



An Examination of Factors Affecting Online Interaction in Online Courses Offered in a Rural-based University

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Doi: 10.23918/ijsses.v12i1p128

Abstract: This study, a component of a more extensive investigation into online interaction, aimed to establish the factors that assist or impede interaction in online learning at a university in a developing context. The connectivist learning theory guided the investigation. The study used a concurrent triangulation design, a mixed methods research approach, and the post-positivist research paradigm. A structured questionnaire was utilised to gather quantitative data from a stratified random sample of 361 students. Qualitative data were collected from four focus groups using a focus group discussion schedule. SPSS software was used to analyse quantitative data. Descriptive statistics were used to analyse data. The qualitative data were analysed using thematic content analysis. At the interpretation stage, the two data sets were combined. Informed consent, ethical clearance, and study permission were among the ethical issues discussed. The study found some factors that were deemed to encourage online interaction. The availability of opportunities for cooperative learning, other students' willingness to participate, the accessibility of adequate technological tools for online learning, and the proper organisation of the course material were all factors. However, particular course instructors' incapacity to offer continuous online assistance, delays in providing prompt feedback, spotty network connectivity in some places, excessive data rates, and an absence of state-of-the-art technological expertise hindered online interaction. The study concludes that effective online interaction depends on addressing the established positive and negative factors.

Keywords: Interaction, Distance Education, Internet Connectivity, Technological Expertise, Course Design.

1. Introduction

Interaction in online learning directly impacts learner motivation, engagement, and the attainment of learning objectives; it is an essential component of online learning. Learner-to-learner interaction in virtual learning spaces is one of the most important aspects of interaction since it promotes teamwork, greater comprehension, and a feeling of belonging. Martin and Bolliger (2020) claim that because student engagement exposes them to various viewpoints and ways of problem-solving, it facilitates information sharing and the growth of critical thinking abilities. Furthermore, communication between students and teachers is essential for elucidating ideas, providing feedback, and sustaining student interest—all of which lessen the loneliness that can arise in distance learning settings (Keaton & Gilbert, 2020).

Received: 03.10.2024

Accepted: 11.02.2025

Maphosa, C., & Van den Berg, G. (2025). An Examination of Factors Affecting Online Interaction in Online Courses Offered in a Rural-based University. *International Journal of Social Sciences & Educational Studies*, 12(1), 128-155.

The social learning component creates a more engaging and encouraging online learning environment, reinforced by productive interaction. This helps students stay on task and show outstanding dedication to their assignments.

Engagement in online learning also directly impacts the attainment of learning objectives and the quality of education. According to Alqurashi (2019), interaction improves cognitive engagement, essential for students to internalise the knowledge and abilities needed for success. Students are more likely to remember the material, sharpen their problem-solving abilities, and use what they have learned in real-world situations when actively involved with their teachers and classmates. Furthermore, regular engagement through interaction facilitates a more individualised learning environment in which teachers can modify their instruction to suit the needs of each unique student, leading to deeper learning and improved academic performance (Martin et al., 2018). As a result, engagement through interaction in online learning environments is essential to developing a dynamic, interesting, and productive learning environment that successfully achieves learning objectives rather than just being about communication.

There are numerous factors contributing to the effectiveness of online learning. As noted by Wang et al. (2022), interaction in virtual learning spaces is important for the attainment of higher learning outcomes. It is important for online course designers and facilitators to plan for and provide opportunities for students to interact in online learning. Such interaction motivates students to learn and provides important peer or facilitator support. Since learning engagement is linked to student success and online education quality, it is acknowledged as a crucial metric in the assessment of online courses (Farrell & Brunton, 2020). Although previous research has shown that interactions between students, teachers, and content are linked to students' learning engagement, there still needs to be more understanding of the underlying mechanisms. Interaction of online students in online learning may be aided or hindered by certain conditions. The researchers address the factors in this section to enhance the favourable aspects and address the negative ones. Online support from the course teacher, the course material, the willingness of the students to collaborate, chances for collaborative learning, and Internet access are a few of the elements covered. The implementation of online teaching and learning through specific learning management systems in universities within developing contexts has been significantly associated with challenges, including internet connectivity issues, limited access to technology, and socioeconomic barriers (Maphosa et al., 2022; Mthethwa-Kunene & Maphosa, 2020; Ndzinisa & Dlamini, 2022). Given the identified factors influencing interaction in online learning, the researchers will offer practical recommendations to improve online engagement and facilitate achieving the intended learning outcomes.

2. Literature Review

Since its inception in the 20th century, online learning has evolved substantially. Correspondence courses, in which instructional materials were sent by mail, are the earliest examples of distance learning. By the 1960s and 1970s, more dynamic kinds of distant learning were made possible by advancing broadcast technologies like radio and television. However, the Internet's introduction in the 1990s was what made online learning a workable teaching strategy. The development of learning management systems (LMS) and online course delivery platforms was made possible by the Internet's ability to facilitate real-time communication between students and teachers (Moore & Kearsley, 2011). Although these early forms of

online learning were mostly asynchronous and relied on discussion boards and email, they set the groundwork for today's interactive, technologically advanced learning environments.

With the emergence of Massive Open Online Courses (MOOCs) and an increasing focus on blended learning approaches, the early 2000s represented a critical turning point in the evolution of online learning. According to Allen and Seaman (2017), higher education institutions' adoption of online learning increased steadily throughout this time due to advancements in multimedia technology and broadband internet access. With the addition of elements like video lectures, tests, and peer collaboration tools, online learning advanced and became more widely available. As institutions and educators worked to guarantee that online learning could provide the same rigour and results as traditional face-to-face training, quality standards for online education also emerged during this time. In particular, the rise of MOOCs democratised education by enabling learners worldwide to access top-notch content irrespective of financial or geographic constraints.

Advances in pedagogy, technology, and learner expectations have all contributed to the ongoing evolution of online learning during the last ten years. Online learning gained momentum in 2020 due to the COVID-19 epidemic, which compelled educational institutions worldwide to transition to digital platforms quickly. This change brought to light the advantages and disadvantages of online learning, such as the significance of engagement, interaction, and the digital divide (Hodges et al., 2020). The integration of synchronous and asynchronous learning methods increased, and real-time communication and teamwork were made easier by programmes like Microsoft Teams and Zoom. Additionally, more individualised and adaptable learning experiences are now possible due to the growing usage of artificial intelligence (AI) and adaptive learning technologies (Means et al., 2020). With its flexibility, scalability, and accessibility, online learning is now acknowledged as a valid and frequently chosen educational approach that is always changing to accommodate the demands of a wide range of learners. However, there are always concerns about the quality of online learning and what could be done to enhance online learning experiences through enhanced interaction.

In an online course, the instructor should be present, and they should show it by actively interacting with the students during the teaching and learning process (Richardson et al., 2016). Students' participation in learning through virtual interactions is influenced by a course instructor who is "visible" in the virtual learning environment. How the learning role is handled online makes the course instructor's availability for assistance and "visibility," often referred to as instructor presence, clear (Lee, 2020). Instructors of online courses must provide ongoing assistance to their students and be aware of the many supportive responsibilities that need to be filled (Lee, 2020). As a facilitator, the course instructor should direct the students' learning by offering learning and support opportunities, continuously observing the learning activities, and being accessible to help when needed (Martin et al., 2018). Students can easily interact with the instructor, the topic, their peers, and the technology because of the course instructor's exceptional facilitation skills.

In the virtual learning environment, there is a requirement for instructor connectedness, which is defined as "a person's level of communication/interaction with the instructor, feelings of support, and sense of belonging or presence. According to Gallien and Oomen-Early (2008, p. 468), "students who feel connected to their instructor are more likely to feel satisfied and perform well in their online courses."

Furthermore, instructor connectedness is described as the "perceived closeness between the student and instructor as well as the instructor and student" by D'Alba (2014, p. 8). The degree of intimacy between the instructor and the class may be gauged by the frequency of communication, promptness with which questions are answered, willingness to clarify matters, and promptness with which feedback on assessment activities is given.

The instructor's accessibility to students is one of the most important means of preserving the instructor's presence in online learning. According to Martin et al. (2018), students should have various means to contact the course teacher, including the contact instructor forum, email, phone, and virtual office hours. Access to the course instructor is important so that students feel included and independent. According to Martin et al. (2018), students' participation in the learning process is significantly impacted by emotions of separation and lack of support.

How students are presented with the material in an online course affects how well they learn. Segmenting or chunking material is crucial so students may interact with digestible chunks of knowledge. Course content delivered in various multimedia formats, such as videos, should be self-instructional, and the movies should not be manageable (Brame, 2016). Retention rates are higher when students engage with digestible material.

Instructors should use synchronous session features like polls, emoticons, whiteboards, text, audio, and video chat to engage with students when presenting online course material (Martin et al., 2020). Students will engage in meaningful learning as the course instructor uses various multimedia tactics to reach out to each student. The realisation that every student learns differently and requires a different strategy for subject presentation underscores the need to utilise various approaches (Mehta & Aguilera, 2020). To inspire and encourage students to learn, the course instructor should clearly explain the expectations and requirements (Cheung & Cable, 2017).

The course instructor must also humanise the online learning environment regarding material delivery. The course instructor should be sympathetic, comprehend problems from the student's viewpoint, and be aware of the needs of the student in order to humanise the online learning environment (Pacansky-Brock, 2017). Culturally responsive instruction, which emphasises instructors' understanding of students' diverse cultural backgrounds and adapts teaching and learning to accommodate them, is the foundation of humanising techniques (Mehta & Aguilera, 2020). In a learning atmosphere where they are respected as distinct individuals without exclusion, students engage more effectively with the course material, their other students, and the instructor (Cheung & Cable, 2017).

For interaction to be improved, it is imperative that students be able and eager to collaborate when working online. In collaborative learning, students actively create and share knowledge in pairs or small groups rather than being passive recipients of information (Straub & Rummel, 2020). According to Bloom's digital taxonomy of educational objectives, students may participate in group projects that call for higher-order skills, such as producing (Husain, 2020). Students who are ready to collaborate with one another can create, design, or invent real technology goods. Collaborating in a technology setting enables students to apply their knowledge and solve problems—two essential graduate qualities (Straub & Rummel, 2020).

Free riders are a problem with team- or group-based collaborative learning strategies, and as noted by Chen et al. (2018), some learners can abstain from group or team activities. Even when students work in groups or teams, it is essential to ensure procedures are in place to guarantee individual accountability (Chen et al., 2018). Assessments of the class may be required individually and collectively to determine each student's specific contribution to the group activity. For better learning experiences, constructive contact is required when people put their all into a team or group assignment.

Through socially coordinated inquiry and knowledge development, collaborative learning facilitates higher mental processes and encourages self-directed and self-regulated learning in students (Hadwin et al., 2018). In order to achieve this, students who collaborate online take advantage of their shared abilities and combine resources to improve learning (Boyer et al., 2014). With self- or peer evaluation integrated into the learning process, students can take control of their education and oversee the entire process from start to finish in a self-directed learning environment (Boyer et al., 2014). Consequently, for online learning to be interactive, students must be eager and able to collaborate.

Online students should have opportunities to collaborate with their course instructors. One quality that employers look for in a graduate is the ability to collaborate with others (Faja, 2013). Perceived interaction and perceived learning were positively correlated in a study on students' perceptions of collaborative learning in online courses (Faja, 2013). Chiong and Jovanovich (2012) discovered that social learning improves learning outcomes for students by having them communicate and share knowledge. Therefore, teachers must include their students in learning activities, encouraging cooperation, joint creation, and knowledge sharing.

When given the chance to collaborate virtually, students "mutually engage in a coordinated effort to solve the problem" (Suriyakumari, 2016, p. 602). Any collaborative assignment should have an issue that needs to be solved, and students should be able to use their combined knowledge and strengths. In a group or team setting, all students should share accountability for the work put in and the outcomes of the learning process. The assignments assigned to pupils for group collaboration should be of a type that necessitates the participation of the entire group or team (Suriyakumari, 2016). When a course instructor intentionally creates opportunities for collaboration among students, it naturally fosters and improves interaction. Students gain the ability to be self-reliant and assume charge of their learning.

Giving students the chance to learn collaboratively needs to include assessment as well. In a traditional assessment, the course instructor plans and leads the assessment process, and the student is evaluated. However, students must collaborate during assessment (Meijer et al., 2020). According to Zou et al. (2018), students should participate in peer or group evaluation activities to evaluate each other's work and the learning process. By doing so, they can share knowledge and receive various comments. Evaluation of teamwork is critical because it lets students know how they and other students contributed to a group project. Students participating in evaluation procedures feel more empowered and better comprehend the learning process.

Learning occurs via the Internet (Mpungose, 2020; Van Deursen & van Dijk, 2019). Internet connectivity is required for online learning so that students may interact with classmates, teachers, and course materials. Concerns about internet connection and the availability of necessary technology equipment have been

identified as significant barriers to online teaching and learning (Aboagye et al., 2021). Students require data to connect to the Internet to use the LMS and participate in learning. It is only possible to learn with connectivity. This also entails providing adequate bandwidth to enable trouble-free student connections. The Internet may be ineffective despite its accessibility (Asio et al., 2021).

The digital divide is a major worry in most developing nations since there is a significant gap between students with access to high-quality broadband connectivity and those without (Cullinan et al., 2021). Students with poor socioeconomic backgrounds may need access to reliable internet connectivity at home, which could hinder their attempts to engage in online learning. According to a report by Jordaan (2020), around half of the university students in South Africa need access to data in order to connect to the Internet and study online during the first COVID-19 lockout. Some South African institutions developed programs to provide data and gadgets to underprivileged students in light of disparities in technology and internet access (Du Plessis et al., 2022; Oyedemi & Choung, 2020).

Certain students' learning behaviours may also harm interaction in online learning. Wildman et al. (2021) note that a problem arises when team members do not manage their behaviour, which could negatively affect people's participation in team or group activities. Inadequate self-management abilities could lead to team members needing to complete tasks allocated to them or even failing to participate in scheduled online meetings. These kinds of actions cause group activities to go more slowly and may eventually affect the accomplishment of group goals. Each group member should assume accountability and actively contribute to the group's success.

Understanding the dynamics of cooperation requires considering each team member's unique contributions in terms of personality and diversity (Humphrey & Aime, 2014). Given the potential for heterogeneity in an online team working on a given assignment, it is critical to comprehend each member's capacity for collaboration and meaningful contribution to group activities. Some people could find it difficult to collaborate with others who identify as a specific gender, religion, or race due to cultural differences. While some group or team members may be too dominant, others may be introverts with individual-oriented learning styles (Oyedemi & Choung, 2020). Personalities would have a detrimental effect on group activity in both scenarios. Therefore, it is essential to comprehend how each group member is unique and how their personalities either support or undermine group activity.

One crucial element influencing interaction that needs to be considered is the setting where the team activities are conducted (Humphrey & Aime, 2014). Online group activities take place in a technologically mediated setting, and for the activity to be effective, it is assumed that each team member has sufficient digital literacy to make a significant contribution. It might be necessary for team members to be digitally literate, which could limit their ability to contribute and engage in group activities.

One crucial element affecting the type and volume of students' interactions with peers, technology, and course material in online learning is the availability of timely and thorough feedback (Cavalcanti et al., 2021). Students who work online need guidance in the form of timely and insightful comments. For students to advance and improve, feedback is crucial in letting them know about their areas of strength and weakness during the learning process (Dawson et al., 2019). A learning management system's features can generate timely and automated feedback, essential for students' academic development.

For students learning online, feedback is more crucial than in-person instruction. Distance and time separate online learners from the course instructor. They need timely and insightful feedback to keep them engaged with the course material and their peers (Pitt & Norton, 2017). Student satisfaction with an online course increases when they receive timely and insightful feedback in online learning activities. Because feedback is a key component impacting online learning progress, it is crucial to incorporate fast and meaningful feedback into the design of online courses.

It has also been observed that assessment feedback in online learning helps students make critical decisions during the process, hence enhancing learning outcomes (Pitt & Norton, 2017). It is crucial to ensure that feedback is incorporated into the learning process since, when learning online, students can choose whether to continue with their work or make revisions based on the feedback they get. Carless (2015) encapsulates the significance of feedback by characterising it as a process that enables students to comprehend information about their performance and apply it to enhance the calibre of their work.

3. Theoretical Framework

Online learning offers opportunities for engagement, interaction, collaboration, and connection. Because of this, it was determined that the best theory to support this investigation was Siemens' connectivist learning theory. The idea contends that learning and internalising information require connecting to and navigating knowledge networks (Siemens, 2005). Online learning settings provide the finest conditions for students to learn about connectedness because they provide access to many resources, knowledge, and opportunities to connect with other students and subject matter experts (Downes, 2008). This connection allows students to engage with individuals worldwide with various backgrounds, experiences, and cultures (Downes, 2008). Because of connection, students can access other points of view and acquire a more thorough grasp of the world. Connectivity helps students develop critical thinking abilities by allowing them to engage in discussions and debates with other students and professionals (Siemens, 2005). They can build their critical thinking abilities and learn to evaluate material critically. Through connectivism, online learners can connect with subject matter specialists and other learners (Siemens, 2005). This could provide them with support, motivation, and opportunities for collaboration and guidance. Therefore, Siemens' idea of connectedness provides a sound and pertinent paradigm for appreciating the importance of contact in online learning.

4. Research Objective

The study sought to determine the views of distance education students on factors that affect interaction in online courses offered in a rural-based university.

5. Methods

The study employed a mixed-methods approach, combining quantitative and qualitative techniques to include quantitative and qualitative data in a single study (Gay et al., 2012). A mixed-methods study should have at least one quantitative and one qualitative component (Creswell & Plano Clark, 2017). Furthermore, the study was positioned within the pragmatic paradigm. A philosophical approach, the pragmatic research paradigm, prioritises research outputs and solutions with practical applications over strict adherence to a single theoretical framework. Creswell and Plano Clark (2017, p. 4) state that the pragmatic approach

"merges the qualitative and quantitative approaches and emphasises that practical questions and real-world problems should guide research." The practical problem that needed to be addressed was understanding the factors impacting interaction in online learning from the perspectives of online learners enrolled in a rural-based university.

The study blended a concurrent triangulation design with quantitative and qualitative research methods. In a rural university, 361 ODL students completed a structured questionnaire out of 1815 students. A stratified random sampling technique was employed to select a 20% sample of 361 students. The strata considered in the sampling process included the level of study, gender, and academic programme. Among the twelve academic programmes offered by the Institute, each with varying student populations, the programmes, levels of study, and gender served as the basis for stratification. Alphabetical lists of all enrolled students, categorised by programme, level of study, and gender, were obtained from the respective programme coordinators. Within each stratum, simple random sampling was conducted using a random number table to determine the required number of students for each category. This approach ensured comprehensive representation across all academic programmes, genders, and levels of study. A total of 338 questionnaires were returned and examined, yielding a 94% return rate. Reluctance to complete and submit the questionnaire to the respondents could be the reason for the non-return of some of the questionnaires. The questionnaire in this study was a research instrument consisting of a set of standardised Likert scale-type questions to gather statistically valid information about a subject from respondents. The items on the questionnaire assisted in eliciting responses on the different factors that promoted or hindered interaction in online learning at the rural-based university. In the focus group, the researchers considered a focus group discussion appropriate for collecting qualitative data because the participants were allowed to reflect on their online learning experiences. Guided by a set of questions constituting a focus group discussion schedule, the participants provided verbal responses to different questions from the researchers on factors affecting interaction in online learning. Different viewpoints were solicited on individual interview questions. Four groups of ten students each participated in the focus group discussions. The focus group discussions were held virtually. The participants joined a Zoom session in which they participated in a discussion. The students were enrolled in four academic programs: Bachelor of Science in Computer Science Education, Bachelor of Education in Primary Education, Bachelor of Education in Secondary Education, and Bachelor of Science in Information Technology. Focus group A's codes ranged from FGDA1 to FGDA10, while groups B, C, and D also used the same coding to protect the participants' privacy.

Students who were primarily in their fourth year of study, both male and female, took part. In order to enhance the internal consistency of the questionnaire, Cronbach's alpha was calculated using the SPSS on the ten items and found to have an acceptable reliability value of 0.7. Descriptive statistics were used to analyse the quantitative data. Descriptive statistics were added; quantitative data were statistically analysed using the Statistical Package for the Social Sciences (SPSS) version 29. As Kaliyadan and Kulkarni (2019, p. 83) noted, descriptive statistics involve applying tools such as frequency distribution tables, percentages, and measures of central tendency, including the mean and standard deviation. In this study, the numerical data collected were analysed by interpreting mean response scores to determine respondents' levels of agreement with various items related to interaction in online learning. Furthermore,

as highlighted by Kaliyadan and Kulkarni (2019), descriptive statistics can be employed to analyse a single variable (univariate analysis) or multiple variables (bivariate or multivariate analysis).

Content analysis was used to analyse the qualitative data. The audio recordings from the focus group discussions were transcribed in content analysis. Themes and sub-themes were drawn from the transcripts through coding. Several ethical concerns were covered, including informed consent, anonymity, confidentiality, and approval for research. The focus group recordings were securely stored on a password-protected desktop computer for two years, after which they were destroyed. Access to the recordings was restricted to the researchers to safeguard participant confidentiality. Informed written consent was obtained from the participants, and no incentives were provided for their participation in the study. The university issued the ethical clearance certificate where the study was conducted.

6. Results and discussion

The findings on the factors that promoted or hindered interaction in online learning at the rural-based university are presented in this section, beginning with the quantitative data from the structured questionnaire and continuing with the qualitative findings from the focus group discussions. The areas of convergence and divergence are then identified by merging the two result sets. The following sub-section presents and analyses quantitative results.

6.1 Quantitative results on factors that promoted or hindered interaction in online learning at the rural-based university

The fourth section of the questionnaire was designed to gather information about the factors that promoted or hindered interaction in online learning at the rural-based university, in keeping with the study's fourth research objective. Table 5.12 contains answers to questions on the factors that promoted or hindered interaction in online learning at the rural-based university.

Table 1: Responses on factors that promoted or hindered interaction in online learning at the rural-based university

Statement	SA	A	D	SD	T	M	ST.D	Decision
Course facilitators/instructors are always available to support students.	22 (6.5%)	90 (26.6%)	114 (33.7%)	112 (33.1%)	338	2.10	0.925	Disagreed
Course content is clearly structured with clear expectations.	32 (9.5%)	234 (69.2%)	56 (16.6%)	16 (4.7%)	338	2.83	0.651	Agreed
Other students are always willing to work collaboratively.	43 (12.7%)	163 (48.2%)	122 (36.1%)	10 (3.0%)	338	2.71	0.723	Agreed

Course facilitators/instructors provide opportunities for collaborative learning.	78 (23.1%)	173 (51.2%)	39 (11.5%)	48 (14.2%)	338	2.83	0.870	Agreed
Students had the appropriate devices/gadgets necessary for online learning.	106 (31.3%)	177 (52.4%)	51 (15.1%)	4 (1.2)	338	3.17	0.692	Agreed
There is reliable internet connectivity.	28 (8.3%)	99 (29.3%)	125(37.0%)	86(25.4%)	338	2.20	0.916	Disagreed
Students are self-motivated to learn from one another.	57 (16.9%)	222 (65.7%)	51 (15.1%)	8 (2.4%)	338	2.97	0.644	Agreed
Other students exhibit individualistic tendencies.	94 (27.8%)	14 (4.1%)	74 (21.9%)	156 (46.2%)	338	2.13	0.815	Disagreed
Students look down upon each other.	43 (12.7%)	30 (8.9%)	112 (33.1%)	153 (45.3%)	338	1.90	0.818	Disagreed
There are delays in the provision of immediate feedback.	78 (23.1%)	151 (44.7%)	82 (24.3%)	27 (8.0%)	338	2.83	0.875	Agreed
There is a lack of support from course instructors	35 (10.4%)	152 (45.0%)	116 (34.3%)	35 (10.4%)	338	2.55	0.814	Agreed
Students incur huge data costs for online activities.	135 (39.9%)	127 (37.6%)	54 (16.0%)	22 (6.5%)	338	3.11	0.900	Agreed
Students lack appropriate technological skills among	48 (14.2%)	143 (42.3%)	108 (32.0%)	39 (11.5%)	338	2.59	0.871	Agreed
Course instructors' differences in online engagement.	46 (13.6%)	150 (44.4%)	103 (30.5%)	39 (11.5%)	338	2.60	0.863	Agreed
Average mean						2.61		Agreed

SA - Strongly Agree; A - Agree; D - Disagree; SD - Strongly Disagree
M=Mean; ST.D=Standard Deviation. (Mean: 1.0 - 2.49 = Disagreed; 2.5 – 5.0 = Agreed)

Only 33.1% (n=110) of the respondents agreed that course facilitators and instructors were always available to help students, which is a very small percentage. This showed that most respondents did not share this opinion, and it was possible to conclude that the absence or limited accessibility, of course, instructors hampered online interaction. The majority of respondents, 78.7% (n=266), agreed that the course content was properly structured and that there were clear expectations. How courses were organised and structured encouraged online interaction. The majority of respondents, 60.9% (n=206), stated that other students were always willing to collaborate, and it was deduced from this finding that this readiness to work cooperatively was a factor encouraging online interaction. Among respondents, 74.3% (n=251) confirmed that the instructors and course facilitators provided opportunities for collaborative learning. Opportunities for collaborative learning were a positive factor in promoting online interaction.

Regarding possession of appropriate gadgets, 83.7% (n=213) confirmed that students had the appropriate devices/gadgets necessary for online learning. The finding indicates the meeting of a fundamental requirement for online interaction: possession of the right tools for online learning. Only a small portion of the respondents, 37.6% (n=127), believed that reliable internet connectivity existed, indicating that the majority did not share this opinion. The findings suggest that inconsistent internet access was a barrier to online interaction. The vast majority of students, 82.6% (n=279), confirmed that students were self-motivated to share knowledge, which was inferred to be a factor fostering online interaction.

Only 31.9% (n=108) of respondents agreed that other students showed individualistic inclinations; most disagreed. This demonstrated that students' lack of individualism was a desirable quality required to promote online engagement. Most respondents disagreed with the idea that students treat one another with contempt, but a minority, 21.6% (n=73), did. It was determined that students did not treat one another with contempt, which was good since it encouraged online interaction. Regarding feedback, 67.8% of respondents (n=229) agreed that there were delays in providing immediate feedback, suggesting a factor that might impede online connection.

Regarding help from course teachers, 55.4% (n=187) of respondents agreed there was an absence. Regarding data costs, 77.5% (n=262) of respondents agreed that students paid a high price for using the Internet, and it was clear from the result that this could limit their ability to communicate online. Most respondents, 56.5% (n=191), agreed that students lacked the necessary technology skills, while 58% (n=196) said the same about course teachers. The problem of inadequate technological knowledge could hamper online interaction. The majority of the respondents, 58% (n=196), also confirmed notable differences in the course instructors' levels of online engagement. Such a result could hinder online interaction as course instructors are all expected to exhibit high levels of online engagement in all the courses.

According to mean responses, structured courses with clear expectations (mean: 2.93), students' willingness to work collaboratively (mean: 2.71), student's motivation to learn from one another (mean: 2.97) and possession of appropriate devices (mean: 3.17) were identified as the main factors promoting interaction in online learning. According to the mean response, the problem with the high data costs associated with online learning was the most significant impediment to online interaction.

Following the presentation and analysis of quantitative results in this section, the following section discusses qualitative findings regarding the elements that promoted or hindered interaction in online learning at the rural university.

6.2 Qualitative results on factors that promoted or hindered interaction in online learning at the rural-based university

This section presents the qualitative results from FGDs on the factors that promoted or hindered interaction in online learning at the rural-based university. The central theme generated sub-themes such as the provision of collaborative learning opportunities, fellow students' willingness to collaborate, availability of technology, and the clarity of course structures as positive factors. Conversely, negative factors were the unavailability, of course, instructors for support, delayed feedback, some students' individualistic tendencies, erratic internet availability and huge data costs.

Table 2 presents the results of the factors that promoted or hindered interaction in online learning at the rural-based university.

Table 2: Main theme and sub-themes on factors that promoted or hindered interaction in online learning at the rural-based university

Theme	Sub-Themes	Related Issues
Factors promoting interaction in online learning	Provision of collaborative learning opportunities	<ul style="list-style-type: none"> • There are opportunities for working together • Social media groups allow group activities • Group tasks make us work together • Group projects call for collaboration
	Lack of individualistic tendencies by students	<ul style="list-style-type: none"> • Students were willing to work with others • Availability for group activities • Willingness to share ideas with others
	Fellow students' willingness to collaborate	<ul style="list-style-type: none"> • Easy to find colleagues to work with • WhatsApp groups make it easy to work together • Students see the need to work with others • Mutual benefit in working together
	Availability of technology	<ul style="list-style-type: none"> • Students in possession of laptops • Possession of tablets • Access to computer laboratories • Access to the Moodle LMS in and out of campus
	Clarity of some course structures	<ul style="list-style-type: none"> • Some courses have clear structures and easy-to-follow • Instructions for each individual activity are clear • Course expectations are provided in each unit • One can quickly go through the course without difficulties

Factors hindering interaction in online learning		<ul style="list-style-type: none"> • Course instructors may not be available online when required • Failure to get instant help from course instructors • Getting frustrated for lack of support
	Delayed feedback	<ul style="list-style-type: none"> • Assignments submitted take too long to be graded • Tests that are not electronically marked are not marked on time • Reaching exam time without coursework feedback • Signing continuous assignment marks without receiving back the graded work
	Erratic internet availability	<ul style="list-style-type: none"> • In some areas of the country, internet connectivity is a problem • Internet disruptions while connected to the LMS • Being kicked out of Zoom live sessions
	Huge data cost	<ul style="list-style-type: none"> • Need to sufficient data bundles to study online • Data an extra cost to students • Live online lecture sessions require a lot of data • Learning online will be more affordable with the support of data
	Lack of the necessary technological skills by students	<ul style="list-style-type: none"> • Feelings that more could be done in exhibiting technological skills • Need to develop advanced technological skills • Struggles with some tasks done online
	Differences in course instructors' levels of online engagement	<ul style="list-style-type: none"> • Lecturers are not the same • Some lecturers do more work on Moodle than others • Differences are observable

6.2.1 Provision of collaborative learning opportunities

The FGD participants indicated that the provision of collaborative learning opportunities was a factor that promoted interaction in online learning. This viewpoint is supported by the following verbatim quotations from some of the participants;

Some of the online tasks make it possible for us to work together. If it is a group assignment, one has no choice but to work with others. (FGDD3)

We have WhatsApp groups in every course and work together in these groups. (FGDB1)

In some courses, we are arranged in groups and given some work together, and participation in the group is rewarded. (FGDA6)

Whenever we are given group tasks, we are forced to organise ourselves and work together to complete the task. (FGDC9)

The discussion revealed that the opportunities for collaborative work in the different online courses heightened the chances for online interaction. When collaborative tasks were assigned to students, it became imperative that they work together to complete and submit the assignment. The existence of student-initiated social media groups also predisposed students to work collaboratively.

6.2.2 Fellow students' willingness to collaborate

Additionally, it came out of the FGDs that the willingness of other students to work together was a significant and positive component. The following quotes from a few of the participants help to reinforce this point:

Finding partners to work with is easy because people are always willing to work with others. (FGDC1)

We already belong to the WhatsApp groups that we form for different courses, and it becomes easy to use the same groups to work together. (FGDA10)

Almost all of us see the need to work together because we all stand to benefit by sharing ideas. (FGDB7)

The need to work together is because not everyone knows everything, and we all gain from working together. (FGDD1)

The discussion revealed that the willingness of fellow students to collaborate was another positive factor promoting interaction in online learning. It was great to note that it was easy for students to establish partnerships. Furthermore, students exploited their participation in social media groups to collaborate in online learning. Students also appreciated the mutual benefit of online interaction, which was a motivating factor for collaboration.

6.2.3 Availability of technology

The FGD participants also indicated that the availability of technology was a factor that promoted interaction in online learning. The following verbatim quotations from the participants support the viewpoint;

All students have the appropriate devices for online. I have a laptop and a tablet; all I need is internet connectivity, and then I can access Moodle. (FGDB4)

Almost everyone owns a smartphone, and with a smartphone, one is able to learn online without any problem. (FGDA3)

There are a number of computer laboratories on campus, and one can access computers and free Wi-Fi by visiting any campus and digital learning centres. (FGDD5)

Moodle is easily accessible to students on and off campus. Once one accesses it, then online learning is possible. (FGDC5)

Students could participate in online learning and interact with content, technology, course instructors, fellow students, and technology when they had access to and possessed the appropriate technological devices. Additionally, students had remote access to Moodle LMS.

6.2.4 Clarity of some course structures

The FGD participants also indicated that the explicit structuring of some of the courses on the Moodle LMS made learning and engagement easy. The following excerpts from some of the participants confirm the assertion;

In some of the courses, the structure is very clear, and one can proceed with the work with a clear step-by-step guide. (FGDD10)

The expectations in course CSCXXXX are very clear, and the lecturer provides clear instructions for all the activities. (FGDA1)

The learning activities are well-explained, and what we are assigned is very clear, making learning easy. (FGDC10)

In course ALLXXX, one can easily go through the course on Moodle without any challenges because it will be like you are communicating directly with the lecturer. (FGDB9)

It was established that one important component encouraging engagement in online learning was the clear course structures on the LMS, which has implications for instructional design. The way courses were presented on the LMS offered direction, crystal-clear explanations of subject matters, and directions for tasks that allowed students to meaningfully participate in online learning and, invariably, interact at various levels.

6.2.5 Lack of adequate online support from course instructors

The FGD participants lamented the lack of adequate online support from the course instructors as a handicap. It was clear that without the needed support, online interaction was negated, as shown in the following excerpts;

There are times when working online, and one requires assistance, but it may not be easy to get it from course instructors. (FGDA8)

I have to send an email requesting assistance, and it takes time to get a response, affecting my work progress. (FGDC3)

Most of the time, I ask my friends for help because the course instructors are unavailable. (FGDD7)

The most frustrating thing about working online is the failure to get assistance at the time of need. It is really frustrating. (FGDB2)

The course instructors' lack of online support was viewed as a factor impeding interaction in online learning since it impeded the students' learning progress. Additionally, the absence of support led to frustration, which was detrimental to successful online learning.

6.2.6 Delayed feedback

The FGD participants also mentioned that a barrier to involvement in online learning was the delay in feedback. The view is supported by the following exact quotes from some of the participants;

The course lecturer may take a long time in discussion forums to review our posts and comments. One will need to find out if the contribution to the discussion is good. (FGDC7)

Some of the assignments we submit online take a long time to grade. We may keep checking on Moodle, but no graded work will be graded. (FGDD3)

Only tests and quizzes that are graded electronically result in immediate feedback; everything else appears to be a problem. (FGDB10)

Sometimes, we reach exam time with some coursework assignments still to be graded, which is not good at all. (FGDA5)

In online learning, the absence of delayed feedback was seen as a barrier to interaction since it prevented students from gaining the necessary information about their progress. Feedback is crucial to the development of online learning. Concern was also raised by the fact that, in some cases, students would show up for their examinations after receiving feedback for all their coursework assignments.

6.2.7 Lack of individualistic tendencies by students

The FGD participants indicated that the behaviour of some students who did not exhibit individualistic tendencies and were willing to work with others was considered a factor that promoted interaction in online learning. The following verbatim quotations from some of the participants confirmed the point;

We always try to avoid the know-it-all attitude and commit to working with others all the time. (FGDD2)

In group activities, all students play their part and contribute together. (FGDC6)

In group activities, we provide each other chances to contribute so that no one dominates the group discussions. (FGDA4)

When we organise WhatsApp video conference calls to discuss something, always schedule a time when we are all available and can attend. We try to accommodate everyone. (FGDB8)

It was established from the discussion that behavioural issues about attitudes towards group activities positively affected interaction in online learning. The group members tried accommodating and ensuring everyone participated, which was vital for online interaction.

6.2.8 Erratic Internet availability

The FGD participants also revealed that erratic internet availability in some parts of the country negatively affected their online learning endeavours and, invariably, online interaction. The following excerpts from some of the participants confirm the viewpoint;

In the XXXXXX region where I reside, there are times when we need access, and it becomes difficult to log onto Moodle or participate in WhatsApp meetings. (FGDC4)

What is disappointing in online learning is facing disruptions while connected to the LMS, and suddenly, one cannot access it. (FGDD9)

There are times when I will be participating in live online classes through Zoom, and due to internet challenges, I am kicked out. (FGDA9)

In my area, internet speed is very slow during peak hours, and I have to utilise the early morning hours to do my work. (FGDB6)

Since students in some areas of the country had trouble connecting to the Internet, this issue was reported as a barrier to online interaction. Additionally, internet access could have been faster in some locations, occasionally preventing students from participating in live online classes.

6.2.9 Huge data cost

The FGD also revealed that huge data cost was a negative factor affecting students' online interaction, and this viewpoint was confirmed by participants in the following verbatim quotations;

Data is costly. We spend much money buying data to access the Moodle LMS and learn online. (FGDA7)

I am a self-sponsored student, and buying data is an additional cost for me, which makes the cost of studying quite high for me. (FGDD8)

It is more expensive to join live online lecture sessions because one requires a lot of data, which is sometimes unaffordable. (FGDB5)

There was a time when the university used to support students with data, but this has since stopped, and students have to fund themselves now. I feel that students should be supported with data. (FGDC2)

Since students had to pay for the costs of obtaining data for online learning as an additional expense on top of their study costs like tuition fees, the issue of enormous data cost was established as a barrier to meaningful online interaction. Attending live online classes also costs much money and requires more data. The students felt that being assisted with data would be helpful for their online learning.

6.2.10 Students lack the adequate necessary technology skills

It was also revealed from the FGD that the students had basic skills in technological abilities; hence, they lacked the necessary technological skills to enhance online interaction. The following verbatim quotations support the point;

Of course, we can access course content on Moodle and get involved in online discussions, but I feel we could do more online. (FGDC10)

One course instructor requested us to work on a Google Docs document, and it took time for most students to master this basic skill. (FGDA8)

Working collaboratively on Jamboard was also a challenge for some of us when it was introduced by one of the lecturers. (FGDD4)

I just feel there is more that we can do online if we have advanced technological skills. (FGDB5)

It was clear from the discussions that the students viewed themselves as needing adequate necessary technological skills to manipulate the virtual learning space for enhanced online interaction. The finding has profound implications for the support provided to students for online learning and engagement.

6.2.11 Differences in course instructors' levels of online engagement

The FGD indicated that there were differences in the ways the course instructors engaged students online, which was a hindrance to online interaction. The following verbatim quotations from some of the students confirm the viewpoint;

One can tell that not all the lecturers are the same in online teaching. Some of them involve us a lot in activities online, and some do not. (FGDD3)

In course XXX, we do not do much online when you compare it with what we do in course XXX. (FGDA7)

The courses are different on Moodle. Some courses show that the lecturers really teach us online, yet some are not of the same quality. (FGDB2)

I think it happens even in face-to-face classes; lecturers are not the same. Some lecturers prepare well, explain clearly and are very good, while some are not, and the same happens online. (FGDC2)

The discussions made it clear that the quality and level of course instructors in online engagements would differ. This finding has implications for the nature and extent of professional development of course instructors in online course design and online pedagogy.

7. Triangulation of quantitative and qualitative findings

The questionnaire results and FGD ones are integrated, contrasted, and compared in this section to identify any areas of overlap or divergence. Table 3 provides a summary of the triangulated findings.

Table 3: Triangulation table of findings from quantitative and qualitative data

Findings (Quantitative data)	Findings (Qualitative data)	Area(s) of convergence/divergence
Course instructors provided opportunities for collaborative learning.	Opportunities are provided for students to work together online.	Both data sets confirm that opportunities for collaborative learning existed.
Students were always willing to collaborate with others.	Students were willing to work with others and share knowledge.	Both data sets confirm that students were willing to work with others.
Students confirmed they had the required gadgets for online learning.	Students had computers, smartphones, tablets and laptops.	Both data sets supported the finding that students had the necessary electronic devices.
The course content was structured correctly, and there were clear expectations.	Clear structuring of some of the courses on the Moodle LMS made learning and engagement easy.	The finding that course content was well-structured with clear expectations was supported by both data sets.
Course facilitators and instructors were only sometimes readily available to help students.	Lack of adequate online support from course instructors.	Both data sets support the need for proper support from the course instructors.
There were delays in providing immediate feedback	Delays in feedback reported	Both data sets confirm the delay in feedback
Students did not show individualistic inclinations	Students did not despise others and were willing to cooperate	Both data sets supported the finding of the lack of individualistic tendencies.
Internet connectivity was unreliable.	Reported challenges with internet connectivity	The finding on unreliable Internet was supported by both sets of data
There was a challenge of huge data costs incurred by students	Students paid enormous data expenses for online learning	Both data sets concurred on substantial data costs.
Students lacked the adequate necessary technology skills	It was reported that students had basic skills and could do more.	Both data sets confirm the need for adequate skills in students.
There were differences in course instructors' levels of online engagement.	Not all course lecturers engaged students online at the same level.	Both data sets confirmed the differences in course instructors' levels of online engagement.

7.1 Interpretation of the triangulation table

The study's quantitative results showed that the course teachers offered collaborative learning possibilities. The same conclusion was qualitatively substantiated when FGD participants indicated that chances were

available for students to collaborate online. Both data sets confirmed the presence of opportunities for collaborative learning. It was also found quantitatively that students were always willing to collaborate with others, and qualitatively, it was also found that the students were willing to work with others and share knowledge. The willingness of the students to work with others was corroborated as a finding of the study from both quantitative and qualitative aspects.

Students' confirmation that they possessed the necessary devices or advice to participate in online learning was demonstrated quantitatively. Additionally, the FGD provided qualitative proof that students typically had appropriate equipment, such as laptops, tablets, and smartphones. Both data sets corroborated the view that students' possession of the necessary electronic gadgets was a significant positive factor in promoting online interaction. The study's quantitative component revealed that the course material was appropriately organised and had specific expectations. Qualitative analysis found that several courses on Moodle LMS's clear structuring made learning and participation simple. Both data sets confirmed that a well-structured course with clear expectations positively promoted online interaction.

The quantitative findings showed that the course facilitators were only sometimes available to assist students. The qualitative data corroborated a similar absence of practical online assistance from course teachers. Both data sets support the conclusion that the course instructors did not provide appropriate support, as the perceived lack of support constituted a barrier to online interaction. The quantitative findings also showed that there were delays in delivering prompt feedback. The qualitative element revealed that there were delays in reporting feedback. Such delays could negatively affect online interaction, and both data sets supported this.

The study's quantitative component showed that students did not exhibit individualistic tendencies. The same finding was qualitatively supported by evidence showing that students were cooperative and did not look down upon others. Both data sets confirmed the view that the absence of individualistic tendencies served as a factor that encouraged online engagement. The quantitative findings demonstrated that the majority of students had unstable internet connectivity. The study's qualitative component also revealed more information on the pupils' reported difficulties connecting to the Internet. Both data sets confirmed that inconsistent Internet made it difficult to interact online. The quantitative outcomes supported the issue of the significant data expenses borne by students. Similar to the quantitative findings, the qualitative findings demonstrated that students incurred significant data costs for online learning, which limited online interaction. Both data sets confirmed huge data expenditures.

The quantitative results further indicated that the students needed more technology skills. The same finding was confirmed qualitatively when FGD participants indicated that students had basic skills and could do more to enhance their learning online and online interaction. More advanced technological skills were needed to improve online interaction. Both data sets confirm the need for adequate skills in students. It was established quantitatively that there were differences in course instructors' levels of online engagement. Similarly, the qualitative results revealed that not all course lecturers engaged students online at the same level. Both data sets confirmed the differences in course instructors' levels of online engagement.

8. Discussion

It was established in the study that it was a promoting factor for online interaction that students were willing to work collaboratively with others. This finding is consistent with the views by Straub and Rummel (2020) that interaction in online learning is enhanced when students become active participants in the learning process by working collaboratively to co-construct and share knowledge. As further noted by Husain (2020), through involvement in collaborative tasks, online students apply higher-order skills in line with Bloom's digital taxonomy of educational objectives and may create and publish digital products. The realisation in the present study that students were willing to work collaboratively with others shows that the students were predisposed to interaction.

The study found that having properly structured course content on the LMS with clear expectations was a factor in fostering online interaction. A well-defined course framework makes it easier for students to know what to expect from the course and what is expected each week, lowering anxiety and enabling them to plan better and manage their time (Oswal & Meloncon, 2014). Yang (2017) adds that responsive online course design strategies produce structured courses that make it easier for students to follow the course's steps and achieve the intended learning results.

The study found that students disapproved that course facilitators/instructors were always available to support students. Such a finding is contradictory to findings by Dlamini et al. (2022) that online learning course participants had positive and rich online learning experiences because facilitators were available online to assist students. The availability of the course facilitator online guarantees 'visibility', which is essential in promoting the much-needed instructor presence in online learning (Lee, 2020). The finding in the present study of limited or non-existent instructor presence negates the promotion of interaction in online learning, as instructor presence is vital for enhanced online interaction.

The study further established that the course facilitators/ instructors needed to provide opportunities for collaborative learning. Such a finding is quite profound as it has implications for online pedagogy and the nature and extent of interaction in online learning. The finding also negates views by proponents of effective online teaching and learning who advocate engagement, collaboration and interaction in virtual learning spaces (Bates, 2020; Farrell & Brunton, 2020; Keaton & Gilbert, 2020). It is important to note that interaction in online learning is only possible and heightened by utilising appropriate online pedagogies that allow online students opportunities for collaboration. Such approaches enhance the students' online learning experiences (Dlamini et al., 2022; Maphosa et al., 2022).

The study also established that students experienced unreliable internet connectivity. This finding is consistent with the literature findings, which confirmed that internet connectivity challenges negatively affect online learning in African higher education systems (Aboagye et al., 2021; Asio et al., 2021). Similarly, Cullinan et al. (2021) note that the digital divide in most developing countries, evidenced by the vast disparity between students with access to high-quality broadband connectivity and those without, is vast. As further noted by Jordaan (2020), during the initial COVID-19 lockdown in South Africa, about half of the university students needed access to data to connect to the Internet, so they could not effectively study online. The issue of reliable internet connectivity is a significant determining factor for effective online learning, and in instances where internet connectivity is unreliable, it becomes a cause for concern.

The study found that students were self-motivated to learn from one another. Such a finding was an important one and corroborated findings in the literature. Straub and Rummel (2020) noted that online learning provides students with opportunities for collaborative learning. In such an approach, the students are not passive receivers of information but are active students who work in pairs or small groups to co-construct and share knowledge (Maphosa et al., 2022). As students work and learn together in virtual learning spaces, they may be predisposed to achieving higher-order skills in line with Bloom's digital taxonomy of educational objectives, where they show high abilities, such as creating and publishing (Husain, 2020). By working together in a technological environment, students learn and practise to apply knowledge and solve problems; these are essential graduate attributes in the 21st century.

The study found that students did not look down upon each other in online learning. This finding confirms similar findings in the literature that through the social-cultural approaches, students learn together collaboratively (Amrullah & Zahratun, 2022). Bates (2019, p.19) also notes that in line with the sociocultural theory, "knowledge and interactions are constructed through social interactions with families, friends, teachers, and peers". Therefore, by interacting with fellow students, there is an exchange of knowledge, which allows students to learn from each other and enhance their online learning experiences.

It was also established in the study that it was a hindrance to online learning that there were delays in providing immediate feedback by course facilitators. This finding is inconsistent with Jensen et al.'s (2021, p. 2) views that online learning is often "a remote and solitary activity" and requires prompt and meaningful feedback by utilising available technologies for immediacy, expediency and connectedness to learning. To this end, feedback becomes an essential aspect of scaffolding for learning by providing students with the necessary support to achieve the set learning outcomes (Cavalcanti et al., 2021). Therefore, to establish, in the present study, that students experienced delayed feedback in their online learning is indicative of pedagogical deficiencies as various forms of assessment and feedback, therefore, should be embedded in online course design, and different LMSs have tools that could be utilised for instant and meaningful feedback.

The study further established a need for more support from course instructors as a hindrance to online learning. The finding supports the views by Lee (2020) that an online course facilitator has a critical role in ensuring student engagement and interaction in online learning. Similarly, Zulfikara et al. (2019) note that facilitators work more to support students in an online learning environment than support provided in a face-to-face environment. There should be teacher presence in a virtual learning space, and this involves the facilitator regulating and threading discussions, among many other online roles. Therefore, online learning needs to improve in instances of perceived or actual lack of support for students by course facilitators.

The study also found that students incurred huge data costs for online activities, negatively affecting online learning initiatives. The finding corroborates the findings by Budiman (2020) that online learning could be expensive for students who require data to access synchronous and asynchronous online learning activities. Hence, some universities in Indonesia have attempted to support students with data. Similarly, in South Africa, Lumadi (2021) avers that student support in ODeL should be extended to ICT support. However, ICT support should be more than students' ability to utilise technology central to online learning;

it should also include access to appropriate devices and data packages. To this end, there is a need for institutions of higher learning to support students in having access to data for online learning.

The study also found that students needed to gain appropriate technological skills, which was deemed a hindrance to online learning. Studies in the literature have buttressed the challenge of the digital divide as an impediment to meaningful online learning (Brodie, 2018). All students should possess functional technical competencies to navigate the LMS and can utilise the LMS by performing essential functions such as logging onto the LMS and downloading and uploading material. A scenario where some students need more basic technological skills to operate the LMS becomes challenging since an LMS is a digital learning platform that allows online students to be involved in the co-construction of knowledge (Chang & Kuo, 2021). Students should also be able to participate in online discussions to share ideas with other students and to explore several viewpoints from their mates as an element of online collaborative learning (Mtshali et al., 2020).

9. Conclusions

The study discovered that a few elements were reported to promote online interaction, such as the availability of chances for collaborative learning, the openness of other students to participate, the availability of suitable technological tools for online learning, and the proper organisation of course material. The results indicate that favourable preconditions for online interaction significantly influenced online participation. Nonetheless, several factors that impede online connection have been identified; if these factors exist, successful online involvement is impossible and must be addressed. The study contributes to online education in developing contexts by addressing the quality of online learning from the perspective of factors that promote or hinder online interaction. Future research may focus on exploring longitudinal studies on the issue of online interaction. Future studies may also examine how emerging technologies, such as AI-driven platforms, could help overcome the challenges in online interaction.

10. Recommendations

Given the findings of the study, the following recommendations are made;

1. Policymakers

- a) There is a need to enact higher education policies that address digital divide issues by suggesting ways of assisting students from disadvantaged backgrounds.
- b) Institutional policies should address resource provisioning in higher education institutions to reduce the digital divide in online learning.

2. Instructional designers

- c) Given the importance of interaction in online learning, online course designers should consider opportunities for interaction as they design their courses.
- d) Online course facilitators should provide online learners opportunities to interact with facilitators, course content, and fellow learners.

3. Education funders

- e) The online teaching agenda in a developing context should address fundamental prerequisites such as providing students with the required technological devices, internet availability, and technical support.

- f) Online learners should be supported in understanding the importance of collaboration in online learning.

11. Conflict of interest:

There is no conflict of interest in this paper.

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