

Student Voices: A Critical Reflective Exploration of an Online Groupwork Video Analysis Task During the COVID-19 Pandemic

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Abstract

The shift to online learning in universities prompted by the COVID-19 pandemic impacted field learning, an important component in nature conservation qualifications. Academics used video resources as an alternative approach to mitigate related challenges. This case study critically reflects on students' experiences and views on the use of an internet video and WhatsApp text messaging to complete a groupwork task in a conservation module offered at a university in South Africa. The video content focused on threats to rare indigenous plant species in South Africa. Data were collected using an online electronic questionnaire (n=26) and through the analysis of five group-discussion text-messaging transcripts. Mixed-method analysis was used to analyse the data. Descriptive analysis was used to analyse the closed questions in the questionnaire, and qualitative analysis was used for the open questions and transcripts. Ethical protocols were followed, with anonymity and confidentiality maintained. The findings, amongst others, indicate that overall, students agreed that the video promoted their understanding of threats to rare indigenous plants (76.9%); most students watched the video more than three times (84.6%); students had a positive response to the use of text messaging for group discussions (91.6%); and evident in the transcripts was active group engagement. Overall, WhatsApp text messaging facilitated student discussions in the asynchronous group work video analysis task. This reinforces underlying social constructivist pedagogy, which facilitates the integration of course content with group interaction and promotes critical thinking and problem-solving in a post-COVID-19 society.

Keywords: Online learning; Video Analysis; Groupwork; WhatsApp Text Messaging; South Africa

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Introduction

The COVID-19 pandemic had a sudden impact on all aspects of life, including higher education. The shift to online learning during the COVID-19 pandemic prompted academics to seek alternate ways of achieving curriculum outcomes (Hedding et al., 2020; Zhang et al., 2022). Pedagogical approaches such as contact small groupwork, field trips and contextual learning were disrupted. It is important in nature conservation studies that students engage in groupwork, in field trips and in contextual learning. An important topic in nature conservation is the threat to rare indigenous plants. In this study, during the COVID-19 pandemic, internet videos served the purpose of replacing field studies and contextual learning with respect to rare indigenous plants in South Africa but also captured aspects which would have otherwise been complex to teach. To encourage small group work, the lecturer designed an asynchronous group work assessment task. The task involved the use of WhatsApp text messaging to facilitate group discussions based on the internet video. WhatsApp text messaging is easily accessible, uses less data, and is often more affordable than other media (Chiparra et al., 2022; Wargadinata et al., 2020). Text messaging also provides a record of the discussion. This study fills a gap in terms of small group work and the use of WhatsApp text communication for a discussion based on an internet video, on nature conservation of rare indigenous plants within the South African context, during online learning under the COVID-19 pandemic conditions. The study also contributes to mitigating the difficulties in engaging in field trips during challenging circumstances. The COVID-19 pedagogical shift in this study also highlighted new ways of maintaining the quality and depth of online teaching, as well as adaptation and transformation of teaching and learning in post-COVID-19 higher education. This study aimed to determine students' views and experiences on the video analysis task as online asynchronous activity and to determine the quality of the small

group interactions using WhatsApp text messaging to complete the assigned task. This paper commences with a review of the existing literature on asynchronous learning, and the use of videos and WhatsApp in teaching and learning. This is followed by the theoretical framework, the methodology employed in conducting this study, the findings, the discussion of the findings and the conclusion.

Literature Review

Asynchronous learning provides the opportunity for students to participate in learning activities without physical classroom lessons (Carswell & Venkatesh, 2002). For distance learning purposes, asynchronous learning requires the integration of 'community' to reduce the sense of isolation experienced by students (Adams & Wilson, 2020). This was especially significant during the COVID-19 pandemic, as students became physically isolated and required a community to enable effective learning. Enhancing this was the use of group work tasks, which often result in challenges due to individual differences, but many benefits have been exposed from students' responses in a number of studies (Adams & Wilson, 2020; Bernier & Stenstrom, 2016; Willis et al., 2002). Of value in group work is the spirit of teamwork, which prepares students for employment, enabling them to navigate challenges in the workplace. In addition, cooperative learning and collaborative learning contribute to critical thinking and problem-solving (Hammar, 2014; McKinney & Sen, 2016). Asynchronous learning requires modern communication technology, which has the advantage of being accessible at any time suitable to the student and allowing the study materials to be viewed several times.

Although asynchronous learning has been in use globally for a few decades, the technology available to facilitate blended and online learning has progressed extensively. The advances in internet technology and the information available provide abundant material to enhance course content. One such resource is online videos of varying lengths and content, available to students for viewing at their

convenience (Seufert et al., 2016). It has been found that knowledge acquisition and retention are increased by watching videos due to the visual and auditory impact (Nomura et al., 2021). Video content can link course content, real-world scenarios, and assigned tasks (Boateng et al., 2016). This is relevant to the current study, which relates to the conservation of rare indigenous plants in South Africa, which is of significant concern. Among the technologies that can support asynchronous learning meaningfully is WhatsApp, a social media application which proved to be very effective in online learning, especially during the early stages of the COVID-19 pandemic (Chiparra et al., 2022; Wargadinata et al., 2020). Some of the benefits of using WhatsApp for online learning include: it is freely available and easy to use, facilitates collaborative tasks, and allows for group discussions and knowledge and information to be easily shared (Barhoumi, 2015). The successes and benefits of using WhatsApp and video analysis for online group learning and tasks provide a suitable foundation for the current study, which arose in response to the circumstances imposed on the education sector by the pandemic. This study fills a gap in the literature by expounding on the use of groupwork in specific tasks in the natural sciences involving video analysis in the online learning mode, beyond general academic communication, but also confirms the value of the media in the academic journey. Group work is a social activity as it involves group members. In the education context, group work contributes to learning and not just task accomplishment (Govender & Pillay, 2018). Social constructivist pedagogy is an appropriate theoretical framework to understand the dynamics in group work learning, activities and communication within groups. Thus, social constructivist pedagogy underpinned this study and is discussed in the section which follows.

Theoretical Framework: Social Constructivist Pedagogy

Proponents of the constructivist learning theory, Jerome Bruner and Jean Piaget, posit that individuals construct knowledge through

experience and reflections (Akpan et al., 2020). Constructivist teaching and learning allow students to use their adaptive cognitive abilities to build on existing knowledge, construct new knowledge and reconstruct existing knowledge (Thampinathan, 2022). A key principle of constructivist learning is that the student is an active participant in constructing knowledge rather than a passive recipient of knowledge. Social constructivism, a Vygotskian perspective, posits that the construction of knowledge takes place jointly through social interactions and is thus a social phenomenon (Chandler & Teckchandani, 2015; Thampinathan, 2022; Zhang et al., 2022). Social constructivist pedagogy provides learners opportunities to communicate through social dialogue and discussion, which involves many interactions (Chandler & Teckchandani, 2015; Holmes, 2019; Nugent, 2019). This pedagogy interweaves learning, course content and social interaction (Chandler & Teckchandani, 2015; Secore, 2017). Social constructivist pedagogy promotes the student voice (Nugent, 2019). Small group work is an appropriate approach in social constructivist pedagogy. It provides opportunities for students to clarify concepts and questions, get immediate feedback, draw on the knowledge of others and develop their critical thinking skills (Chandler & Teckchandani, 2015). Social interaction is deemed significant in the learning experience (Finnegan & Ginty, 2019). However, during the COVID-19 pandemic, online learning generated a sense of isolation in learning amongst students (Zhang et al., 2022). Interactive online learning encompasses accessing digital libraries, websites or using learning platforms for individual tasks (Basar et al., 2021). However, central to social constructivist pedagogy is the value of the social interaction that takes place in the construction of knowledge. Small groupwork (online or in-person) provides for multiple perspectives of the actors, immediate feedback and clarification through collaboration, which differs from interaction with online digital libraries. In this study, social constructivist pedagogy was used to understand the learning experiences and views

of group members and the quality of the group work learning.

Methodology

A mixed-method research design was used to gather and analyse the data through descriptive statistics and qualitative interpretive analysis. A convergent parallel mixed methods design was used instead of an explanatory or exploratory design. In a convergent parallel mixed methods approach, both data types are gathered simultaneously instead of sequentially (Ivankova, Creswell, and Clark, 2016). This case study explored the use of WhatsApp as a medium to carry out small group work tasks based on an internet video during the COVID-19 pandemic. Third-year students who were enrolled for a module in a nature conservation qualification at a South African university were required to watch an internet video. The subject of the internet video focused on threats to rare and indigenous plants within the South African context. Students had to view the video, engage in group discussions using WhatsApp as a communication medium, and then submit a collated group-written response to the task. WhatsApp was used as a means to mitigate physical contact due to the COVID-19 pandemic lockdown. Two approaches were used to collect data for analysis; firstly, a voluntary electronic questionnaire was sent to all students enrolled in the module, to which 26 students responded, the response rate being 51%. The questionnaire had open and closed questions, eliciting the student experiences and views as participants in the group work activity and discussions. Secondly, the five group-discussion text messaging transcripts were analysed. Descriptive statistics assist in organising, summarising and describing data (Ramachandran & Tsokos, 2009). Descriptive statistical analysis was applied to the closed questions in the questionnaire using percentages. The qualitative interpretive analysis involves understanding the perspective of the respondent within the “whole story”, as data are seldom neatly packaged in one set of texts or one quotation (Mason, 2002). Qualitative interpretive analysis was applied to

the open questions and interview transcripts. The study was conducted under a university-registered research project. Ethical protocols were followed including maintenance of confidentiality. Anonymity was maintained in the reporting by substituting student names with a general reference to students (e.g. Student 1).

Findings

The findings focus on answering two key research questions, viz.:

- What were students’ views and experiences on the video analysis task as an online asynchronous activity?
- What was the quality of the group interactions using text messaging?

The findings of the first question are based on an analysis of the open and closed questions in the questionnaire. The findings of the second research question are based on the analysis of the group interaction using text messaging.

What were Students’ Views and Experiences on the Video Analysis Task as an Online Asynchronous Activity?

The questionnaire contained questions relating to the following aspects and are the focus of the findings for the first research question: video content, the value of the video as a method of engaging with content, feedback on the video length, approach to viewing the video, and the use of text messaging for the group work communication.

The Value of the Video Content

96% of the students responded that they had not been to the Northern Cape, one of the provinces in South Africa where the rare indigenous plant *Conophytum* is found and where the video was filmed. Overall, the majority of students, that is 76.9% agreed that the video promoted their understanding of threats to rare indigenous plants (Figure 1). However, none of the respondents disagreed. Some aspects of the video that contributed to students’ understanding of indigenous and rare plants under threat are illustrated in Table 1.

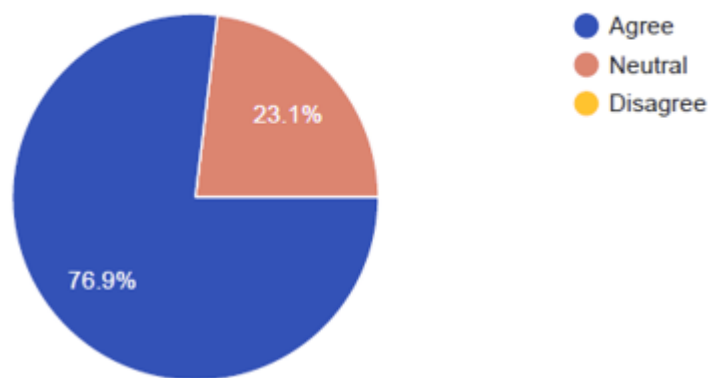


Figure 1: Students' Responses to the Value of the Video Content in Promoting Understanding of Indigenous and Rare Plants under Threat

Source: Personal Survey, 2021

Table 1: The Usefulness of the Video Content	
Criteria	Student responses from the questionnaire
Anthropological Interference	<i>(Student 9)</i> It made me understand that most of them are poached for money and that the immigration of people also increases the poaching of endangered plants.
Supplementation of Information	<i>(Student 5)</i> Have knowledge about South African indigenous species. <i>(Student 17)</i> Not only animals but also plants are poached, which may lead to the extinction of many plant species, some of which play a vital role in the pharmaceutical industry
Mitigation Measures	<i>(Student 1)</i> It gave me a clear indication of how to conserve rare species. <i>(Student 5)</i> It has helped me know that indigenous plants are rare and under threat because of human beings, as they poach them. Moreover, it has shown some mitigating measures towards conserving the most threatened and rare plants to avoid extinction. <i>(Student 8)</i> I got insight into the importance and role of these plant species, and that strategies should be implemented to conserve them.
Source: Personal Survey, 2021	

In summary, causes of threats to rare indigenous plants and understanding and implementing mitigation measures are important in nature conservation studies. The video was helpful in conveying some of the causes and the mitigation measures.

Students provided various reasons why the video was valuable for studying indigenous and rare plants under threat and nature conservation issues. Table 2 reflects the value of using the video through student responses from the questionnaire.

Value of the Video as a Method of Online Teaching and Learning

Table 2: Value of the Video as a Method to Engage with the Content	
Value	Student response
Reality	<p><i>(Student 1)</i> The video was based on real-life issues impacting indigenous plants. It was an application of theory included in the curriculum.</p> <p><i>(Student 6)</i> Watching the raw video that is not edited feels practical as you can see everything happening, and you are able to see the area of study and studied plant species.</p>
Accessibility and convenience of the video	<p><i>(Student 3)</i> The video was on YouTube; it was accessible at any time.</p> <p><i>(Student 9)</i> You can repeat it many times, and having people talking is not like reading.</p>
Substitute for field work/visit	<p><i>(Student 5)</i> Using a video is a good idea to put us as students in the field while we are not.</p> <p><i>(Student 13)</i> Yes, because it was easy to access the video instead of going to the reserve ourselves.</p>
Learning style	<p><i>(Student 4)</i> Some students may not understand theory too well. So, by visually presenting content, students will be more dedicated to studying concepts such as this.</p> <p><i>(Student 15)</i> It was practical, and visual literacy is much easier to understand.</p>
Understanding content	<p><i>(Student 12)</i> All topics should have videos for those students who understand the content better through visuals.</p> <p><i>(Student 18)</i> Videos should be used more often; sometimes, it is hard to grab written content; you don't get bored when watching a video.</p>
Source: Personal Survey, 2021	

Visuals played an important role in helping students understand the reality of the issue and the actual rare plant species of *Conophytum*. The video was also easily accessible and could be replayed. One student indicated the convenience of watching the video instead of going to the field, which was more practical under the circumstances. In this study, the site where the video was filmed (Northern Cape) was approximately 12 hours (1 101,7 km) from the university. However, it was convenient to use the video, as the COVID-19 pandemic had

reached its climax and field trips were discouraged because of the risks of infection. The video footage also suited the learning styles of audio-visual learners. In another question, all students agreed that the video allowed them to do self-paced learning.

Approach to Viewing the Video

One of the advantages of using videos to learn is the value of being able to replay them. Students were given three choices concerning how many times they had watched the video, viz., once,

twice, thrice or more. All students watched the video more than once, as indicated in Figure 2. 84.6% watched the video three times or more.

None of the respondents watched the video only once (as noted in the absence of blue in the pie chart, Figure 2).

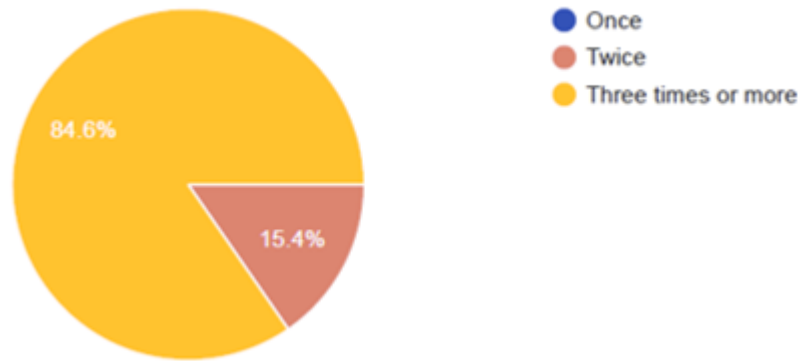


Figure 2: Response to: ‘How many times did you watch the video prior to the group discussion?’
 The absence of blue in the chart indicates that none of the students watched the video once only

Source: Personal Survey, 2021

There were different strategies used to view the video. These included watching the video alone prior to group discussion, a first viewing to get an overview, and making notes while watching the video (Figure 3). Below are some responses from students:

- (Student 5): The first time I watched it was just to see what was happening. Secondly, I repeated it because there were words that I did not hear clearly. Thirdly, I watched to understand the content. After that, I went on with the task to see what was expected from me, then I went back to see if I got it. Then I watched it repeatedly until I got everything done.

- (Student 6): I first watched it, and on the second watch, I started taking down notes.
- (Student 18): I watched for the first time and listened to the information, watched again, making notes, and then watched for the last time to confirm.

Feedback on the Length of the Video

The length of the video in this study was one minute and fifty-two seconds. Therefore, 84.6% indicated that the length of video was adequate for the task given. Table 3 provides some of the reasons for the students’ responses on the length of the video.

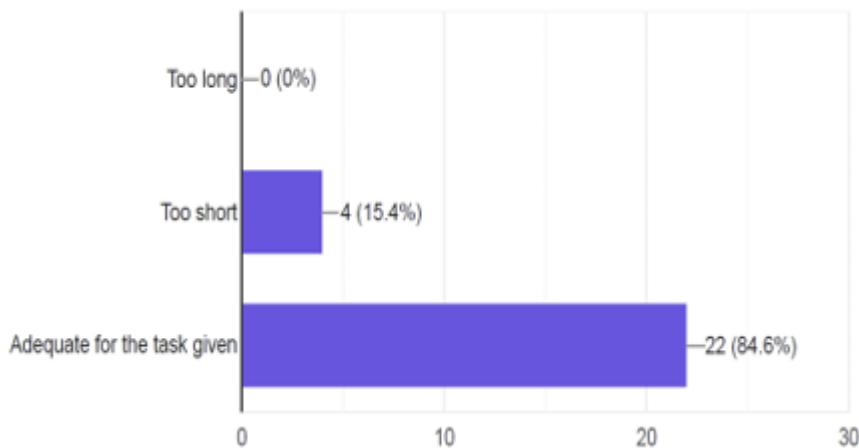


Figure 3: Graphic Representation of Students’ Views on the Length of the Video
 Source: Personal Survey, 2021

Table 3: Students' Views on the Length of the Video	
Length of the video	Reasons
Adequate length	<p><i>(Student 5)</i> Shorter-duration videos have a clearer perspective of the content as it is easy to follow. However, if there is a video with a duration of 10 minutes, the content will be harder to follow as concepts are spread throughout the video.</p> <p><i>(Student 7)</i> My response is based on data issues.</p> <p><i>(Student 9)</i> Easy to watch videos more than once.</p>
Too short	<p><i>(Student 16)</i> The video was too short and difficult to understand. So we had to repeat the video many times.</p>
Other	<p><i>(Student 1)</i> If it too long, it becomes hard to analyse it and find appropriate answers, but when it is too short, you run out of answers or creativity to build your reports or essay.</p> <p><i>(Student 13)</i> If the video is too long, you can lose interest in it.</p> <p><i>(Student 21)</i> Long videos tend to involve unnecessary information that leads to students losing interest.</p>
Source: Personal Survey, 2021	

Only one student responded that the length of the video was too short, which impacted understanding of the issue. However, most students preferred a shorter video as they believed it was easier to follow and understand. Another reason of significance within the online learning context is that shorter videos use less mobile data. Data constraint is one of the challenges for online learning. Also, shorter videos make it easier to replay the video. For maximum learning benefits, watching videos more than once would be advisable.

The Use of Text Messaging for Group Work Communication

91.6% of students responded positively to using text messaging for group discussions. Additionally, 88% of the students answered that they re-read the WhatsApp group discussion text to reflect on the content. One response indicated that it was appropriate to use because

of the risks associated with the COVID-19 pandemic.

- (Student 5): It makes life much easier. We can discuss different concepts as a group and confirm with each other if they understand or need clarity for concepts. So, the use of WhatsApp for me is successful.
- (Student 10): I feel it is much better than Blackboard as we find WhatsApp easy to use and access.
- (Student 16): WhatsApp and text messages can be a good way of discussing because you can go back and read the discussion.
- (Student 22): As most students have WhatsApp, it is a convenient way to work.
- (Student 23): That was a good idea because everyone had a chance to participate; some are comfortable doing that in their private space.

Negative Responses Included

- There was no actual discussion but rather narrative input from group members.
- There were delays in responding to the chat, causing the discussion to be unnecessarily drawn out.

What was the Quality of the Group Interactions using Text Messaging?

The transcripts of five groups that permitted the use of the transcripts were analysed. There were two parts to the analysis. The first related to the meeting statistics, and the second related to the quality of the actual group discussion.

Statistics of the Meetings

Meetings’ statistics included a number of criteria, as listed and analysed in Table 4.

Table 4: Meetings’ Statistics

Criteria	Group A	Group B	Group C	Group D	Group E
1. Number of text sessions	2 sessions over two days	1 session on the same day	1 session on the same day	2 sessions over two days	1 session on the same day
2. Time of discussions	Both sessions: midday – afternoon	Night	Morning	Session 1: Afternoon – night Session 2: All day	Morning
3. Length of discussions	Session 1: 1.5 hours Session 2: 4 hours	1.5 hours	1.5 hours	Session 1: 6 hours Session 2: 8 hours	1.5 hours
4. Group member contribution	All	All	All	All	All

Source: Text Message Transcripts, 2021

The number of WhatsApp group texting sessions varied between one and two sessions. The minimum duration of the sessions was 1.5 hours, and the maximum was 8 hours. However, this was not continuous texting but described the duration from when the first message was posted to the last posting. Groups seemed to have different preferences for the times of the WhatsApp group texting discussion, that is, morning or night but also included sessions drawn out from the afternoon to night. In all the groups, all members contributed to the discussions, although to varying extents.

Quality of the Small-Group Discussion using Whatsapp Texting

The quality of the small group discussion using WhatsApp texting was analysed according to the following criteria:

Group Interaction

It was evident in the transcripts that there was active group engagement (questioning, seeking clarification, engaging in discussion, and providing input) in all five groups. Extracts from the group transcripts demonstrating group engagement include:

- With the issues that were stated in the video, why do you think we have to conserve indigenous plants? (Group B).
- What do you think the response to the problem is, colleagues? (Group D).

Scientific Content Clarification

Scientific clarification was sought in only two groups. The responses below show species clarification (Group C) and biome vegetation characteristic clarification (Group E).

- Can someone correct me if I’m missing the point, but I think it is the *Amaryllis*

paradisicola – its scientific name (Group C).

- Student 1 As you have mentioned, the controlled environment that we were discussing had three biomes that were all grouped into one location, right? (Group E).

Discussion Focus According to the Task Instruction

The task instruction required the groups to critically analyse the challenges and responses to the problem of threats to rare and indigenous plants. All the groups focused on the task instructions in their WhatsApp discussions. Below are the group responses:

- Laws that protect rare plant species should be enforced for the successful recovery of the endangered species (Group E).
- It also agrees with the aim of this exercise which is the management of endangered communications (Group E).
- Then they should make the laws because only fining the poachers, as said in the video, is clearly not intimidating enough (Group E).
- They say there is a plan they are working on by having many rangers to decrease poaching of the species; it is also imperative that they deal with other threats to the biodiversity, such as ensuring that they maintain sufficient environmental management to those species that are in controlled environments (Group C).

Critical Approach

A critical approach in the context of the video required consideration of the video content beyond the description to analyse the effectiveness of mitigation measures and alternatives to these measures to address threats to rare indigenous plants. The group responses below indicate critical analysis.

- The authorities indicated that there is a plan they are working on by having many

rangers to decrease poaching of the species; it is also very important that they deal with other threats to the biodiversity, such as ensuring that they maintain sufficient environment management to those species that are in controlled environments (Group C).

- As the trade of *Conophytum* takes place during export-import, border security should be tight to prevent this from happening illegally (Group D).
- It is said that *Conophytum* is much more expensive if it is poached in its natural environment, as these plants are endemic to that area. As a measure to prevent the plant species from becoming extinct, since many *Conophytum* species there are critically endangered, controlled areas have been established to grow them from seeds, but those are not as valuable as the ones that grow in their original environment (Group E).

Discussion

Initially, the COVID-19 pandemic created uncertainty in education, but there were innovative efforts to adapt for continuity of education at all levels (König et al., 2020; Wargadinata et al., 2020). There were universities that were more prepared, as online learning had been previously instituted there. However, online learning was employed at many universities throughout South Africa (and in many other countries) (Pillay et al., 2021; Pather and Cupido, 2020), as the world adapted to changes arising from the pandemic. Pedagogical approaches were trialled within the online environment. This study highlighted pedagogical approaches where there is a gap and dearth in the literature reflecting on the use of internet videos in small-groupwork, with the use of WhatsApp texting as a means of communication. Much can be reimagined from this social constructivist approach in the post-COVID-19 era. There is a relationship between social interaction, academic success and well-being, and there was a need to maintain social interaction in some form or the other during the COVID-19 pandemic (Holzer et al., 2021). Zhang

et al. (2022) suggest that instructors should promote active social interaction to intensify the benefits of online learning, as active participation in small groups expands student knowledge and promotes community values.

The use of WhatsApp communication makes student participation more inclusive, as the data quota package and costs are lower. Most students can access mobile phones and the application (Agrawal & Mittal, 2019; Wargadinata et al., 2020). Jackson (2020) suggests that WhatsApp can be used to enhance learning experiences through creating a group structure for active participation. In this study, small group work and the use of WhatsApp text messaging was the medium for social connection within the online academic environment. The internet video on threats to rare indigenous plants provided the content focus for the social interaction. Overall, text messaging using electronic devices facilitated student discussions in the asynchronous groupwork video analysis task. However, text messaging can interrupt the flow of discussions as students sometimes delay in responding. This was a finding in this study, as discussions were drawn out due to delayed responses, as opposed to immediate responses in face-to-face small group work. However, Chiparra et al. (2022) report on a study in Peru, where WhatsApp positively impacts the construction of knowledge (both synchronous and asynchronous). Social constructivism involves reflective practice (Nugent, 2019), as was evident by students' responses that WhatsApp text messages were there for future reference. This has the potential to encourage reflective practice as well.

Internet videos are also valuable for supporting relevant learning within actual contexts (albeit virtual). Real contexts and active learning are tenets of constructivist learning approaches. In a study in the Philippines on learning physics, Lampara and Maquiling (2021) found that videos provide opportunities for collaboration and increased student motivation. Many videos, varying in duration, and filmed in different parts of the world on the same subject, can be sourced on the internet. However, internet videos need

to be evaluated for their content quality, as videos may have unverified or unauthenticated information. For example, according to Kazancioğlu and Bodur (2021), it was found that Turkish internet videos on malaria had unverified information, contained personal views and were presented by news agencies. However, teaching and learning during the COVID-19 pandemic affirm the value of internet videos in the post-COVID-19 era. In our findings, the respondents mentioned that the video was relevant, substituted for field visits, which suited the circumstances, and would generally be too time consuming and costly to undertake. Additionally, it provided scaffolding for the group discussion on threats to rare indigenous plants in South Africa. In a similar context, a 2016 study involving medical students in South Africa, it was reported that the students articulated that visuals and simulations had greater potential to generate new knowledge compared to the traditional didactic mode (Diab et al., 2016). In the same study, students indicated that the video was an advantage, as the content could be revisited. This observation reinforces in a systematic study on online videos by Srinivasa et al. (2020), which was also noted in this study.

Conclusion

The implication for post-COVID-19 education is that there are opportunities for flexible asynchronous online learning, underpinned by social constructivist pedagogical approaches using small-groupwork and social media technology. As technology advances, there may be an opportunity for further investigation of unexplored technologies to support asynchronous online learning. The potential of this approach to teaching and learning promotes innovative and critical thinking to address real-world problems, such as those facing nature conservation and many other disciplines in a collaborative online space.

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Ethical Approval and Conflict of Interest

Ethical protocols were followed with confidentiality maintained. Anonymity was maintained in the reporting of responses. This study received no funding. We hereby declare no conflict of interest. We confirm this study has not been submitted or considered for publication elsewhere.

Informed Consent

All participants were provided with the necessary information at the outset of data collection, and they were informed that participation was entirely voluntary.

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Author Contribution Statement

The first author conceived the idea and collected the data. Thereafter the manuscript was prepared and completed with contributions from both authors.

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