the most challenging stage and it required the researchers' undivided attention when the researcher got to it. Meaning that, more effort was required, in terms of evaluating the data collected, transcribing, analysing, and discussing. Hence, it is time consuming and was treaded upon with care.
- **Reporting of findings –** the researcher read articles based on qualitative research methods and the quality of online discussion forums. Respondents were interviewed via Zoom, and participants' interactions were recorded using BigBlueButton discussion forums. This helped the researcher gain more knowledge on attempting to interpret and analyse this study's findings.

3.5. Data collection tools

*3.5.1.***online discussion forums**: *BigBlueButton Recordings*

Galindo-González, (2020) and Wanas, Saban, Ashour, and Ammar (2008) noted that online learning provides for synchronous engagement, complete feedback, and collaborative learning. The technology BigBlueButton (BBB) is a particularly successful tool for establishing online teaching and learning processes while the usage (Galindo-González, 2020), encourages online education to be more effective in remote places and to produce better teaching-learning

outcomes. In this study online discussion forums were captured on BBB, between the lecturers and the students. It allows the lecturers and students to share their desktop or a window in real time (Galindo-González, 2020), allowing participants to demonstrate techniques, programs, or tools, or ask questions about how they are implemented. Students posted comments, responses, or asked questions in the online discussion forums. Based on this statement, Microsoft Teams is an excellent tool for virtual meetings, collaboration, and even recording class sessions, according to Poston, Apostel, and Riehardson (2020). The researcher utilized the Zoom app to record interviews with five different lecturers in Life Sciences courses, each lasting approximately an hour. The lecturers delivered lectures and provided complete feedback to the students verbally (using the online microphone); occasionally, the lecturers used a video tool; these lecture sessions lasted about an hour and a half and were recorded for future use just in case some students were unable to attend due to connectivity issues or other factors.

The researcher transcribed the communications and posts of participants using BBB recorded lecture sessions, Sakai, and Canvas/Ulwazi, which used online discussion forums. This was done in order to capture the lecturer-student relationship through reflecting snippets in discussion forums. More analysed details that are relevant to Sub-questions **i**, **ii**, **iii**, and **iv,** are discussed further in chapter 4 and 5.

3.5.2. Interview Schedules

Tools used for interviews (Taylor, 2005) shape semi-structured interview schedules. These tools give a direction on how to structure the questions. Moreover, the researcher used semi-structured interview schedules adapted from de Lima et al. (2019) to retrieve more information or get more insight on the chosen study. Based on this statement, semi-structured interviews are expected to influence the outcome of this study (Kallio, Pietila, Johnson & Kangasniemi, 2016). Interviews, according to Taylor (2005), are most structurally focused for discussions but allow for flexibility. The interviews were conducted via Zoom meeting based on the availability of the lecturers.

3.6. Validity and Reliability

The researcher interviewed five lecturers who have worked with online discussion forums to confirm associated online learning involvement; the function of the lecturers' online discussion

forums was taken into consideration. The lecturers' interviews were recorded and transcribed, which improved the accuracy of their responses. This means that the researcher can always go back and repeat what was said, improving the accuracy of the researcher's analysis. Because the precise data from the participants was recorded in order to improve this study's analysis.

Based on literature, this study is reliable and valid in that, it lays out several benefits and difficulties in terms of credibility, transferability, dependability, and conformability in the quality of online discussion forums. In terms of benefits, BBB has excellent and dependable credibility in online learning delivery, with lecturers transferring information to students through the use of available Life Sciences courses materials. By recording each session, both lecturers and students will have something to hold themselves to if there are any misunderstandings during the live sessions, and the quality of online discussion forums will be maintained. For instance, in terms of difficulties other students, on the other hand (the shy ones), would prefer to participate in the online discussion through posts rather than communicating verbally in the discussion forums.

Nelson (2017) mentioned that validity could be viewed in terms of data collection and analysis methods, procedures, and presentation. In sharing the same sights, Cook, Kuper, Hatala, and Ginsburg (2016) refers to validity as a framework for organising qualitative research quality. The term "validity" refers to the ability to measure what is intended. Several studies have looked into the quality of online discussion forums, as well as the engagement of lecturers and students. As a result, this study's assessment of the quality of online discussion forums is based on what has been established and validated (Cypress, 2017). Credibility, transferability, dependability, and conformability are believed to be four components of reliability, which pertains to the quality of both findings and data collection (Nelson, 2017). This study examined several data sources, such as reflecting on other reports, to confirm related online learning in order to establish reliability or trustworthiness.

3.7. Data Analysis

Deductive qualitative data analysis is the approach this study used. Deductive data analysis was used, with pre-existing categories from the conceptual framework being used as they are. If the overall goal was to test a previous theory in a different setting or to compare categories at different time periods, a deductive method might be appropriate (Elo & Kyngäs, 2008).

Conversely, from a deductive standpoint, the analysis of this study is based on various literature reviews in online discussion forums, in which the researcher gathered large amounts of information and summarized it into what is relevant for this specific study, while also exploring the relationship between the research objectives and the extract (Ligurgo, Philippette, Fastrez, Collard, & Jacques, 2017). In other words, the reader and participants should explicitly understand the study through the researchers' justification; and the construction of review should be evidence based. Henceforth, this study made use of semi-structured interview schedules adapted from de Lima et al. (2019) and the Life Sciences courses from BigBluButton recordings utilized during the online discussion forums in contributing to the literature review. The researcher carefully checked the data and cut out the units of analysis after gathering and transcribing the interviews and the discussions on the recordings. Each unit of analysis was given a label consisting of a word or a sentence (de Lima et al., 2019) that expressed its significance to the investigator. The purpose of open coding was to use constant comparisons to produce and validate characteristics and categories, which can aid researchers in defining a set of conditions in order to arrive at a category (de Lima et al., 2019). Additionally, to provide meaning to the data and be able to isolate what is relevant for this study, the researcher employed theoretical sensitivity. The table below demonstrates the technique, tool, and method that was used in chapter 4 for this study's analysis:

Table 3.2a **Participation of Lecturer and Students using online discussion forums:**

Categories	**Lecturers**	**Students**
Asking questions	**Lecturer C**: (**discussion forum)** ▪ Leading questions - For example, the lecturer says to the students, '*What do you know about Genetics?* *What comes into your mind when you hear the word genetics?'.*	**Students:**

The researcher began the category with the defined axial coding phase adapted from Nandi et al. (2012) and de Lima et al. (2019) as shown in the table**.** Based on this table sample above, more table analysis with categories and coding have been expounded further in chapter 4.

3.7. Ethics Considerations

Following protocol procedures in a particular institution is defined by the term *ethics* (Voltelen et al., 2018). Meaning that whoever falls under such an institution should be informed about the institutions proceedings. Cascio, Weiss, Racine, and Autism Research Ethics Task Forcetable (2020) mentioned that it is important to consider ethics in research, because ethics extends beyond the approval of an ethics committee and consent documents. It addresses greater problems of respect, inclusivity, and empowerment in the framework of research on a daily basis (Cascio et al., 2020). Consequently, consent forms for participation were handed out; clearly indicating the height of confidentiality and stating that there was no exchange of cash or prices for participating. Therefore, participants who were involved in this study as addressed by Arifin (2018) and Voltelen et al. (2018), were well informed and had willingly volunteered. The participants' decisions were respected as a way forward. Thus far, the researcher was aware of the ethical implications towards this study. Information attained from either the students or lecturers is kept confidential and anonymous for at least five years for further purposeful research studies (Husband, 2020). In order to be granted access to conduct this research study, the researcher went through the ethics process of application approval. Henceforth, the researchers application to conduct this study was granted.

3.8. Summary

Research design and research methodology were defined in this chapter. The researcher also accounted for other components with their sub-titles, such as data collection techniques; tools used for online discussion forums, data analysis and ethics considerations.

Chapter 4: Data Analysis, interpretation, and Presentation

4.1. Introduction

Chapter 3 explained what research design and research methodology entails. Presentation of data analysis and discussions from gathered sources such as semi-structured interviews and online discussion forums are accounted for in this chapter. Hence, through interpretation of the collected data the research questions are answered.

4.2. Participation Types

4.2.1. Lecturers and Students

Online discussion forums are enhanced by techniques individuals use in order to interact through contributing ideas and opinions among themselves (Rinekso & Muslim, 2020). As mentioned in the literature further up, the moment students begin to ask questions, is the beginning of active online discussion forums' participation, and shows willingness of participants to explore dialogical interactions through cognition development. In contrast, "To improve student learning, it is important for lecturers to identify students' cognitive engagement in discussion forums" (Kew & Tasir, 2021, p.39). For instance, students end up not putting much effort in their discussion responses, if they do not receive any form of feedback from their lecturer or fellow peers.

The excerpts in the five tables below show how participants (Life Sciences course lecturers and students) interacted in discussion forums, as well as how lecturer A-E responded to semi-structured interview questions. In terms of how their online discussions were conducted on the Ulwazi platform/Canvas, BigBlueButton, or WhatsApp. Content analysis of the conceptual framework drawn from Nandi et al. (2012) and de Lima et al. (2019) was used to outline categories in each table; more interpretation was provided below each table.

With the help of ***table 4.1a-4.4d*** below, the goal of this study was to investigate the quality of online discussion forums between lecturers and students in the Life Sciences. Hence, the tables are divided into various categories with excerpts from various participants where possible, and each example given is highlighted in a different color in order to distinguish: the type of participation occurring between students and the lecturer; the benefits and challenges experienced by the lecturer; the strategies lecturers used to mediate discussion forums; and the

roles played by the lecturers. Various discussion forums were used for example, **Lecture A** used the Ulwazi discussion forum, **Lecture B** used Sakai and WhatsApp discussion forums, **Lecture C and Lecture D** used BigBlueButton, WhatsApp, and Ulwazi, and **Lecture E** used BigBlueButton discussion forums.

Table 4 Codes adapted from Nandi et al. (2012, p.13) and de Lima et al. (2019):

Table 4.1a, Participants (participation between lecturers and students)	***Table 4.2b , Difficulties*** and ***Benefits experienced by lecturers***	***Table 4.3c, Strategies used by Lecturers***	***Table 4.4d, Facilitation activities (roles of lecturers)***
Administrative: **admin**	***Difficulties:*** Difficulties in following forum: **Diff**	Group discussions: **Gd**	Provision of administrative guidelines: **Pag**
Leading questions: **Lq**	Update of comments delayed by students: **Uocds**	Consistent intervention: **Ci**	Clarification of questions and problems: **Coqap**
Straight and in detail: **Sid**	Lacking collaboration resources: **Lcr**	Prompting students: **Ps**	Direct and extended periodic intervention: **Depi**
With lines of Code: **Wloc**	Forum not current: **Fnc**	Assisting students: **As**	Promotion of deep learning: **Pdl**
Giving tips: **Gt**	Students prefer using social media than the forum: **Spsmtf**	Providing hints: **Ph**	New questions raised: **Nqr**
With real world: **Wrw** From interview: **I**	***Benefits:*** More time to reflect on other participants' responses: **Mttropr**		Proves technical assistance: **Pta**
Coding with own examples: **Coe**	Forum as a collaborative and communication tool: **Fcct**		

Justification: **J**	Positive points: **Pp**		Providing feedback with examples: **Pfwe**
From students: **Fs**	Forum versatile: **Fv**		Directly providing answers: **Dpa**
Triggering discussion: **Td**			Initiates community building: **Icb**
From lecturers: **FL**			
Clear rationalization of posts: **Crop**			
Explaining posts clearly: **Epc**			
Providing logical explanation: **Ple**			
Covers agreement or disagreement: **(Caod)** New ideas: **Nc**			
Sharing informative knowledge: **Sik**			
Developing knowledge: **Dk**			
Building learning communities: **Blc**			
Relevant to the topic: **Rt**			

Table 4.1a,

Participation of Lecturer and Students using online discussion forums:

Categories	**Lecturers**	**Students**
Asking questions	**Lecturer C**: '*What do you know about Genetics?* (**Lq**) -*What comes into your mind when you hear the word genetics?'*. (**Lq, Sid, Wloc**)	**Students:**

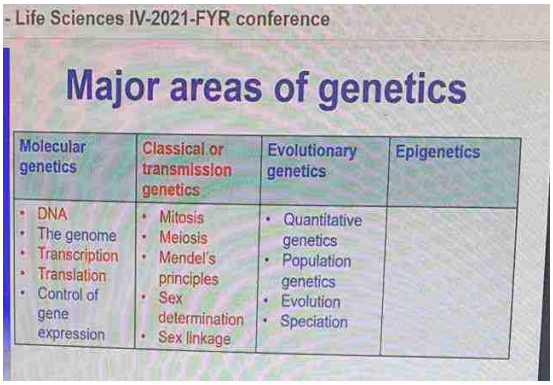
	Lecturer D: -For example, the lecturer says, *'examine the pictures given to you and answer the questions.* (**admin**) *-When this patient urinates, he has a burning sensation, what other symptoms do you see*? (**Lq, Sid**) *-Has he been infected by a bacterium or virus*? **(Wloc**) *-What disease does he have*?' **(Sid**)	
Answering questions	**Lecturer C**: - '***What do you know about Genetics?*(Lq),** below is how the lecturer tried answering the question: '*...so when you look at this picture, it basically sums up what* ***genetics is about*** **(Sid).** *So, I'll start at the top of the picture going down. So, at the very top of the population. And we know that a population is…the same species living in together in a community. So, we know that in our environments, in our communities we are made up of a population. So, we know that when we think of a population it didn't just spontaneously happen but it was a result of two love birds who decided that, they are perfect for each other so much that they wanted to reproduce. So, when they reproduce they decided that we, we want to make a baby* **(Gt, Wrw, Coe, J,)**. -' *I've realised is different classes that I teach have uhm different levels of being active in the discussion.*'(**I)**	**Students:** **Student A**: *'genetics is the study of genes which tries to explain what are genes, how they work, and how genes are transferred from one generation to another. I firstly think about genes and DNA'.* (**Sid, Wloc, J**) **Student B**: '*I think about inheritance. The [they] passed down inheritance from parent to child'.*(**Sid**) **Student C**: '*Genetics is the study of genes, genetic variation and heredity in different organisms. Identification, inheritance, and genes'.* (**Sid, J**)

	Lecturer D: -For example, the lecturer gave students a picture a task with diseased human pictures instructing them on what to do, then gives away a clue answer and says, 'the pennies are releasing something, but you need to explain more'. (**Gt**) -'*When I set up my discussion I set it in such a manner that the students will only see their fellow classmates discussion when they've posted theirs. So, also that encourages them uh post their opinions*'. (**I**)	**Student: A** -'*I see unusual discharge from the pennies'*. (**Sid**) **Student B**: *'Greater frequency or urgency of urination. Swelling or pain in the testicles. A persistent sore throat'*. (**Sid, J**)
Justification	**Lecturer A**: -For instance, the lecturer says to the students '*As you read the two articles before the tutorial sessions on Monday 31..I'd like you to think of ICT in education and in particular, how they can help in the classroom with teaching and learning…*'. **(Crop)**	**Students:** **Student A**: *'… Teachers need to adapt and be more knowledgeable about how to use technology to be more innovative and allow for integration…some examples are providing a tool for learning by using videos to enhance the lesson, using WhatsApp to interact with learners beyond the classroom, using projector for a PowerPoint presentation to deliver a lesson and make it more interesting, using an iPad to take quizzes or for classroom management using laptops to mark the class register or create lesson plans, etc. However, disadvantages are also evident and can impact on the access to quality teaching and learning. Lack of access to*

		technology, for instance as devices (cellphone, laptop, etc.) or internet (data or WiFi) which not everyone have access to due to the cost or connectivity in certain areas. Another aspect is that teachers have limited time or limited training in order to integrate with ICT technology. Thus lessons cannot be enhanced and are restricted'. **(Crop)** **Student B**: '*The advantage is that ICT can better our learning and teaching methods, it exposes learners to skills they can use later in the workforce, help teachers make learning more interactive and interesting, and allows teachers to use graphics while delivering lessons. The disadvantages of ICT is that we cannot monitor misuse of technology, not all learners can afford devices or data, schools lack the funding to equip learners with the necessary devices, not all teachers are computer literate, and load shedding'.* **(Crop)** **Student C:** '*I absolutely agree with you! Teachers have to be adaptable and should be able to work with any resources but it is a sad reality*

	Lecturer C: *'WHAT IS GENETICS ABOUT?'* *- 'Genetics is about biological inheritance or heredity'.* *- 'So we are saying ...for the reasons that when we talk about inheritance, it's outside the biology class. It becomes an everyday term, or to what scientists refer to as a none technical term. Meaning that, when your students come into the class and you say that genetics is about inheritance or heredity, one student could just go to the wealth or, the position that they were left with...but when we sum it down to say that genetics is biological inheritance or heredity, it means that we are contextualising to fit the biological context. And I want you to be really conscious of the words that you use'.* **(Crop)**	*in our country that many teachers and learners do not have access to the necessary needed skills for the use of these resources. My apologies. My above response is for students A and student B's contributions'.* **(Crop)**
Clarification	**Lecturer C**: *'WHAT IS GENETICS ABOUT?'* *- '...So, when individuals make babies we know that a process of meiosis...uh, I want to first differentiate what meiosis is*	**Students:**

	and what mitosis is. So, mitosis is an everyday cellular activity that happens on a daily basis, each and everyday of our lives with the sole aim of replicating, making exact copies of our DNA. So that we are able to grow, our cells are able to regenerate and we're able to heal from different wounds. But when we talk about meiosis, now that's a different cellular replication altogether. Here, the cells are not making uhm, exact copies of themselves. And here is, what we're trying to do is half the number of chromosomes in the cell. So, uhm, meiosis will begin to happen at fertilization stage. And fertilization is brought by a sperm cell, as well as an egg cell, fusing together to form a zygote. And this zygote needs to be different from other babies, unless it is an identical twin. But if it is not an identical twin therefore, it needs to have genetic recombination or DNA that makes it a unique baby.so, that is what meiosis is about. So, once all that happens, that new genetic information produced by meiosis will multiply, and multiply…so that at the end of 9 months the baby can be born. So, mitosis also aid in the reproduction or the development of the different cells that we have and the different organs that we have. I hope that makes sense?' *-'…It's really not easy to differentiate genetics from reproduction'*. **(Epc)**	

Critical discussion of contributions	**Lecturer C**: *-'so there are major areas of genetics that we can study in order to understand genetics itself!'* the lecturer shows students a diagram: (**Ple**)  **Lecturer D:** -'*There's an issue of diversity and inclusivity so that is what we are going to be looking at today, and obviously at the back of your mind you still have to consider that, okay if I'm going to be teaching respiration, nutrition, and uhm, what else, photosynthesis around this block, how do I make sure that I have considered the issues of diversity in my planning and in my teaching? And how do I consider the issues of inclusivity? So, I just want to hear from you, those that can talk, you can talk, Those that can* type you can type?'. -'***when we are talking about issues of inclusivity, what exactly are we considering?****' Those that can unmute, please unmute so that we can talk'*.	**Students:** **Students:** *-Ma'am, I think that it's because of different financial backgrounds and different like cultural backgrounds and definitely like different ways that the learners can learn which is diversity'.* (**Ple**)

	-*'Yes, diversity includes many things, one of which can be the backgrounds, which can be the socio-cultural background. I think we spoke about it earlier. Where we said that you know what, you can't just go and say you are teaching…you need to be sensitive to that, and even financial background'.* (**Ple**) **Lecturer E**: -*'..What does a teacher need to comprehend before they come to class?* ' -'*Ma'am what do you mean by in depth knowledge'?* -**'***Yes,… as a teacher you need to be knowledgeable, which include subject matter structures and that is to say, how are the concepts related? Uh, and when you are talking about relationship between concepts which, what are the threshold concepts? What are the key concepts and where should one start?...***'** **(Caod)**	**Students:** **Student A:** -'*Well I think, I think uh the teacher needs to have in depth knowledge of the study '.* (**Ple**) -*'uhm, know the historical part of the subject and the modern part, and know how to make means and see where to help learners where they lacking. And in case, where learners feel like they don't get it, the teacher should find easier ways to help them get it'*. (**Ple**)
New ideas	**Lecturer C**: - '*We have sex determination which we also might touch on a bit as well as sex linkages that we definitely going to touch on…this covers the aspects of qualitative genetics, evolution as well as speciation. And, then we have another group that is relatively well in the field called epigenetics. So, this one is beyond our*	**Students:**

	score and I think it's beyond the scope of life sciences IV as a whole!'. **(Nc)**	
Posting opinions	**Lecturer C**: *-'**WHAT DO YOU KNOW ABOUT GENETICS?**'* *'And I want you to be really conscious of the words that you use in your classroom because they might have multiple explanations,, or multiple meanings that are associated to the everyday way of using the term and as well as the biological way of using the term. So, every time we try and explain '**WHAT GENETICS IS ABOUT?'** It is about the biological inheritance or the biological heredity'*. (**Td**)	**Students**
Providing feedback	**Lecturer C** ***WHAT GENETICS IS ABOUT?*** *-'So now, we've thrown around new concepts as well. We have talked about inheritance, heredity. So now, what is inheritance? When we talk about inheritance, it is the transfer of genetic material. And hence, the genetic material from the parents to the offspring'.* **(Dk)** *-Therefore, genetics is the study of heredity, the transfer of genetic heredity. The transfer of genetic information from your parent. Your mother and father, through the offspring which is you. And its expression is in the offspring and of the differences between individuals and*	**Students:**

	between generations and how those differences come about. I've said a mouth full, but ***what is important there is that genetics is the study of biological inheritance.*** *When you want to understand inheritance, it is a transfer of genetic material from the parent to the baby, that's essentially it!'*. **(Dk)**	
Sharing knowledge	**Lecturer C:** *-'So the core knowledge of genetics that we are going to cover… we are going to look at the nature of genetic information/material, we are going to look at DNA, genes, and chromosomes. Which are central features of genetics. We are going to look at the way that genetic information is interpreted from gene to protein. And this process is protein synthesis. We are going to be looking at the way genetic information is transfered from cell to cell within an individual, through the processes of …we are not going to be focusing on mitosis that much but our major concern will be on meiosis. We are going to be looking at the way genetic information is transferred from parent to child through the processes of reproduction'*. (**Sik)** **Lecturer D**: -'***If I'm catering for diversity which steps do I take? Anyone, you can talk you can umute, those that can type, type?*** '	**Students:** **Students:** **Students A:** **-'***Ma'am' I don't really remember nicely, but what I think is a to be*

	-'*In some schools you find that learners are told to bring books to draw, or make a model of the nutritional system or the digestive system and I want you to go to Crazy store and buy those. But when you say that, have you considered the socio economic background of your learners and its diversity? You cannot say that this is a former model C school so, this is parents can afford, no, it doesn't work like that because you don't really know where they are coming from. Or you take what they were teaching in a private school somewhere and want to impose that into a township school somewhere no, it doesn't work like that …*'. **(Sik)**	*inclusive is through your examples that you use when you teaching, like you can't use an example of an expensive oven or stove and you talking about convention and all that stuff… '.* **(Sik)**
Relevance using social cues	**Lecturer C**: **'Levels of representations of genetics'** - '*When we talk about DNA,we talk of genes, we talk of chromosomes, we talk of chromatids. All of those uh, concepts are abstract, we cannot see them with our eye we need pictures for us to really visualise those concepts. So, that why we need to also be considerate of the levels of representations of genetics …the macro level that's where things are seen with the naked eye. Those will be the pictures that we see on textbooks, on uhm YouTube or wherever the case is. And we have a cellular level where things can't be seen with a naked eye but can be seen through an electronic microscope. We also have*	**Students:**

	molecular level (seen or identified through using analytical tools such as your chemical tests) and other methods. And lastly, we have the symbolic level where calculations and equations are used to explain phenomena. So when we looking at problem solving in genetics, we'll be looking more on the symbolic level'. (**Blc**) **Lecturer D**: -'***when we are talking about issues of diversity, what exactly are we considering?***' -'*So, diversity also includes how the learners learn better. So, if you are a person that's going to be teaching using auditory, you are only catering for the learners that are auditory learners! But if you use the different learning styles, then it means that all the learners are going to be captured and are going to be motivated and are going to maximise in terms of their learning'*. (**Blc**)	**Students**: **Student A**: '*We are considering the different learning styles'*. (**Rt)** **Student B**: '*I think we are considering beliefs and values and sociocultural background'*. (**Rt)** **Student C**: '*Can consider the social economic background of learners'*. (**Rt)**

According to ***table 4.1a***, **Lecturer C** dwelt more on leading questions when administering the online discussion forum (BigBlueButton), and she focused on important details that were provided with lines of codes. However, it is clear that students did not ask any questions but rather sat in silence, or it could be that the students were pondering upon the question (see Appendix C response to question 8).

Drawing from ***table 4.1a***, **Lecturer D** used administrative procedures from the beginning of the online learning, that is, before going into the depth of asking students leading questions, straight and detailed questions, or questions with lines and codes; she had to first inform

students what she expected from them. The lecturer noted that some students need to be reassured of their contributions before interacting with other students (see Appendix D response to question 4).

Answering questions

Lecturer C from ***table 4.1a***, made use of diagrams when trying to answer questions that were directed to students. In other words, **student A** gave detailed answers with lines of codes and justification, **student B** gave a detailed answer, and **student C** gave a detailed answer with justification. So, the lecturer was basically giving tips to students who were still struggling to give the correct answers. She did this by giving more tips, using real world examples, coding with her own examples and justifying her answers. (see Appendix C response to question 3).

Lecturer D gave students a task with various pictures of diseased human beings. She then instructed the students on what to do and gave away a tip for answering the questions as shown in ***table 4.1a***. **Student A** gave a detailed answer and **student B** gave a detailed answer with a justification. (see Appendix A response to question 3).

In summing up from ***table 4.1a***., it is clear that asking questions and answering questions in online learning becomes successful only when the lecturer masters how his or her students respond to various learning approaches. For example, one of the lecturers mentioned that it depends on the topic taught for her students to respond meaningfully.

Table 4.2b,

Benefits and Difficulties perceived by Lecturers when using educational discussion forums adapted from de Lima et al. (2019):

Categories	**Lecturers** *Benefits*	*Categories*	**Lecturers** *Difficulties*
Discussion depth	**Lecturer C**: -'*Student A, you woke me up this morning, so what do you know about DNA?* ' (**Mttropr**) -'*…I use the discussion forum for all my lectures…. Because the online offers the uhm, the*	*Accompanied difficulties*	**Lecturer E**: -'*I, I lost some of the presentations, sweet comments that came in anyway, yes, please come in uhm student A*? *The question was, what is it that you are supposed to*

	verbal way the students could just uhm, I mean after asking a question they could just uhm provide answers'. (**I**)		*comprehend before going to class because this question is showing you a linear model, it is a linear model, the model is linear! Student A, can you hear me? Okay..'.* (**Diff)**
Collaboration	**Lecturer E**: '*Everyone is going to speak here before we go! Students, student A, the question is, what is it that you are supposed to comprehend before going to class? How do? Yes, yes you are very right…'.* (**Fcct**)	*Structural*	**Lecturer C**: -'***What do you know about genetics***? *Anybody? It doesn't have to be right'*.(**Uocds**) -'*So, their understanding of the language of instruction is not necessarily at the same level. And again, uh teaching biology which like also has difficult terms is sometimes the language factor of it and not really the platform in which they are I mean in we are using for the discussions but I, I just feel that it's, it's just a matter of the language of instruction combined with the language of the subject which creates those difficulties*'**(I)**
Informative record	**Lecturer C**: '*And other answers sometimes they are just you know, written for the shy students I see them uhm, usually in uhm in a form of students writing their responses to the question on the textbooks and it gives also a way of reading the text*	*Motivational*	**Lecturer E**: *'When you are teaching the, when you have a set of slides to, to, to complete. If you come with a, an aim of completing the slides, the discussion forums can pull you back. Because we have quite a*

	for other students and actually they provide discussion points as well. (**I**) **Lecturer E:** -'*Ma'am what do you mean by in depth knowledge'?* (**Pp**) -*'If the questions are not clear I ask them to rephrase it.* (**I**)		*variety of, of responses'* (**Lcr, Fnc**)
Informative visualization	**Lecturer E**: -'*When you are teaching the, when you have a set of slides to, to, to complete. If you come with a, an aim of completing the slides, the discussion forums can pull you back. Because we have quite a variety of, of responses'*.(**Pp, Fv, I**)	*Structural and Motivational*	**Lecturer B**: -'*Discuss the sociocultural approach and evolution in the discussion forum. Remember you do get marks for participation in the forum'*. (**Spsmtf**) -' *I was approached by some students who said that they felt that that assigning marks for a discussion forum was completely unfair*'(**I**) -' *I generally find that its actually difficult to motivate the students to participate in any sort of course, they tend to sit there very quietly'*. (**I**)

Benefits

In relevance to the discussion depth, more time reflecting on other participants' responses is important so, **Lecturer C** intentionally engaged with students by keeping them active and touching on responses shared during the online discussion forum as indicated in ***table 4.2b***, with evidence from the response to question 1 (see Appendix C).

According to ***table 4.2b***, **Lecturer E** encouraged interactions between students and himself in the online discussions, and took the forum as a collaborative and communication tool in

relevance to its versatility. The BigBlueButton discussion forum has a recording feature that records posts, voices, and live sessions so, the lecturer paid attention to positive points made by students and kept referring to those comments made. (see Appendix E, response to question 5).

Difficulties

Lecturer E as indicated in ***table 4.2b,*** was consistent in helping the students to stay focused on the main discussion despite any form of interruption that could have occurred during the online session. For example, someone with a noisy background not aware that his or her microphone is on, or perhaps, connectivity issues.

Lecturer C applied various structural techniques when working with students online as shown in ***table 4.2b***, it is time consuming but important for quality online learning (see Appendix C, response to question 13).

Drawing from ***table 4.2b***, staying motivated to complete the session slides might be difficult for **Lecturer E**. Because the forum versatility is time bound, meaning that if the discussion gets more interesting the lecturer might end up not completing the number of slides he prepared (see Appendix E, response to question 3). Sometimes incompletion of slides might be due to the lack of collaborative resources, for instance, online discussions discontinued due to loadshedding interfering with the forum sessions.

Based on ***table 4.2b,*** **Lecturer B** discovered ways to enhance students to participate in the online discussion forums. But the students tend not to co-operate with the lecturer (see Appendix B, response to question 6 & 7).

In summarizing ***table 4.2b*** in online discussions, consistency in prompting students and flexibility were critical.

Table 4 3c,

Strategies used by lecturers to mediate discussion forums:

Categories	**Lecturers**
Administrative guidance	**Lecturer A**: -'*As you read the two articles before the tutorial sessions on Monday 31..I'd like you to think of ICT in education and in particular, how they can help in the classroom with teaching and learning.* ***Please comment***

	on this and feel free to engage in discussions with your colleagues'. (**Gd**) -'*Uhm, from what I've seen they are able to follow structure of an argument and uhm, I don't know if that's because the tasks that I've put up, I've asked them specifically to make a, like a statement regarding the question or whatever I put up. And then I'll ask them to also respond to atleast one other person's response. And from what I've seen is, they do engage in that. Uhm, either an agreement or maybe a slide re-buckle so, it seems that they can follow but that is only with uhm, a response to one other person's discussion*'. (**Gd, I**)
Periodic intervention to direct and extend	**Lecturer B**: -'*Dear honours students. I have posted an announcement on SAKAI… assessment 6 is now available until Friday 10pm'*. (**Ci**) -'*I did the first time I ever presented an online course, which was after lockdown. And it was basically I, uh, I had the students, I gave them readings and then in the discussion forum I asked them questions'* -' *Uhm, assigning marks to a discussion forum is problematic. And there has to be a level of playing field, or it could be ideal if there was*'. (**Ci, I**) **Lecturer C**: -'*Student A, you woke me up this morning, so what do you know about DNA? '*(**Ps**) -*'Other lectures will just say to the students they could only use WhatsApp discussions from eight to four but with mine I mean; I'd wake up to questions and sometimes those questions are even answered by other students. It's just that it's a matter of me of just confirming'*. (**I**)
Declaration of expectation	**Lecturer D**: -'*Or remember we also have WhatsApp groups so; you go to the WhatsApp groups and say guys we are now discussing. And just remember marks are, are located to those that are responding or that are posting their opinions*'. (**As, I**)
Promoting deep learning	**Lecturer E**: *-'In addition to your readings, may you please prepare a written piece each for the following for submissions? What is meant by the Central*

	Dogma of Molecular Biology? Give an illustrated account of the dogma, Why should learners know genetics?'.(**Ph**) - *RTQ13 -'So, uhm, all arguments must be such that, in such a way that they are coming from simple to complex.* (**I**) 7- *'...I like my students to co-operate, and I'd like them to cooperate in the way they think and the way they, they talk and the way they express themselves and especially through the language that they have'* . (**I**)

According to ***table 4.3c***, the lecturer gave the students pre-tutorial readings and asked them to respond to a statement given for discussion, this discussion took place in the Ulwazi online discussion forum, with the aim of creating group discussions. It is evident with the response to question 13 (see Appendix A) from **Lecturer A,** that his students were able to follow the structure of the argument and were encouraged to freely work together in groups.

When it came to periodic intervention, **Lecturer B** gave students 20 marks assessment quizzes with no time limit (but students were only allowed 2 chances to submit their work), and he consistently used WhatsApp to remind students of the posted assessments. The lecturer had proper planning for his online discussion forum interactions, with evidence from the response to question **1** and **2** from ***table 4.3c*** (see Appendix B)**.**

As indicated in ***table 4.3c*** , **Lecturer C** assured students that she was aware of their WhatsApp platform interactions (see Appendix C & D, response to question 4) even though she did not respond to the text earlier on. But resorted to raising the point again. This was discussed in the online discussion forum during a lecture, in order to prompt the students to participate. **Lecturer D** also used the WhatsApp platform to inform or assist students on what she expected from the online learning.

Lecturer E instructed students to read articles then discuss using the online microphone or with posts during the online discussion forums while providing hints to the students, as shown in ***table 4.3c***. Otherwise, the lecturer relied more on write ups (see Appendix E, response to question 7 & 13).

In summing up ***table 4.3c***, proper lesson planning was the bedrock of an effective and successful online learning outcome. In other words, time could be wasted if spent unwisely on unnecessary discussions.

Table 4.4d,

4.3. Participation Types

Facilitation Activities (roles played by the lecturer) adapted from Nandi et al. (2012):

Categories, Baran et al. 2011	**Lecturers**
Management and Instructional Design	**Lecturer A**: '*I would send eh, eh message to the student to I don't know, try and say: your, your statements that you making seem to be sexist, or you know whatever just you need to consider what you saying, that this is a public forum and so on.*'(**I**, **Pag**) **Lecturer B:** *'..I think for me, firstly I would try more forums I will with yeh… but I think that, without marks yeh.. '.* **(I)**
Pedagogical	**Lecturer A**:*'…teaching about the Bryophytes and eh Pterophytes and Spermatophytes. There's a lot of content that is easy to access. Because you just go to websites where you go to a textbook, where you go to YouTube videos so, what I'm trying to do.. I'm trying to get the students to on their own go through the basic content. So that when I meet with them we can discuss things like uh.. a comparative study of two groups. Or like I'm trying to do now; the evolution of seeds and vascular tissues and pollen allows plants to colonise that.* (**I, Pdl**) 1 **Lecturer C**: (**discussion forum**) -'*When we teach you this course we would like to take you outside the textbook explanation. We want you to really understand what you are saying when you are defining a particular structure…'*. (**Coqap, Depi, Pdl**) -'*And sometimes is just a matter of the language used you know so, it's a matter of trying to break it down to them so that they understand better because I mean we teach students from emm different backgrounds'* **(I)** **Lecturer D:** *'When I set up my discussion I set it in such a manner that the students will only see their fellow classmates discussion when they've posted*

	theirs. So, also that encourages them uh post their opinions'. (**I**) Response to question 1 **Lecturer E**: **(discussion forum)** The lecture uses slides in his lesson presentation for meaningful teaching. - *'…students…before you get to that level of transformation, you need to develop ehh….is pck linear?'* (**Depi**) - *'Yes, uni-directional. Because if you look at the arrows, they seem to point to comprehension, transformation, instruction, uh, evaluation, reflection and new comprehensions. And…'.* (**Coqap)** - *'In your experience, in your teaching experience, are you teaching? is… your pck linear? Jah!'.* **(Pdl, Nqr**) - *'…hmm, and* ***how does your topic photosynthesis influence the evaluation? And how does the evaluation influence the transformation? How does the purpose of the teaching influence the evaluation? And…just one short example of that relationship?***. (**Depi, Pdl, Nqr**) *'Students may not like using the discussion forum because it commits them more. It demands more commitment time from them. But it can only be part of the teaching and learning transaction in the classroom but not afterwards. I don't think students are very comfortable'*. (**I**)
Technical	**Lecturer A**: *'I think it's important then to create a discussion forum where students can communicate how they finding the course, what the challenges are, what some of the difficulties are, what they enjoying about the course'* **(I, Pta)** **Lecturer E:** *'eh, what seemed to be of a problem ah, for me, was mainly the, the, the poor connectivity for students across the country. Because when it is online, our students are almost everywhere. And even you notice that in town even itself they are in an urban setting. They don't necessarily have adequate eh, network'* **(I)**
Facilitator	**Lecturer C**: *'…most roles that I play is just a matter of facilitating the discussion where just towards the end I, I sort of you know tell them wha' uhm: who was sort of correct or the correct scientific way of viewing things'.* **(I)**

	Lecturer D: (**discussion forum**) '**Teaching Life Sciences**' - '*…even when I had to set the exam, I also had to consider issues of diversity and then inclusivity. So, that's what we going to look at today…, when you consider diversity that when you are now assessing how are you going to consider diversity and also, inclusivity so that you include all the learners? There are aspects that we have to take into consideration'.* **(Pfwe, Dpa)** - *'Some cases I just come and like mediate with em, or to listen moderate what em, both of them are saying to arrive to one conclusion because if you don't; the one is saying the opposite and then the other one. It will actually confuse everyone else. So, I always come in to consolidate their whole idea so that they know what is the correct ah aspect'*. **(I)** **Lecturer E:** *'And communication between them has to be facilitated and there has to be some form of coordination. Eh, you don't just speak anytime for you to speak you have to listen to another person's argument, to listening atte'..attentively and then you generate your own response and get your own time and to make your contribution yes!'*. **(I)**
Social Roles	**Lecturer B:** *'…Uhm, I've set up WhatsApp groups and it has been fairly good discussions on that. I think it's very immediate that uses a cellphone, that they all familiar with. And uhm with those WhatsApp groups there would be no mark or anything like that… It's immediate uhm, and they always, everybody is always sitting on their cellphones'*. **(I)** **Lecturer D:** *'I always encourage them or actually got, say: but you are quite and who's quiet is because sometimes the students will be having the information but just not keen to share. So, by encouraging them to discuss it will help, for me to see whether they have some misconceptions or they're actually in the right track'*. **(I)** **Lecturer E**: - *'So,* ***is it linear? Is it directional? What is directional? That is my question, others come in…this is not a talk for myself and student A. What…are there***

	any cases where this framework is not uni-directional? *Yes, thank you student B!'.* **(Icb)**

Lecturer A ensured that he managed his discussion forums cautiously. For instance, the lecturer ensured that he attended to any threats that could have occurred during the online discussion forum, with immediate effect. Evidence was shown in ***table 4.4d*** (see Appendix A, response to question 5). For example, one of the difficulties that might be encountered during the online discussion forums could be students responding to the lecturers questions without thinking thoroughly. This could lead to ineffective quality online discussions that are not even relevant to pedagogical or enquiry based learning. Therefore, evidence was given from responses to question 1, 13, 1, and 10 by lecturer A, C, D, and E, respectively (see Appendix A, C, D, & E). It is to the lecturers advantage to think creatively when working with students in the online discussion forums. When it comes to online learning technicality, lecturers should give students proper guidance on how to get the Life Sciences course materials and also have alternative plans for future use as indicated in the responses to question 4 and 9 from the interview questions, stated by lecturer A and E (see Appendix A & E). The interview responses to question 5, 5, and 13 (Lecturer C, D, & E respectively, see Appendix C, D & E) indicated how facilitation plays an important role in the online teaching and learning process. It helps students to find their place and to freely express themselves in an online community through various social roles but with the lecturers'(Lecturer B, D, & E, see Appendix B, D, & E) guidance.

Chapter 5: Discussions and Conclusions

5.1. Introduction

The researcher provided the findings, results, limitations, recommendations, and conclusion of the study in this chapter. This chapter begins with a description of the research findings, then moves on to the research questions, limitations, recommendations, and the study's conclusion. The findings in chapter 4 are related to the research question and are supported by this study's limitations.

5.2. Discussions

5.2.1 Participation of Lecturers and Students

First finding: both lecturers and students participated by *asking questions*

Drawing from chapter 4 of this study, Lecturers participated by *asking questions*. Most questions were leading questions coming out of a post in the discussion forums, straight and detailed questions; students asked direct and detailed questions on WhatsApp platforms, but the lecturers kept directing the conversation to the online discussion forums, and lastly, questions with lines of code (it made it easier for other students to raise questions by looking at the code, for example, the lecturer showed students a picture of the human system when asking them questions on how DNA came about). This finding highlighted the fact that student participation in online discussion forums is not always automatic, and there is a lack of clarity about lecturers' preferred approach in them (Nandi et al., 2012). Students, on the other hand, were unprepared to ask questions in online discussion forums. This finding contradicts Nandi et al. (2012)'s claim that students perceived themselves as part of an online learning community who were free to ask questions.

Second finding: lecturers participated by *answering questions*

When it came to *answering questions*, lecturers used diagrams to help students comprehend how the solution was arrived at, varied illustrations, hints and directions, thorough answers with their own coding, and explanations for struggling students were addressed. Based on this finding mentioned, it is evident that students responded to questions in a number of ways, which have been classified in the categories above (Nandi et al., 2012).

Third finding: *justification* (both lecturers and students justified their answers)

When it came to *justification*, both students and lecturers gave clear rationalization based on the posts shared in discussion forums. This finding is supported in studies by Minas, Potter, Dennis, Bartelt, and Bae (2014), which found that information that challenges a person's prediscussion decision preference is processed similarly to irrelevant information, whereas information that supports a person's prediscussion decision preference is processed more thoroughly. The finding shows that the primary processes of confirmation bias in information processing during online discussions learning are cognitively based on evidence.

Fourth findings: lecturers *provided Clarification, critical discussions, new ideas, posting opinions, providing feedback*

Clarification in explaining posts clearly, *critical discussions* of contributions in providing logical feedback by covering agreements or disagreements in online learning, identifying *new ideas* when discovering new concepts, *posting opinions* that spark discussions, and *providing feedback* when developing knowledge between the lecturers and the students were all covered during participation in online learning. One of the most significant requirements for participation in any online discussion forum, according to Nandi et al. (2012), is that individuals know what they are talking about. Because online courses are prone to misunderstandings and misinterpretations. Students and lecturers in Life Sciences courses attempted to clarify their postings in the above-mentioned manner based on evidence from the findings in order for everyone in the discussion forum to comprehend them. Students are mostly motivated through feedback mechanisms and by feeling recognized by their lecturer (Herrera-Pavo, 2021). Lecturers sharing knowledge included sharing informative knowledge, making relevance using social ques in building learning communities with students contributing to the topic.

5.2.2 Benefits and Difficulties perceived by Lecturers when using educational discussion forums

Benefits

Sixth finding: lecturers engaged in *Discussion depth, Collaboration, Informative record, Informative visualization*

More time to reflect on other participants' responses through in-depth discussion, using online discussion forums as a collaborative and communication tool through *collaborations*, pinpointing *informative recordings* made by others through engaging on the positive points mentioned in the Life Sciences topic, and using *informative visualization* through versatility in

online learning were some of the benefits lecturers perceived. As a result, these findings indicate that students were able to engage in *in-depth* online discussions as a result of the lecturers continually encouraging them to interact with one another by emphasizing positive points, serving as a benefit. In conjunction with these findings, Wickersham and Dooley (2006) posited that students spend more time reflecting in online discussion forums than in face-to-face discussions; additionally, evidence from chapter 4 for higher-order thinking is seen in how the lecturers continually encouraged students to expand on their comments in online discussion postings. Previous studies on teaching and learning behaviour benefits, by Wickersham and Dooley (2006); Nandi et al. (2012); de Lima et al. (2019); and others, have generally established that online discussion forums can enhance and prompt student learning because students become actively engaged. According to this remark, both fast and slow students felt accommodated during online discussions as lecturers offered additional light on the Life Sciences topic, based on the findings of this study.

Difficulties

Seventh findings: lecturers contributed to *Accompanied difficulties, Structural, Motivational, Structural and Motivational*

Accompanying connectivity issues resulted in a lack of collaborative resources and motivation for the discussion forums not being current because some chats were lost along the way, *structural* subject content, such as the difficult terminology used in Life Sciences courses, reduced the pace flow in online discussions, resulting in students' comments being delayed. Students would rather use social media platforms such as WhatsApp than participate in online discussion forums, as perceived by lecturers. In the meanwhile, poor internet connectivity and task misunderstandings were a problem. Based on these findings shown, studies by Jianyun (2021); An et al. (2009) and; Aduba and Mayowa-Adebara (2020) indicated that students participate in online Life Sciences courses discussions based on the benefits and difficulties that their lecturers have encountered in online discussion forums (lecturers took note of the pros and cons of online discussion forums then improved on what had to be improved). Moreover, the difficulties experienced in online discussion forums were validated based on various interactions. In addition to student and lecturer participation, interactive teaching and learning in online discussion forums, for example, was a key function of overcoming difficulties while also increasing structural motivation.

5.2.3 Strategies used by lecturers to mediate discussion forums

Eighth finding: lecturers mediated discussion forums by *Administrative guidance, Periodic intervention to direct and extend, Declaration of expectation, Promoting deep learning*

Lecturers for online learning indicated *administrative guidance* for group discussions, consistent *intervention to direct and extend* with prompting students to participate, *declaration of expectation* of the subject content was emphasized by the lecturers, and *prompting deep learning* was used by the lecturers as one of the strategies to provide students with hints of the Life Sciences topic discussed. These findings suggest that lecturers were prone to critical creativity when encouraging participation of students in online discussions. Studies by Huang (2002); Jelodar et al. (2020); Johnson & Johnson (1985) and; Aduba and Mayowa-Adebara (2020), accounted for these findings. In that students become ready to learn when their life circumstances necessitate it, for example, when lecturers strategically reinforce meaningful online teaching and learning. Students, on the whole, prefer a problem-solving approach to learning. They learn best when information is provided in a context that they can relate to. Motivation to learn, to be sure. Students are highly motivated to learn when they can develop new skills that will assist them in solving crucial challenges in their lives.

5.2.4 Facilitation Activities (roles played by the lecturer)

Ninth findings: lecturers played *Management and Instructional Design, Pedagogical, Technical, Facilitator, Social Roles*

Pedagogical authenticity was applied in promoting deep learning for example, playing around the word DNA in building meaningful learning, clarifying questions and problems using direct and extended periodic intervention approaches, providing feedback with examples, paying attention to new questions raised by students while directly providing answers, providing *technical* assistance when needed by students, and initiating community building among the students were *roles* manifested by lecturers *management and instructional design* in online discussion forums. These findings indicate what studies by Huang (2002); Nandi et al. (2012); Al-Fraihat et al (2020); Baran et al. (2011) and; Bolliger and Martin (2020) meant by teaching students should be based on students' experiences due to the nature of experiential learning. As a result, their experiences could be really useful. Student development necessitates the ability to learn how to learn. Students have the ability to become life-long learners once they have mastered the capacity of learning. Lecturers must know and understand their students'

learning styles in order to manage online discussions so that no one feels left out and everyone can participate productively. Studies by Simanullang and Rajagukguk (2020) and; Kew and Tasir (2021) suggested that students need to be reminded to take accountability for their own work. This enables individuals to become more competent in discussion forums.

In summary, the success of online discussion forums relies heavily on course facilitation. In order to engage students in online discussions, lecturers used a variety of facilitation tactics. For online learning, lecturers' prompt responses to questions and rapid comments in online discussion forums was critical.

5.3 Answering Research Questions

*5.3.1. Research Question **i:*** How do the lecturers and students participate in the discussions?

Students and lecturers participate in discussions by *asking questions, answering questions, justification, Clarification, critical discussions, new ideas, posting opinions, providing feedback*

Lecturers usually invite and prompt students to participate in the discussion forums based on specific posts or articles shared with students via a common link days before the online discussion. Some students, on the other hand, are eager to join in the discussion forums, and others will remain silent. Depending on the topic under discussion, students participate by commenting in the discussion forum or audibly utilizing the microphone feature of the BBB app.

Additionally, Kew and Tasir (2021) and Nandi et al. (2012) said that online discussion forums allow lecturers and students to easily post in terms of directing the discussion towards learning, ensuring students understand, while mastering the knowledge and skills in order to promote successful cognitive learning.

*5.3.2. Research Question **ii*:** What benefits and difficulties of using educational discussion forums are perceived by lecturers?

Benefits of using educational discussions were based on the following categories: *Discussion depth, Collaboration, Informative record, Informative visualization*

This study's key reliable finding benefit indicated that the main goal was to establish a welcoming classroom environment for the online teaching and learning process, particularly when using online discussion forums for learning. Conversely, the benefit in online discussion forums is that the platform allows all students to freely express themselves. Furthermore,

lecturers could easily identify students who were not participating in the discussion forums and developed a creative strategy to encourage them to do so.

Difficulties of using educational discussions were drawn from: *Accompanied difficulties, Structural, Motivational, Structural and Motivational*

Based on the findings, one of the difficult experience encountered by lecturers with online discussion forums was that students were unwilling to participate unless the lecturers encouraged and motivated them to do so. Another issue raised in relevance to discussion forums was that students appeared to dislike using the discussion forum because it required them to devote more time to it. However, it was primarily used in the online discussion during the teaching and learning process, not afterward.

5.3.4. Research Sub-Question **iii**: What strategies do lecturers use to mediate discussion forums?

Strategies lecturers used to mediate discussion forums were: *Administrative guidance, Periodic intervention to direct and extend, Declaration of expectation, Promoting deep learning*

Lecturers used a variety of strategies to mediate discussion forums, including being consistent in directing and extending online discussions, encouraging students to participate in a form of presenting their voices instead of typing, because students tend to take longer when typing and limits what could have been said audibly (using the online microphone), but it depended on the size of the classroom, and ensuring that students were on track and understood what was being discussed by calling out individual names to share their perspectives on specific topics being discussed in the discussion forums.

5.3.5. Research Sub-Question **v**: What roles do lecturers play in online discussions?

Roles lecturers play in online discussions were: *Management and Instructional Design, Pedagogical, Technical, Facilitator, Social Roles*

The roles lecturers played in online discussions included interactions impacting on students' behavioural and emotional involvement. Lecturers primarily had a role in reinforcing pedagogical, social, and technological transformation, as well as balancing and resolving instructional, interpersonal, technical issues, and fostering a learning community marked by trust and reciprocal concern.

5.4. Limitations of this study

Limitations of this study are outlined in this section.

Some students were not willing to participate during the online discussion forums. This limited the lecturers perception of the quality of online discussion forums. In other words, the lecturers could not assume how the whole teaching process would be successful. The lecturers, on the other hand, had ideas on how to help and guide students to overcome their resistance to online discussion forums.

Some of the interview responses were only partially answered due to a few constraints experienced by some of the lecturers, such as a lack of data and the challenge of assigning marks for online discussions, as reported by students.

Since online discussion forums require internet, connectivity constrains seemed to be a major limitation with all lecturers.

Some students were more interactive on the WhatsApp group discussions which was a constraint, restricting their perceptions on the idea of online discussion forums. For instance, students would just be silent throughout the online discussion forum.

5.5. Recommendations to be considered in future research

This section established research recommendations based on the discussions of this study and its limitations.

An analogous study could be conducted focusing on lecturers from different universities, who implement online discussion forums. Particularly, on how the lecturers manage and instruct their students during the teaching and learning process, relevant to tackling how lecturers conduct online discussion forums in Life Sciences courses.

Population dynamics could be considered that is, the data collection could include probability in student sampling, where the research will be established on the number of students the lecturer is facilitating in a specific classroom, in online discussion forums.

A comparison of how both students and lecturers from different universities perceive online discussion forums could be conducted.

A quantitative study could be conducted in order to distinguish the percentage of both lecturers and students' online discussion participation levels.

5.6. Conclusion

This chapter presented the discussions and conclusion for this study. Firstly, a discussion of this study was accorded as deliberated in chapter 1, 2, and 4. Secondly, the research question was answered and linked with the established findings. Clearly the primary objective of this study was attained by answering interrelated research questions and gathered findings from data collection.

The underlying objective of this study was established from the research question correlated in chapter 1. Limitations of this study were reviewed and recommendations to be considered for future research were established for the conclusion of this study.

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APPENDIX A: Interview Schedule

Lecturer Consent Form

School of Education Wits

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Tel: +27 11 717-3007 • Fax: +27 11 717-3009 • E-mail: enquiries@educ.wits.ac.za • Website: www.wits.ac.za

Please fill in and return the reply slip below indicating your willingness to be a participant in my voluntary research project called:

Research topic: An Investigating the Quality of Online Discussion Forums for Life Science courses.

My name is: Dr Stephen Andrew Malcolm

Permission to review/collect documents/artifacts	**Circle one**
I agree that my recorded videos can be used for this study only.	**YES**/NO
Permission to be interviewed	
I would like to be interviewed for this study.	**YES**/NO
I know that I can stop the interview at any time and do not have to answer all the questions asked.	**YES**/NO
Permission to be audiotaped	
I agree to be audiotaped during the interview or observation lesson	**YES**/NO
I know that the audiotapes will be used for this project only	**YES**/NO

Informed Consent
I understand that:

- my name and information will be kept confidential and safe and that my name and the name of my school will not be revealed.
- I do not have to answer every question and can withdraw from the study at any time.
- I can ask not to be audiotaped, photographed and/or videotaped any time during the study
- all the data collected during this study will be destroyed within 3-5 years after completion of my project.

Sign _____ Date 04 – 11 – 2021

Interviewer: S. Mohlala

Below are interview questions that will be conducted to the participant as a form of mediation:

1. Do you use the discussion forum in your discipline? How do you use the forum and in which cases do you use it?

Answer: "*Yes, I do. I used it for the teaching Life Science III course to discuss thee digit ah, like the statement about the schools in South Africa. You know being connected online. I used it for the NS II methodology course and I'm just busy setting up one for the NS II content. Uhm, where I'm asking the to consider a statement related to the development of seeds that help plants colonise land and pollen that help them to disperse over great distances. Uhm, so jah, I'm trying to do the NS II course because I was only told when I started teaching it when the block started. You know it's very…teaching about the Bryophytes and eh Pterophytes and Spermatophytes. There's a lot of content that is easy to access. Because you just go to websites where you go to a textbook, where you go to YouTube videos so, what I'm trying to do.. I'm trying to get the students to on their own go through the basic content. So that when I meet with them we can discuss things like uh.. a comparative study of two groups. Or like I'm trying to do now; the evolution of seeds and vascular tissues and pollen allows plants to colonise that. So, I do make use of the discussion forum".*

2. Can you use the online discussion forum as an educational communication strategy?

Answer: "*…uhm I think as a communication strategy, to share information mhmm.. because for me a communication strategy is eh the sharing of information uhm.. so, I, I wouldn't use the uhm the discussion forum for that because it's a forum that I would want students.. and this is how I set it up. I ask them that they have to respond to the statement uhm.. you know giving examples and they have to respond; they have to reply to atleast one other persons response to stimulate discussion. So, I wouldn't use it. I don't use it as a communication tool. Uhm, I think there'r better aspects of.. was…like the announcements and so on".*

3. Can you understand the structure of the forum responses? Do you find it difficult to keep up with the discussions?

Answer: "*Uhm.. no, it's fairly easy. And I think.. probably the reason for that, when I did the ehm, Bsc honours in science education, eh, we had a guest lecturer from the US who used uhm, I think it was blackboard. And he used on a number of occasions thee eh, discussion forum as a form of assessment where we also had to reply to a statement and respond you know, to other people's statements. To kind of develop that scientific argumentation through the discussion forum. So, for me it is fairly easy to follow".*

4. What would the mediation structure be like (Imagine you have to help a lecturer who has never worked with Distance Education courses. Step-by-step how would you structure the course to help the instructor promote interaction and exchange of student knowledge)?

Answer: *"Okay, uhm..well, I mean firstly, the one thing that I do know about distance education, because I worked for an organisation that had an outcomes based distance education science course is, number one, it has to be interactive. Uhm, in some way so, whether you use different media such as audio, or video. You know, you've gotta use that different, uhm the different media's. also, the students need to know step-by-step what do. So, it has to be fairly structured. So, if I was trying to teach a colleague, Uhm, about how to use the dis, the discussion forum in distance education. I would uhm, I think number one, show them how to set up the discussion and then I think it's important to also make sure that students are, an announcement is made with a link to the discussion. So that it can easily be followed so that students know where to look. Uhm, and then I think I would take them through, I would actually create a discussion forum for the two of us to interact with for a while because I think, uhm you've gotta see how it can work with in practice, uhm, which I think is uhm most learning for ehm, especially if it's professional development for teachers. Or I suppose educators, they have to see where this fits into their current work and how they would use it. Uhm, so, I think that's how I would set it up. But uh, are you only wanting to look at the discussion forum? …okay, because then I would add an addition.. an additional thing and I think this is where the communication strategy would come in. Do you want to be able to see how the students are interacting with the course? Or how they found maybe a certain module that you set out? So then I would use, and I think you've just given me a, I've been giving myself an idea about doing this cos I'm the one teaching this, the NS II. I think it's important then to create a discussion forum where students can communicate how they finding the course, what the challenges are, what some of the difficulties are, what they enjoying about the course. Uhm, I*

just don't know if it can be done anonymously because I think students would fill more comfortable doing it anonymously. But uhm, those that do want to uhm, you know give information they would know it's not anonymous so, but one would hope for an honest feedback so that as an educator you can reflect and improve for the next year. Ja"

5. Do you usually intervene in the conversations taking place in the forum? In what situations do you take part in the forum?

Answer: *"Uhm okay the first time I did it was the first cos and that's because students weren't engaging. So, I repeated my instruction asking, k: this is a statement that I am making so I would like to hear what your opinion is. I think if I see that someone has made maybe an incorrect factual statement that hasn't been picked up by other students then I might just make a short comment saying: think about what stoo.. what you've just said uhm, maybe they've shown a misconce… I would, I, I would try and guide them to think about what was said but I would not really intervene much more than that. Uhm, but I would look at the comments and uhm, maybe if the comments become I don't know, like out of hand and there's sexist comments being made and things like that, you know I think I would intervene and I would delete those comments and I would send eh, eh message to the student to I don't know, try and say: your, your statements that you making seem to be sexist, or you know whatever just you need to consider what you saying, that this is a public forum and so on. Uhm, but ja, I haven't actually had to do that, I mean do that. But if that kind of situation arose I think it would be important to uhm, intervene".*

6. Do you remember an instance in the discussion forum that interfered with communication and interaction?

Answer: *"Uhm, no, not in the di, discussion forum. Uhm, I was actually like surprised at how it encouraged interaction, uh because I was very uhm hesitant about this idea of online teaching because so many things can go wrong, and you want students to engage that my first. My first lesson which included a discussion about ITC in schools and getting it in schools was that it took me two weeks to prepare with the discussion and I did pre-recorded videos and the discussion was then set for like I think 45 minutes session in class, but they needed to make comments on the discussion forums so that when we came together we could now kind of debate about you know: should ICT be in schools? You know, are we doing enough considering the current crises and so on"?*

7. Do you as a lecturer motivate students to cooperate in the discussion forum?

Answer: *"Uhm, like I said my initial uhm post always does try and encourage them and what I've done for example now with I think with the NS II method the, the discussion is actually an assignment where I'm gonna grade their initial comment and they response to somebody else. Out of 10/10 so, uhm, unfortunately my, with my experience with students engaging with online activities and I mean this came to me when I was teaching the Physics II for NS in two thousand and I think it was eighteen. And I wanted them to read through the textbook chapters before. And I found that nobody was doing that, as soon as I attached some form of like I gave questionnaires, or short little assessments to be done before each lecture started suddenly I had students engaging. So, if I, I think sometimes attaching mark value if you include it as an assignment. I wouldn't do that with all the discussions forums. Only those that I think are put in, is one way to ensure that students engage if they generally wouldn't engage otherwise".*

8. Can you keep track of student interactions in the forum? (Can you follow the forum in terms of the time that the interactions take place and the depth of the conversation?)

Answer: *"Uhm, I think jah, generally I can, you can see when responses are made uh, I can see when students respond. So, I think the online discussion forums on this various uhm learner management systems like Canvas or Blackboard are fairly easy to use once if you know how to use them. Okay, so once you know how they work, they are easy to use"*

9. Is it possible to see through the online discussion forum the cooperation between students? (Do students cooperate through the forum?).

Answer: "*Uhm, I think that it's possible when you see the level to which students respond to the discussion forum. If they interact with other students and responses, then I think yes, you can".*

10. Do you think that students see the discussion forum as a communication tool or only as an evaluation tool?

Answer: *"Hmm uh, I think unless you use it as a communication tool they won't see it as a communication tool. So, unless you stating that you would like feedback from them about certain aspects of the course and you say, and you using it as a communication tool I don't think they will see it as a communication tool but rather as a, someway to get them to engage with a particular topic and maybe sometimes for, that is a way to assess their reasoning uhm, so. So, ja I mean up until you've asked this question about the communication tool uhm I did not even think that how one could use the discussion forum for communication, but I do think*

it's, it can be used effectively to get feedback like how things have been structured and challenges students found".

11. In the discussion forum, the agent that predominates in the debate is:

( ) Lecturer

( ) Student ( ) Both. Which are?

Answer: *"Uhm, I can only tell you how I use it. Uhm because as I said; I don't generally like to intervene. I might make one or two small comments if I need to encourage the moment I see, I see they not engaging or there's some factual thing that hasn't been corrected by other students. But for me its mainly for the students to communicate and to discuss and participate. Uhm, and not as a lecture unless I don't know I might do it with for example, masters and honours, and honours course but I don't even, uhm ja because I mean the classes are often like a discussion type. I might do it there but like I said I might. I don't know, I haven't, I haven't used the discussion with, with the masters or the honours students".*

12. In your opinion, what elements of collaboration predominate in the forum:

( ) Communication ( ) Cooperation

( ) Coordination by the lecturer

( ) More than one. Which are?

Answer: *"… ja, uhm, well like I said, I didn't think that it could be used as a communication tool up until you mentioned it. If one is planning a field trip for example, it might be a good way to organise the field trip. Now just uhm, by your questions I'm thinking of ways that could be used because you know back and forward with emails might, you know things might get lost. But if you use the discussion forum to coordinate let's say, an event and get volun, get people to volunteer and to make suggestions I think it could also be quite useful there to, to plan. Uhm so, I mean like in my opinion it could be, and I think it could be used that way uhm, to collaborate with others, to coordinate but also to get students to share ideas which for me is the most important aspect that they share ideas. But it could have those secondary uses. Uhm, and there could be quite effective in both of those aspects…ja".*

13. What are the difficulties you perceive in the students when they are using the forum? (Can students understand the structure of the answers in the online discussion forums?)

Answer: *'Uhm, from what I've seen they are able to follow structure of an argument and uhm, I don't know if that's because the tasks that I've put up, I've asked them specifically to make a, like a statement regarding the question or whatever I put up. And then I'll ask them to also*

respond to atleast one other person's response. And from what I've seen is, they do engage in that. Uhm, either an agreement or maybe a slide re-buckle so, it seems that they can follow but that is only with uhm, a response to one other person's discussion. I don't know if they will be able to do that if I ask them maybe to do more uhm so, but I don't, I don't perceive it as being difficult, but I do perceive as problem, is students connectivity and uhm ja, access uhm to this. I mean I, because of eh having to you develop the uhm teach the NS II course with no planning. I've been working late, and I think many of the students actually start responding and talking to each other like 12 o' clock at night, like 1 o' clock at night because of issues with connectivity. So, see that would be their greatest difficulty if they aren't able to maybe attend like a, an online session explaining things, then they have to get from their friends or reading and sometimes they don't get the gist of what you want. So, uhm ja'.

APPENDIX B: Interview Schedule

Lecturer Consent Form

School of Education Wits

27 St Andrews Road, Parktown, Johannesburg, 2193 • Private Bag 3, Wits 2050, South Africa
Tel: +27 11 717-3007 • Fax: +27 11 717-3009 • E-mail: enquiries@educ.wits.ac.za • Website: www.wits.ac.za

Please fill in and return the reply slip below indicating your willingness to be a participant in my voluntary research project called:

Research topic: An Investigating the Quality of Online Discussion Forums for Life Science courses.

My name is: Ian McKay

Permission to review/collect documents/artifacts	**Circle one**
I agree that my recorded videos can be used for this study only.	**YES**/NO
Permission to be interviewed	
I would like to be interviewed for this study.	**YES**/NO
I know that I can stop the interview at any time and do not have to answer all the questions asked.	**YES**/NO
Permission to be audiotaped	
I agree to be audiotaped during the interview or observation lesson	**YES**/NO
I know that the audiotapes will be used for this project only	**YES**/NO

Informed Consent
I understand that:

1. my name and information will be kept confidential and safe and that my name and the name of my school will not be revealed.
2. I do not have to answer every question and can withdraw from the study at any time.
3. I can ask not to be audiotaped, photographed and/or videotaped any time during the study
4. all the data collected during this study will be destroyed within 3-5 years after completion of my project.



Sign_____ _____ Date 22 September 2021

Interviewer: S. Mohlala

Below are interview questions that will be conducted to the participant as a form of mediation:

1. Do you use the discussion forum in your discipline? How do you use the forum and in which cases do you use it?

Answer: *"okay uhm, the answer is… Uhm, I did the first time I ever presented an online course, which was after lockdown. And it was basically I, uh, I had the students, I gave them readings and then in the discussion forum I asked them questions. And my hope was that they would respond and answer the questions and just basically discuss those uhm, those questions amongst themselves and with me, but I was gonna chip in. That was the idea anyway, but I found that there was a huge amount of resistance on their part, to actually participate in the discussion forums. And so, subsequently I haven't used discussion forums again. "*

2. Can you use the online discussion forum as an educational communication strategy?

Answer: *"I think you could, I mean at some… it seems like a very good idea, but I think you need students that are positive. Uhm, assigning marks to a discussion forum is problematic. And there has to be a level of playing field, or it could be ideal if there was. And if they all have to have equal, they feel that they have to have equal access to the internet".*

3. Can you understand the structure of the forum responses? Do you find it difficult to keep up with the discussions?

Answer: *"Hmm, well like I said my problem was that uhm, a few, that the, that. the students showed resistance to it. Now, I don't know if it was because they were not used to discussion forums. And this was their first online course they uhm, I had no problem following the answers of those that did reply but the problem was those that didn't have good access to the internet, they felt that they would be penalised 'cause they couldn't participate in the discussion forum in the same way as those who had good 24hour internet connection".*

4. What would the mediation structure be like (Imagine you have to help a lecturer who has never worked with Distance Education courses. Step-by-step how you how you would structure the course to help the instructor promote interaction and exchange of student knowledge)?

Answer: *"Haa, I think, I mean that I never got it right so, I would hesitate to, to answer that question. And uhm, I mean uhm I gave them readings, I asked them questions, I asked for their opinions, they replied. But well I think I would suggest that the lecturer should first of all sound out the, their students, would they participate? Uhm, and I would suggest that maybe trying it without any mark, without any marks. Uhm, no, I don't know I can't answer that because I don't think I ever manged to get a discussion forum to really work… and maybe a second time they could emm, try with marks, but you'll have to be very clear on how you gonna mark it, and it couldn't be a high mark just a small mark for participation. Uhm, I don't know I think that depends very much on the group of students".*

5. Do you usually intervene in the conversations taking place in the forum? In what situations do you take part in the forum?

Answer: *"Well look I've, because my forums did not work out so well, uhm, I never really did but I think that if I felt that uhm, conversation was going off track or uhm that some , or that some students who have been unfairly uhm, treated and uhm silenced in that sort of situation I would uhm, intervene, if I thought the students were not really staying on the, on mark you know. So, it could be they were misinterpreting the question completely inaccurately, or going off in some non-productive direction, or ja, just that some students would be nasty to others if it was that kind of atmosphere".*

6. Do you remember an instance in the discussion forum that interfered with communication and interaction?

Answer: *"Yes, I mean I, I mean very strongly I was approached by some students who said that they felt that that assigning marks for a discussion forum was completely unfair. Because they didn't have equal access to the internet as the others and they would be uhm, panelised. They would be unfairly panelised for the lack of technological access so, that's why I stopped. And I, I've given several online courses since then and I haven't used them really".*

7. Do you as a lecturer motivate students to cooperate in the discussion forum?

Answer: *"Uhm, well in that situation there wasn't much I could do hey uhm, to motivate them. I mean they were very fearful for the whole situation and so, they wouldn't participate. Uhm, I think you could uhm, I generally find that its actually difficult to motivate the students to participate in any sort of course, they tend to sit there very quietly. Uhm, my best, my best uhm results have been face-to-face with them working in groups and then discussing things with one another, and we just circulate them. Uhm, I think that you could get that to work on rhyme maybe having working in groups. I did try that but then the marks interfered. I think small group discussions within talking to one another, peer to peer interactions and then you can have them summarise their discussions and present it to the rest of the class maybe, in some way".*

8. Can you keep track of student interactions in the forum? (Can you follow the forum in terms of the time that the interactions take place and the depth of the conversation?)

Answer: *"Well I think uhm, definitely the depth of the conversation I could've uhm, time. And the other things I haven't really used those online discussions while enough to be able to say I could've, or I couldn't. I would need more experience".*

9. Is it possible to see through the online discussion forum the cooperation between students? (Do students cooperate through the forum?).

Answer: *"I think it would be, especially if you take that forum and you divide the students into small groups. You could look at the groups and you could look at the participation within the groups. Ja, I'm, I'm confident that you could do that".*

10. Do you think that students see the discussion forum as a communication tool or only as an evaluation tool?

Answer: *"I think in my case uhm, the problem was that they kind of focused on the evaluation side of things rather than the communication. Uhm, actually what I have found that really worked and that maybe this answers some of the previous questions is WhatsApp. Uhm, I've set up WhatsApp groups and it has been fairly good discussions on that. I think it's very immediate that uses a cellphone, that they all familiar with. And uhm with those WhatsApp groups there would be no mark or anything like that. For some reason I, WhatsApp works better than Ulwazi or, all those, all the more formal Wits systems, I don't*

know why but it does. It's immediate uhm, and they always, everybody is always sitting on their cellphones".

11. In the discussion forum, the agent that predominates in the debate is:
    ( ) Lecturer
    ( ) Student ( ) Both. Which are?

Answer: *"Uhm, actually the students. I mean I'll ask questions and then the students and then go back and, I, I think the students hey. I mean I think is electro. Uhm I if you dominating too much then it's a problem. So ja, it must be the students hahaha..it must be, and I think in my experience it has to really be the students".*

12. In your opinion, what elements of collaboration predominate in the forum:
    ( ) Communication ( ) Cooperation
    ( ) Coordination by the lecturer
    ( ) More than one. Which are?

Answer: *"uh, I think its… uhm, ja all of them. I think it keeps [gives] the students opportunities to talk to one another, to ask you questions, and generally keep up with the course. Ja, it's the sort of thing especially with what's, with the WhatsApp groups somebody can ask a question at midnight, and somebody else will reply if they, because of the nature of the medium".*

13. What are the difficulties you perceive in the students when they are using the forum? (Can students understand the structure of the answers in the online discussion forums?)

Answer: *"That, more formal way of things… uhm, ja I think they can. I think for me, firstly I would try more forums I will with yeh… but I think that, without marks yeh. I think thee, it's not a problem. They used to communicating online and talking to one another and coordinating one another so, not really, no, no problems. I think first years are more, just uhm observing them, first years that I know uhm, are more likely to participate in a discussion forum than the honours students. And I think that's because they haven't, the honours students are a bit more jaded by the whole system and a bit more likely to perceive things as being unfair and disadv' and feel disadvantaged by it. Whereas the first year*

students are, a little bit more enthusiastic and willing to co-operate and discuss things for points. Ja so, that's just one thing I have observed".

APPENDIX C: Interview Schedule

Lecturer Consent Form

School of Education Wits

27 St Andrews Road, Parktown, Johannesburg, 2193 • Private Bag 3, Wits 2050, South Africa
Tel: +27 11 717-3007 • Fax: +27 11 717-3009 • E-mail: enquiries@educ.wits.ac.za • Website: www.wits.ac.za

Please fill in and return the reply slip below indicating your willingness to be a participant in my voluntary research project called:

Research topic: An Investigating the Quality of Online Discussion Forums for Life Science courses.

My name is: Miss Nomzamo Xaba

Permission to review/collect documents/artifacts	**Circle one**
I agree that my recorded videos can be used for this study only.	**YES**/NO
Permission to be interviewed	
I would like to be interviewed for this study.	**YES**/NO
I know that I can stop the interview at any time and do not have to answer all the questions asked.	**YES**/NO
Permission to be audiotaped	
I agree to be audiotaped during the interview or observation lesson	**YES**/NO
I know that the audiotapes will be used for this project only	**YES**/NO

Informed Consent
I understand that:

1. my name and information will be kept confidential and safe and that my name and the name of my school will not be revealed.
2. I do not have to answer every question and can withdraw from the study at any time.
3. I can ask not to be audiotaped, photographed and/or videotaped any time during the study
4. all the data collected during this study will be destroyed within 3-5 years after completion of my project.

Sign_  Date_02/02/2021

Interviewer: S. Mohlala

Below are interview questions that will be conducted to the participant as a form of mediation:

1. Do you use the discussion forum in your discipline? How do you use the forum and in which cases do you use it?

Answer: *"Uhm well, I, I use the discussion forum for all my lectures as well as my uhm tutorials if I happen to attend one but mostly for me lectures because I am the one who sorts of delivers those. So, I use them uhm in two ways. Because the online offers the uhm, the verbal way the students could just uhm, I mean after asking a question they could just uhm provide answers. And other answers sometimes they are just you know, written for the shy students I see them uhm, usually in uhm in a form of students writing their responses to the question on the textbooks and it gives also a way of reading the text for other students and actually they provide discussion points as well. And in some cases we also have uhm break away room. And I usually use those when there is full participation and all the students have attended. Then we can have a breakaway room especially for lectures that uhm, combine with our tutorials".*

2. Can you use the online discussion forum as an educational communication strategy?

Answer: *"Definitely".*

3. Can you understand the structure of the forum responses? Do you find it difficult to keep up with the discussions?

Answer: *"Not necessarily because what I've realised is different classes that I teach have uhm different levels of being active in the discussion. And I think sometimes it just goes with the topic, content, and the planning from their side as well. Ah although there could be maximum participation but it's usually not difficult to follow because as one is responding maybe verbally I'm just going through eh the text. If there's something new emerging from the text I'll just pick it up and really use it but I do acknowledge other eh responses to say: so and so has said a similar thing however, Sha' is saying something new which is interesting that I think we could just discuss for a brief moment before I continue with my slide. She's saying this and this so it's, it's never really difficult to, to keep up".*

4. What would the mediation structure be like (Imagine you have to help a lecturer who has never worked with Distance Education courses. Step-by-step how you how you would structure the course to help the instructor promote interaction and exchange of student knowledge)?

Answer: *"Uhm, I think that's a difficult one actually in a sense that I feel that teaching is very subjective, like it's different to everyone given uh the type of students you teach, the type of topic you teach as well. So, I just think that it would be maybe an issue of advising that particular or even actually inviting the, the, that lecture to your own lecture just to give them exposure as to how you'd facilitate your own discussion, what options are there so that they get a real feel because it's so difficult telling somebody of how Ulwazi works if they have never interacted with Ulwazi. So, it's always nicer to give them a real practical feel, to say: okay so, I will be waiting for my students now please just ehm, be aw, just ehm just observe how I try to stimulate the engagements or the discussion so that there is uhm learning eh going, active learning I mean going on. And then I think WhatsApp is also one of the most important tools that I will tell them about because we usually whatever it is that you know there's such time constraints when it comes to lectures but with WhatsApp I mean it gives endless and endless of mhm uh, of let me just say, it's an unrestricted app and again it depends on particular lectures. Other lectures will just say to the students they could only use WhatsApp discussions from eight to four but with mine I mean; I'd wake up to questions and sometimes those questions are even answered by other students. It's just that it's a matter of me of just confirming. So, those are all the things that I think I'll make them aware of and take them step by step in a form of a partition".*

5. Do you usually intervene in the conversations taking place in the forum? In what situations do you take part in the forum?

Answer: *"When, in all honesty I really I, I really enjoy just you know uhm, I, I use well, let me just say my name and role in the disc, in the discussion is to initiate those discussions where I am the one who's asking the prompting questions that stimulate their thinking. And I sort of give a, give them time just to interact with one another. And I, I love it when I hit a point where somebody has a question they sort of direct that question to me. Eh and it's, it's, it's always nice for me to say: uh no this no', a, a person is asking a question so, what do you guys think? It's not just about me and they sort of, I love that collaborative uhm interactions that happen in my classroom and most roles that I play is just a matter of facilitating the discussion where*

just towards the end I, I sort of you know tell them wha' uhm: who was sort of correct or the correct scientific way of viewing things. And sometimes I just mediate again to say: no this is wrong because…maybe if there were wrong answers that prevailed to sort of give guidance as a form of feedback because it is also important in the discussions. So, that they'r clear as to what makes an answer wrong. Not necessarily that maybe we want them to have a close type of thinking but there's always a scientific way of thinking. Yes, they could say in multiple ways but as long as the key or, ja, the key ideas of the concepts are said in a correct way. Whatever way they say it's fine is just a matter of facilitating and mediating in this discussions. "

6. Do you remember an instance in the discussion forum that interfered with communication and interaction?

Answer: *"Yes, uhm, a lot of those uhm, the main, main inhibiter is the connection. I remember I just went on and on and I was not aware that my students uhm I mean I had long been disconnected. So, I've been asking this question and during then I was not the type of, of I would just leave the main screen open and not really go to the sub screen where I could see the activeness of the students because usually they would just uhm, you know communicate while, whilst I have my main screen on if I'm just having a break from the lecture and I'm just having a smaller nyana discussion segment. And I was, I did that tss, twice where I explained that main, main problem of the disconnecting part. So connectivity is one of the key issues that lead to that".*

7. Do you as a lecturer motivate students to cooperate in the discussion forum?

Answer: *"Definitely, I mean just one answer is not enough like you just want to get a variety of thinking no matter how closed the question is, but you just want to hear multiple voices which also as a lecture and ensure you that they listening, they following and yeh it's always nice to have the, those collaborative discussions happening".*

8. Can you keep track of student interactions in the forum? (Can you follow the forum in terms of the time that the interactions take place and the depth of the conversation?)

Answer: *"Well in all honesty I think to a particular extend you can but to a very large extend you cannot because I mean how would, you choose to plan. I, I know exactly where I want my students to sort of have a discussion but the depth and the length of those discussions of how they manifest is really out of, out of my control. And I could only uhm, sort of measure it once they, they happen or manifest. Because sometimes I expect that eh if I use this ehm, probably*

this picture to just initiate a, a hmm, a discussion maybe it could take 5, 10 minutes. You do have those rough estimations but honestly, before a lesson it's hard to do that but you can do that after the lesson".

9. Is it possible to see through the online discussion forum the cooperation between students? (Do students cooperate through the forum?).

Answer: *"Yes, definitely if you, you sort of create those opportunities because I think as a lecturer you are allowed to be responsible for creating that culture and that type of se', set up like I've always, like I've been saying to say that uhm: what else can somebody have I mean say, you know having those promptings to say: no somebody means and you will find som', I mean in my lessons I feel like there's a lot of uh, like sha' said I think that I could just add that you know. Those signpost are indicators that there is collaborative learning because they have, they have listened to the initial speaker and they're just adding on what the initial and that is a sign of learning I believe".*

10. Do you think that students see the discussion forum as a communication tool or only as an evaluation tool?

Answer: *"I'd really like to believe that uhm, they see it more as a collaborative tool rather than as an assesse, an assessment tool or an evaluative tool especially in, in my case. It's only where maybe we having prese, group presentations and then maybe they will realise that this is for marks but in most cases they just see it as a learning tool…yes, more like communication, sorry that's the word".*

11. In the discussion forum, the agent that predominates in the debate is:

( ) Lecturer

( ) Student ( ) Both. Which are?

Answer: *"…Uhm, you know I think to be honest it's, it's, it's me the lecturer although I do I mean, at the end of the day a lecture in, in definition is just a why, a, a one way of presenting information. But we try so hard, I try so hard let me speak for myself. I try so hard to create opportunities with my students are, are participating and collab, and, and they are active in the meaning making opportunities that I create. However, I'm largely the one who is explaining, consolidating, asking questions. So, there's if I were to analyse my lesson I think I'll have a large amount of time of talking as compared to my students. That's the honest reality".*

12. In your opinion, what elements of collaboration predominate in the forum:

( ) Communication ( ) Cooperation

( ) Coordination by the lecturer

( ) More than one. Which are?

Answer: *"Well the question is tricky, but I'll just say uhm all of the above yeh. Uhm at, like I was saying to say that at some point you'll see the em, collaboration in the signpost of students responses like, uh like what sha' has said or adding to what you've said, and you know there's those elements of collaboration in this, those elements of coordination as well. To say they are picking up from the previous speaker's response and they are sort of extending to it or maybe sometimes they are I mean in disagreement with it and they're providing reasons. I mean there is collaboration, coordination, and other elements as well, or hence, I say all of them".*

13. What are the difficulties you perceive in the students when they are using the forum? (Can students understand the structure of the answers in the online discussion forums?)

Answer: *"Em if I'm understanding the, the question correctly you're asking the difficulties associated with students understanding of the answers provided in the discussion forum? Okay, uhm well I, I think I have very active students who are not afraid to say what do you mean when you, when you say that and I don't get that a lot and it's you know I think as lecturers we have this ehm tendency of is that clear? do you understand you know? Do you understand? and I think those are just indicators of them understanding so I, I doubt that my, my students although yes, they do sometimes experience difficulties maybe in understanding, but they are not afraid to ask for clarity. And sometimes is just a matter of the language used you know so, it's a matter of trying to break it down to them so that they understand better because I mean we teach students from emm different backgrounds. So, their understanding of the language of instruction is not necessarily at the same level. And again, uh teaching biology which like also has difficult terms is sometimes the language factor of it and not really the platform in which they are I mean in we are using for the discussions but I, I just feel that it's, it's just a matter of the language of instruction combined with the language of the subject which creates those difficulties. And I think instead the platform sort of like provides an opportunity for all the students. The shy ones, the active ones, to be constantly asking and engaged uhm for clarity and understanding because some are not even afraid to text to say: but what do you mean when you say haemoglobin? What is haemoglobin? You know and I think instead of it being an ee,*

the, the platform being an inhibitor I felt that it was quite a eh…I'm looking for the word that is opposite an inhibitor so, sha' you'll add that word. Ja it's sort of a facilitator but it's not that word, or enables the discussions to take place. It's an, an abler, yes".

INFORMATION LETTER: LECTURER

Dear Sir/Ma'am

My name is S. Mohlala. I am a registered student (Masters-sciences: coursework and research) in the School of Education at the University of the Witwatersrand. I am undertaking a research on an investigation of the Quality of Online Discussion Forums for Life Sciences courses. My supervisor is Dr. Mpho Mosabala.

I would like to kindly request for the permission to make use of the Ulwazi recordings of discussion forums. My research involves analysing discussion forum recordings and conducting semi-structured interviews with the lecturers.

I am therefore also inviting you to participate in this study where you will be interviewed (which may take up to one hour of your time). You will not be advantaged or disadvantaged in any way. You can withdraw your permission at any given time during this project study without penalty. There are no foreseeable risks in participating in this study. You will not be paid for your participation to this study.

Your name and the identity of the school will always be kept confidential in all academic writing relevant to the study. Your individual privacy will be respected and maintained in all published and written data resulting from the study.

All research data will be stored in my supervisor's password protected computer and destroyed between 5 years after completion of project.

Please let me know if you require any further information. I look forward to your response as soon as it is convenient. Yours Sincerely,

NAME: S. Mohlala,

Cellphone Number: 0717404590

APPENDIX D: Interview Schedule

Lecturer Consent Form

School of Education Wits

27 St Andrews Road, Parktown, Johannesburg, 2193 • Private Bag 3, Wits 2050, South Africa
Tel: +27 11 717-3007 • Fax: +27 11 717-3009 • E-mail: enquiries@educ.wits.ac.za • Website: www.wits.ac.za

Please fill in and return the reply slip below indicating your willingness to be a participant in my voluntary research project called:

Research topic: An Investigating the Quality of Online Discussion Forums for Life Science courses.

My name is: Dr Portia Kavai

Permission to review/collect documents/artifacts	**Circle one**
I agree that my recorded videos can be used for this study only.	**YES**/NO
Permission to be interviewed	
I would like to be interviewed for this study.	**YES**/NO
I know that I can stop the interview at any time and do not have to answer all the questions asked.	**YES**/NO
Permission to be audiotaped	
I agree to be audiotaped during the interview or observation lesson	**YES**/NO
I know that the audiotapes will be used for this project only	**YES**/NO

Informed Consent

I understand that:

1. my name and information will be kept confidential and safe and that my name and the name of my school will not be revealed.
2. I do not have to answer every question and can withdraw from the study at any time.
3. I can ask not to be audiotaped, photographed and/or videotaped any time during the study
4. all the data collected during this study will be destroyed within 3-5 years after completion of my project.

Sign_____ Date 22-01-2022

Interviewer: S. Mohlala

Below are interview questions that will be conducted to the participant as a form of mediation:

1. Do you use the discussion forum in your discipline? How do you use the forum and in which cases do you use it?

Answer: *'Yes, I use the discussion forum in uhm both the teaching of content, the Life Sciences content and also in the relevant methods, teaching methods. I mostly use it uhm for my tutorial sessions where first of all I will have taught or deliberated on a certain content and then during the tutorial I would like the students themselves to share ideas based on the em concepts that we'll have uh dealt with before. So, uhm you'll find that I used to say now that we are online we mostly use the discussion forum rather than when we were in contact. Because during contact sessions maybe we would do actually face to face discussions, but now because eh we are online we do those, we use the discussion forums. And depending on the size of the group, in some cases the discussions are planery like they are done, the whole group as a whole. And I try to encourage them to participate by giving them some marks for any participation that they've done. And uhm maybe im now going to talk about something that you're going to ask me but if I am it's fine. When I set up my discussion I set it in such a manner that the students will only see their fellow classmates discussion when they've posted theirs. So, also that encourages them uh post their opinions'.*

2. Can you use the online discussion forum as an educational communication strategy?

Answer: *"Yes, I use it as an educational communication strategy for my courses. "*

3. Can you understand the structure of the forum responses? Do you find it difficult to keep up with the discussions?

Answer: *"Yes, uhm uh one thing that I'm not happy with the, the, the discussion forum is uh, in some cases you like you as the, as the lecturer, when each student posts something you are trying to read through what they're posting but remember it's a group with eighty students and maybe forty are participating because it's not always all of them. But still these uh discussions are being posted and you go, and you comment, and you make a follow up. So, sometimes you*

lose some along the way because you are not seeing them or maybe they've been posted as a response or a reply thre', a reply thread to another students' post. So, I find it very hard to, to uh, to keep up. And one thing I noticed about this discussion forum on Ulwazi is eh, in some cases you have to go back and refresh. Otherwise, you will not see new discussions that have been posted. So, by the time that you go, and you refresh the page, by the time you come back they are many that have been posted again. And you have to continue to look for them. So, there is I think it's a technical thing that means obviously improvement but yes, it makes it very difficult to keep up".

4. What would the mediation structure be like (Imagine you have to help a lecturer who has never worked with Distance Education courses. Step-by-step how you how you would structure the course to help the instructor promote interaction and exchange of student knowledge)?

Answer: *"In terms of discussion I would ehm, if it was upto me of course I would say, if it wasn't an issue of limitation of data and all that, I would still do it as a synchronised eh set up where students actually present voices instead of typing. Because when they are typing it takes long. It limits what they want to say. So, that will be my explanation to a person who wants to, to do uh discussions that; your options is either they are doing synchronised where they actually express themselves like vocally. But it depends on the size of the class or the level. If it is uh undergraduates it is difficult because not all of them can afford the data to join into live discussions. And not all of them have the gadgets that can even allow them maybe to use the microphone. But let's say it's no', it's like that now where you cannot use uh live uh oral discussions then you can use the discussion forum. But I will still explain to that person uh the advantages and disadvantages of each one of them and what measures they can put in place so that they are, they keep up. So, I will obviously teach how to set up from setting the discussion forum, the date, the time, that is supposed to be done and then also say maybe you, you set up the settings like are you allowing to comment as a reply? or are you allowing one thread to be continued? Are you allowing liking, or disliking of uh, just like what you do on social media of a certain comment? And then after you've done that you also uh, advise the person that if you want the discussion to continue this is what I noticed. If let's say the students keep on posting and then they don't see you, like your comments; then they stop. But if they go along reading what they are saying and you comment along the way, then they will also continue. Or remember we also have WhatsApp groups so; you go to the WhatsApp groups and say guys we*

are now discussing. And just remember marks are, are located to those that are responding or that are posting their opinions. Aah you will see their motivation. They all go, and they comment and some of which are actually very constructive. The good thing about discussion is it doesn't disappear after the station. Even those that em couldn't attend, they can actually go off the time that we were in the lesson, and they can also add their comments or learn from others".

5. Do you usually intervene in the conversations taking place in the forum? In what situations do you take part in the forum?

Answer: *"Uhm, I sometimes I comment as a backup after students would have said or if there is a deliberation where I feel that they are, there's a contrast or what, the opinions that are being presented they are in contrast. Some cases I just come and like mediate with em, or to listen moderate what em both of them are saying to arrive to one conclusion because if you don't; the one is saying the opposite and then the other one. It will actually confuse everyone else. So, I always come in to consolidate their whole idea so that they know what is the correct ah aspect".*

6. Do you remember an instance in the discussion forum that interfered with communication and interaction?

Answer: *"Yeh, well that was more of a technical issue. That maybe I would go offline, or I have loadshedding and then I will have to go to WhatsApp and say guys I have loadshedding please continue to discuss. That did not necessarily interfere with the flow of discussion as such it just interfered with my position of being a mediator or facilitator of the whole, eh for the whole discussion. So, what it meant is, I would then have to just go later and see what it is that they were talking about. And then I go to the WhatsApp group and then summarise everything and then eh, pick up on the important points. But jah, it was more of the technical issues not anything else".*

7. Do you as a lecturer motivate students to cooperate in the discussion forum?

Answer: *"I do that a lot uhm, and the reason why I, I, I, I always encourage them or actually got, say: but you are quite and who's quiet is because sometimes the students will be having the information but just not keen to share. So, by encouraging them to discuss it will help, for me to see whether they have some misconceptions or they're actually in the right track. And I*

always go, especially to the eh WhatsApp group to say guys lets go and discuss this issue, we need to get to your opin', your opinion. So, yes I always do".

8. Can you keep track of student interactions in the forum? (Can you follow the forum in terms of the time that the interactions take place and the depth of the conversation?)

Answer: *"Yah, when there are no technical glitches or erhm, if they are following a certain thread, it's easier for me to keep up. And then I can follow and comment, or add, or subtract if I see that there is, the discussion is misleading. But yes, it comes with its own challenges of me struggling to fo', uhm to keep up with the number of comments that are coming in eh minute or so. So, there are some that you might not pay attention and obviously you are also worried that, that might be the ones that were crucial, but I try. "*

9. Is it possible to see through the online discussion forum the cooperation between students? (Do students cooperate through the forum?).

Answer: *"Some students co-operate. The same you see, the funny thing is eh, the same students that cooperate when you're having asynchronous lesson, are the same students that usually participate also in this discussions. So, it's an issue of interest sometimes, but of course those same students that don't participate will be giving you an excuse of lack of data and then you say: but I have put in an asynchronous discussion link which you can comment on even after hours. Those that say that they have the graveyard data, why is it that you're not doing it? Then you see that it's just an issue of interest. It has nothing to do with really resources as such, but some do participate, not all of them".*

10. Do you think that students see the discussion forum as a communication tool or only as an evaluation tool?

Answer: *"Hmm for some students, especially for those that only participate when you say there are marks allocated. They are the ones that will have, who, who have a feeling like aah oona I, I, I only do it because of marks. Because you see they will even ask you, are there marks for it? And then we have twenty five percent that attribute to it, because they know it will enrich their information, it will clarify what they know so, so in a, in the whole group you have a mixture of students with different intentions, or their interest is based on different intentions".*

11. In the discussion forum, the agent that predominates in the debate is:

( ) Lecturer

( ) Student ( ) Both. Which are?

Answer: *"Ahh it's mostly the students, it's mostly the students because as you are, as they are discussing they, they will even be leading up to say ohh they come one comment and then they will say: no, I agree with you because this is what happened, or this is what happens. So, they actually comment on each other's comments. And you as the lecturer you definitely won't keep up for you to be able to dominate a group which is ninety to hundred students. So, you it's mostly them that are dominating but you as the lecturer sometimes you, you read through, if it is fine then there's no need to comment or you, you where there's need you comment on those arears".*

12. In your opinion, what elements of collaboration predominate in the forum:

( ) Communication ( ) Cooperation

( ) Coordination by the lecturer

( ) More than one. Which are?

Answer: *"I think it's more than one, mostly it's ehm communication yes, and in some cases like there was eh session that I did, and they were, we were trying to put together ideas that we'd use for eh, eh, eh, eh lesson plan which was supposed to include things like learning theories. So, other circumstances is like they were giving each other ideas. So, one would think of this way, one would come up with the scenario and they would say oh okay, if I'm teaching blind kids in a lab this is what I am doing. You see it's not information that can be taught but they were applying from the theories that we had learned and from there that, that discussion was then leading to an assignment, so, I can say that was cooperative learning as well. That was evidence, lecturer will be yah mostly like a facilitator".*

13. What are the difficulties you perceive in the students when they are using the forum? (Can students understand the structure of the answers in the online discussion forums?)

Answer: *"Yah, they can understand eh as you will have given them before isn't it? You say, like uhm at the beginning of the year I give them, when I start the course I give them eh what I call isn't we have a course outline? But then we also have an expanded program for each day. So, even before they attend that they know that eh they are going to have a discussion which is based on this aspects, this aspects, and this aspects so that helps them to read before. Because some of them will even say; ahhh when I was reading this is what I found out. So, if you tell them in advance and you give them guidelines of what they are discussing on, then they won't have problems. But the good thing about discussion, some of those that will be lost, they can*

even have the freedom to ask to say; what exactly are we expected to do here? Those that who have understood will actually comment to say this is what we are supposed to do. But you're watching isn't it? Then you also comment and say: yah, you're spot on, this is what you are doing, or no, besides that I also want you to do this and that. So, Yah the discussion forum gives them freedom to ask right away what is expected if they're not sure and then if then they can go ahead and respond".

APPENDIX E: Interview Schedule

Lecturer Consent Form

School of Education Wits

27 St Andrews Road, Parktown, Johannesburg, 2193 • Private Bag 3, Wits 2050, South Africa
Tel: +27 11 717-3007 • Fax: +27 11 717-3009 • E-mail: enquiries@educ.wits.ac.za • Website: www.wits.ac.za

Please fill in and return the reply slip below indicating your willingness to be a participant in my voluntary research project called:

Research topic: An Investigating the Quality of Online Discussion Forums for Life Science courses.

My name is: Dr Caleb Mandikonza

Permission to review/collect documents/artifacts	**Circle one**
I agree that my recorded videos can be used for this study only.	**YES**/NO
Permission to be interviewed	
I would like to be interviewed for this study.	**YES**/NO
I know that I can stop the interview at any time and do not have to answer all the questions asked.	**YES**/NO
Permission to be audiotaped	
I agree to be audiotaped during the interview or observation lesson	**YES**/NO
I know that the audiotapes will be used for this project only	**YES**/NO

Informed Consent

I understand that:

1. my name and information will be kept confidential and safe and that my name and the name of my school will not be revealed.
2. I do not have to answer every question and can withdraw from the study at any time.
3. I can ask not to be audiotaped, photographed and/or videotaped any time during the study
4. all the data collected during this study will be destroyed within 3-5 years after completion of my project.



Sign__ _____ Date____28/11/2021

Interviewer: S. Mohlala

Below are interview questions that will be conducted to the participant as a form of mediation:

1. Do you use the discussion forum in your discipline? How do you use the forum and in which cases do you use it?

Answer: *"I don't use the emm, discussion forum on the internet, I have not used it as yet. Because my, yes! Because my students have, have struggled to access the, the learning management system".*

2. Can you use the online discussion forum as an educational communication strategy?

Answer: *"..comments, whether it is a question, whether it is a question or uh, whether it is their response, they are able to type it on the chat. So, I would say, that is my discussion forum either than the discussion forum on the platform".*

3. Can you understand the structure of the forum responses? Do you find it difficult to keep up with the discussions?

Answer: *"When you are teaching the, when you have a set of slides to, to, to complete. If you come with a, an aim of completing the slides, the discussion forums can pull you back. Because we have quite a variety of, of responses. And then you, you at times you need to develop some of those arguments into meaningful, learning arguments. Some of the arguments are way out but you need to make the correct, thee, thee incorrect uhm arguments be expressed in a way that everyone learns out of them. And the correct ones you may want to acknowledge them and at times you might want to polish them up. So, yes eh, at times is difficult to keep up with the discussions whilst presenting a lecture".*

4. What would the mediation structure be like (Imagine you have to help a lecturer who has never worked with Distance Education courses. Step-by-step how you how you would structure the course to help the instructor promote interaction and exchange of student knowledge)?

Answer: *"Unfortunately, Uhm the way we work with course outline is that we don't prescribe how a lecturer can work with uh, uh with knowledge. The ehm methodology, there are projects*

that we use ehm teaching methods that we use actually depending on individual lecturers. So, eh, eh course outline is usually presented in terms of the content that is going to be covered. And then, it is upto the individual lecturer to, to seek advice. So, what we usually do is ehm, for example in the sciences division and under life sciences we have a community of practice. We have a life sciences community of practice of lecturers where we used to meet but due to covid we are not meeting. But we used to meet once or twice a month, I don't remember the periodicity eh but we met and we would share some of this issues. Like how for example, when you are teaching a particular topic how, can you make it more interactive and we'd even ehm, do exchange visits visiting each other's lecturers to, to look at what the others are doing so that we can see how much of that we can take in to our own whilst commenting on those that others are implementing so that we continue to improve as a team".

5. Do you usually intervene in the conversations taking place in the forum? In what situations do you take part in the forum?

Answer: *"Well, the way that I work with the chats, the chats yes. When we are using, When I use the chat, I told you I use the chat forum. When we are working with the chat I am a facilitator. I stand as someone who enables the students to interact and if there is an explanation that is given that I need to be clarified, or that I need to be developed to eh the answer that I want, I ask that question a question and the same thing applies with eh those that do have questions. If the questions are not clear I ask them to rephrase it. And at times you find that students their [they] respond to one particular chat for a long time. And then after a period of time as the facilitator I notice that there is a question or there is a comment that has not been picked up. I take that one and activate it: ey what about this one? Thank you. I've heard about this comments what about this comment that was made earlier, what are your views? And then students come in again. So, my role during a discussion during discu' or whatever platform is to facilitate that process of student interactions. But I had to facilitate it from a knowledgeable point of view. From a, from a knowledgeable viewpoint where I know what they are talking about. And then I should in the end be able to summarise it and, and put it together. I should be able to consolidate whatever they are saying when they have all discussed".*

6. Do you remember an instance in the discussion forum that interfered with communication and interaction?

Answer: *"no, I think one of them, one problem that we had was to set up the students in, in groups, giving them groups, putting them into uhm, respective groups for them to contribute, ja".*

7. Do you as a lecturer motivate students to cooperate in the discussion forum?

Answer: *"That is the intention that students need to cooperate and eh, when you are looking at cooperation you are looking at uhm, I'm thinking actually about the language that is used. That students should argue on a point rather than arguing on a person. So, they should not be attacking each other but they should be attacking the use of how I moderate them. And when I see that it is becoming personal I change it, I halt them and say: ey we are not talking about that we are talking about this, we are talking about the content, we are talking about the substance of this particular task yes! I, I like my students to co-operate, and I'd like them to cooperate in the way they think and the way they, they talk and the way they express themselves and especially through the language that they have".*

8. Can you keep track of student interactions in the forum? (Can you follow the forum in terms of the time that the interactions take place and the depth of the conversation?)

Answer: *"No, I have not been able to do that because I only interact with them during the course of the lecture but not afterwards. I was able to do that with the first years. I post questions and they would respond to those questions at their own time, and I was able to tell that hey but right now I'm not".*

9. Is it possible to see through the online discussion forum the cooperation between students? (Do students cooperate through the forum?).

Answer: *"No. it will be possible for them to work through the forum if at all, the forum were to allow them to uhm, I mean if, if the system was to allow them to access the forum. 'cause what eh, what seemed to be of a problem ah, for me, was mainly the, the, the poor connectivity for students across the country. Because when it is online, our students are almost everywhere. And even you notice that in town even itself they are in an urban setting. They don't necessarily have adequate eh, network. So, emm, it is difficult for the system to accommodate them, to accommodate the, the feature. So, eh, when I was teaching 1st years, the network, the em eh, platform would take about uh, almost 109 students out of 172 students at a time. And then it would eh, pick up and drop some of those eh, during the lecture. And if one need to set up a, a*

group activity, some members of the group will be dropped off during that activity. Some members would come in when they did not, when they were not allocated to a group. And the management of that group would be very difficult. So, that is how, and that is why, I failed to conduct group activities eh, on the internet".

10. Do you think that students see the discussion forum as a communication tool or only as an evaluation tool?

Answer: *"Students may not like using the discussion forum because it commits them more. It demands more commitment time from them. But it can only be part of the teaching and learning transaction in the classroom but not afterwards. I don't think students are very comfortable".*

11. In the discussion forum, the agent that predominates in the debate is:

( ) Lecturer

( ) Student ( ) Both. Which are?

Answer: *"Students must always dominate. The lecturer must facilitate".*

12. In your opinion, what elements of collaboration predominate in the forum:

( ) Communication ( ) Cooperation

( ) Coordination by the lecturer

( ) More than one. Which are?

Answer: *"All of them must be pre-dominant yes because the main purpose of any ehm, educational transaction is student learning and student, for students to learn they have to recognise that learning is a coperate activity and that is eh, Vygotsky and the sociocultural approach. And for that to happen there needs to be communication. And communication between them has to be facilitated and the has to be some form of coordination. Eh, you don't just speak anytime for you to speak you have to listen to another person's argument to listening atte'..attentively and then you generate your own response and get your own time and to make your contribution yes! All of them are interrelated".*

13. What are the difficulties you perceive in the students when they are using the forum? (Can students understand the structure of the answers in the online discussion forums?)

Answer: *"They should understand the structure because online should be structured and should come from the simple to the complex. So, uhm, all arguments must be such that, in such a way that they are coming from simple to complex. And they have to, there has to be a mix of*

context dependent and context independent knowledge. Whenever someone is arguing there needs to be an example and ja"

Appendix F: Interview Schedule

Wits School of Education Wits

Interviewer: S. Mohlala

Below are interview questions that will be conducted to the participant as a form of mediation:

1. Do you use the discussion forum in your discipline? How do you use the forum and in which cases do you use it?
2. Can you use the online discussion forum as an educational communication strategy?
3. Can you understand the structure of the forum responses? Do you find it difficult to keep up with the discussions?
4. What would the mediation structure be like (Imagine you have to help a lecturer who has never worked with Distance Education courses. Step-by-step how would you structure the course to help the instructor promote interaction and exchange of student knowledge)?
5. Do you usually intervene in the conversations taking place in the forum? In what situations do you take part in the forum?
6. Do you remember an instance in the discussion forum that interfered with communication and interaction?
7. Do you as a lecturer motivate students to cooperate in the discussion forum?
8. Can you keep track of student interactions in the forum? (Can you follow the forum in terms of the time that the interactions take place and the depth of the conversation?)
9. Is it possible to see through the online discussion forum the cooperation between students? (Do students cooperate through the forum?).
10. Do you think that students see the discussion forum as a communication tool or only as an evaluation tool?
11. In the discussion forum, the agent that predominates in the debate is:

( ) Lecturer

( ) Student ( ) Both. Which are?

12. In your opinion, what elements of collaboration predominate in the forum:

    ( ) Communication ( ) Cooperation

    ( ) Coordination by the lecturer

    ( ) More than one. Which are?

13. What are the difficulties you perceive in the students when they are using the forum? (Can students understand the structure of the answers in the online discussion forums?)

APPENDIX G: Interview Schedule

Lecturer Consent Form

School of Education Wits

27 St Andrews Road, Parktown, Johannesburg, 2193 • Private Bag 3, Wits 2050, South Africa
Tel: +27 11 717-3007 • Fax: +27 11 717-3009 • E-mail: enquiries@educ.wits.ac.za • Website: www.wits.ac.za

Please fill in and return the reply slip below indicating your willingness to be a participant in my voluntary research project called:

Research topic: An Investigating the Quality of Online Discussion Forums for Life Science courses.

My name is: _____

Permission to review/collect documents/artifacts	**Circle one**
I agree that my recorded videos can be used for this study only.	**YES**/NO
Permission to be interviewed	
I would like to be interviewed for this study.	**YES**/NO
I know that I can stop the interview at any time and do not have to answer all the questions asked.	**YES**/NO
Permission to be audiotaped	
I agree to be audiotaped during the interview or observation lesson	**YES**/NO
I know that the audiotapes will be used for this project only	**YES**/NO

Informed Consent
I understand that:

- my name and information will be kept confidential and safe and that my name and the name of my school will not be revealed.
- I do not have to answer every question and can withdraw from the study at any time.
- I can ask not to be audiotaped, photographed and/or videotaped any time during the study
- all the data collected during this study will be destroyed within 3-5 years after completion of my project.

Sign_____ Date_____

Appendix H:

INFORMATION LETTER: LECTURER

Dear Sir/Ma'am

My name is S. Mohlala. I am a registered student (Masters-sciences: coursework and research) in the School of Education at the University of the Witwatersrand. I am undertaking a research on an investigation of the Quality of Online Discussion Forums for Life Science courses. My supervisor is Dr. Mpho Mosabala.

I would like to kindly request for the permission to make use of the Ulwazi recordings of discussion forums. My research involves analysing discussion forum recordings and conducting semi-structured interviews with the lecturers.

I am therefore also inviting you to participate in this study where you will be interviewed (which may take up to one hour of your time). You will not be advantaged or disadvantaged in any way. You can withdraw your permission at any given time during this project study without penalty. There are no foreseeable risks in participating in this study. You will not be paid for your participation to this study.

Your name and the identity of the school will always be kept confidential in all academic writing relevant to the study. Your individual privacy will be respected and maintained in all published and written data resulting from the study.

All research data will be stored in my supervisor's password protected computer and destroyed between 5 years after completion of project.

Please let me know if you require any further information. I look forward to your response as soon as it is convenient.

Yours Sincerely,

NAME: S. Mohlala,

Cellphone Number: 0717404590

Appendix J:

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

OFFICE OF THE DEPUTY REGISTRAR

13 September 2021

Shama Mohlala

Student Number (458689)

Master of Education by Coursework and Research Report Faculty of Humanities

TO WHOM IT MAY CONCERN

"An Investigation of the Quality of Online Discussion Forums"

This letter serves to confirm that the above project has received permission to be conducted on University premises, and/or involving staff and/or students of the University as research participants. In undertaking this research, you agree to abide by all University regulations for conducting research on campus and to respect participants' rights to withdraw from participation at any time.

If you are conducting research on certain student cohorts, year groups or courses within specific Schools and within the teaching term, permission must be sought from Heads of School or individual academics.

Ethical clearance has been obtained. (Protocol number: 2021ECE067M) Research Expiration: (Research submission date)

Potgieter

Nicoleen Potgieter
University Deputy Registrar

Cc Dr Mpho Mosabala

Private Bag 3, WITS, 2050, South Africa | **T** +27 11 717 1204/8 | **E** nicoleen.potgieter@wits.ac.za | www.wits.ac.za
IYUNIVESITHI YASEWITWATERSRAND | YUNIVESITHI YA WITWATERSRAND
100 1922 2022

Appendix K:

WITS SCHOOL OF EDUCATION

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

SCHOOL OF EDUCATION ETHICS COMMITTEE

CONSTITUTED UNDER THE UNIVERSITY HUMAN RESEARCH ETHICS COMMITTEE (NON-MEDICAL)

CLEARANCE CERTIFICATE	**PROTOCOL NUMBER: 2021ECE067M**
PROJECT TITLE	An investigation of the Quality of Online Discussion Forums..
INVESTIGATOR	SHAMA MOHLALA
SCHOOL/DEPARTMENT OF INVESTIGATOR	WITS SCHOOL OF EDUCATION
DATE CONSIDERED	16 August 2021
DECISION OF THE COMMITTEE	Approved unconditionally
EXPIRY DATE	Date of submission of the project report
ISSUE DATE OF CERTIFICATE	25 August 2021

CHAIRPERSON (Dr Paul Goldschagg)

cc: Supervisor: Dr Mpho Mosabala

RESEARCH PROTOCOL NUMBER: 2021ECE067M
Student Number: 458689

DECLARATION OF INVESTIGATOR

To be completed in duplicate and ONE COPY emailed to the Ethics Office: Matsie.Mabeta@wits.ac.za
.

I fully understand the conditions under which I am authorized to carry out the abovementioned research and I guarantee to ensure compliance with these conditions. Should any departure be contemplated from the research procedure as approved I/we undertake to resubmit the protocol to the Committee.



28 August 2021

Signature Date

PLEASE QUOTE THE PROTOCOL NUMBER ON ALL ENQUIRIES

Appendix L:

27 St Andrews Road, Parktown, Johannesburg, 2193 •
Private Bag 3, Wits 2050, South Africa
Tel, +27 11 717-3049 • Fax: +27 11 717-3009 •
Website: www.wits.ac.za

20 September 2021

Re: Ethics Clearance for Research with the students

I am writing to support Shama Mohlala's (Stud No. 458689) request for the clearance and approval to conduct the research with the Science Education lecturers. This approval allows the continuation with research and not access to lecturers, as they are supposed to give permission. I therefore support this research, and request that the student comply with the Ethics principles in relation to doing research with the students.

Please do not hesitate to contact me should you have any questions.

Dr Thabisile Nkambule

Acting Head of School

Wits School of Education

Tel: +27-11-717-3049

TC. nkambule