

## The use of live streaming in design-based modules for open distance learning

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**ABSTRACT:** Live streaming is used as an educational tool to enhance communication in many distance education modules. In some design-based modules at the University of South Africa, a study leader is assigned to each student. The question can thus be asked, how can live streaming be used to establish better communication between the study leader and students in these design-based modules, and what are student's perceptions on the use of live streaming? In this research, a case study was used, where live streaming sessions were held via YouTube live before assignments were submitted during the year of study. Student perceptions were recorded with a questionnaire that contained open and closed-ended questions. Students felt that the live streaming sessions helped them to better understand what was expected of them. They also reported that it made them feel as if they were in a real class and that they could get their questions answered immediately. The positive response from students may be an indication that live streaming can be used with great success to achieve better communication in more design-based modules at distance education institutions in South Africa.

### INTRODUCTION

*There is enormous value in face to face interaction.* These words, by the German scientist Sebastian Thrun, are very much applicable to education [1]. Unfortunately, there are many students that for one or other reason must make use of distant education, where they do not have face-to-face interaction with their lecturers. One of the reasons may be their demanding modern lifestyle, and it is then of no surprise that the flexibility and convenience of the online learning platform may appeal to many students [2]. Although these on-line courses are convenient, there are also some drawbacks. In fact, reports by individual institutions suggest that course completion and programme retention rates are lower in distance education courses than in their face-to-face counterparts [3].

Live streaming is used as an educational tool by many lecturers who teach distance education modules. The use of live streaming can differ depending on the aim of the streaming session. One of the applications may be the use of live streaming in a virtual laboratory environment [4]. In a study by Dolle et al, students access a remote laboratory, where they could do experimental work on a centrifugal pump [5]. Similar to many live streaming setups, the students could access the experiment from any place, where they had Internet access. In other cases, lecturers use live streaming to answer questions from students or to address some of the work in the curriculum.

The aim of this article is to show how live streaming can be used to establish better communication and to highlight the perceptions of students regarding live streaming sessions, which was held in a design-based module; namely, Industrial Projects IV, that is offered at an open distance learning institute in South Africa. In the next section, the study context will be given, followed by the research methodology. The results and discussions then follow with the conclusion at the end.

### LIVE STREAMING

There are many different platforms from where live streaming sessions can be initiated. These platforms may include Twitch, YouTube live, Facebook live and YouNow to name just a few. Live streaming has worldwide become a popular communication medium. The continuous growth of live streaming, for instance in China, has resulted in more than 200 million viewers watching live stream sessions each night on more than 200 live streaming platforms [6].

YouTube live is the platform that is used in this study and will be further discussed. Anyone with a Google account can initiate a live streaming session via YouTube live. The link to the live streaming session must be communicated to the possible participants. This can be done in a number of ways that may include WhatsApp, email and Facebook. Once the session has started, the participants will have near real-time video and audio feed from the presenter. A function that can be enabled in a live streaming session on YouTube live is the ability of the receiving party to ask questions in the form

of text during the session. This enables him or her to ask relevant questions as they arise during the session. The questions that are asked during the session are displayed on the PC or cell phone screen for all parties involved in the session. The asynchronous nature of the live streaming session makes it possible for a broad audience from all over the world to participate in such a session. Another benefit of live streaming may relate to students with disabilities or distant learning students, where it is not always possible for them to attend a session in person [7].

## CONTEXT

The three departments in the School of Engineering at the University of South Africa (UNISA) are: Civil and Chemical Engineering; Mechanical and Industrial Engineering; and Electrical and Mining Engineering [8]. The module that is used in this case study is Industrial Projects IV, and is part of the curriculum of the Department of Electrical and Mining Engineering. This Department offers diplomas and degrees in Electrical Engineering and Mining Engineering (BTech degree and National Diploma).

Industrial Projects IV is a capstone module, where students use knowledge gathered from previous years of study in the design of an electronic project. Due to a large number of students that enrol for this module, external study leaders are appointed to help with the supervision and assessment of the projects. These study leaders are chosen based on their expertise in specific fields, and students with relating projects are then assigned to them. One of the primary responsibilities of the study leader is to guide students, so that they achieve the learning outcomes of the module. In Industrial Projects IV, 20% of the final mark is obtained via assignments that aim to guide the students towards a final working project and final written report. A scaffolding process is used where students are progressively guided towards better understanding [9] via five formative assessments that are presented in Table 1.

Table 1: Assignment contribution towards the year grade for Industrial Projects IV.

Assignment	Description of formative assessments	Contribution to the year grade (20% of final mark)
1	Study field definition	10%
2	Chapter 1 (introduction) including the project proposal	15%
3	Chapter 2 (literature study) including a detailed block diagram of the project	25%
4	Chapter 3 (methodology) including flowchart of the software	20%
5	Chapter 4 (results) including YouTube video of a working prototype	30%
Total		100%

The aim of the first assignment is for the student to identify his or her field of study. The lecturer will also use the information in assignment one to assign the student to an appropriate study leader. Assignment two is a detailed project proposal that includes the introductory chapter that will be included in the final written report. In the next assignment, the student will do a detailed block diagram of the project and will also complete the literature review chapter that will be included in the final written report. In the fourth assignment, the student will do a detailed flow diagram of the designed software of the project that will also include the methodology chapter that will be included in the final written report. The last assignment consists of the results of the project along with a link to a YouTube video of their working project. A summative written report will be handed in at the end of the year of study together with the completed electronic project and will contribute 80% towards the final mark.

Live streaming was used as an educational tool by the study leader in order to convey information about the learning outcomes and to answer live student questions regarding two of the formative assignments. The method that was used in this study will be discussed in the next section.

## METHOD

This research uses a case study, where quantitative and qualitative data were collected regarding the use of live streaming in a distance education module at UNISA. One of the advantages of a case study is the way in which it deals with a variety of evidence and the depth of analysis that it offers [10][11]. Student cell phone numbers were initially obtained via email, and a WhatsApp group were formed. Live streaming sessions were held before the due date of two of the assignments in a continuous evaluation module; namely, Industrial Projects IV, in the first semester of 2018. The link to the live streaming sessions was communicated to the students via a WhatsApp message. Questions were delivered to 52 students (n = 52) after the live streaming sessions, and the data collection instrument was Google forms. The questions were partially derived from previous research regarding the use of WhatsApp in education [12].

In this study, descriptive statistics are used to describe the essential features of the data concerning students perceptions regarding live streaming as an educational tool [13]. The questionnaire consisted of five sections; namely, student demography, Internet connectivity, possible advantages of live streaming, possible challenges of live streaming and some general open-ended questions. A 5-point Likert scale (strongly agree to strongly disagree) were used in the close-ended questions. Bar graphs were used to present the quantitative data of the student's perceptions regarding the live

streaming sessions. The qualitative data that was collected was regarding the student's personal experiences regarding the live streaming sessions and is presented in a table form. Responses of students on the open-ended questions were divided into thematic themes. Thematic analysis is used to identify relationships and patterns in the qualitative data [14].

## RESULTS AND DISCUSSION

The questionnaire that was given to the students consisted of five sections. The first section dealt with student demography followed by Internet connectivity. Section 3 related to possible advantages of live streaming sessions that was followed by possible challenges and lastly some open-ended questions. From the answers in the first section on student demography, 86% of the students were male, which correlates well with literature that shows that there are less female students in engineering [15]. Also, in this section, it was revealed that all the students in this module were older than 25 years of age, with 21% being older than 40 years of age. This can be attributed to the fact that these students are from a distance education institution, where many of the students are already working full time [16]. South Africa has 11 official languages, which were reflected in the eight different home languages reported by the students [17]. From the results, the most prominent languages were English (23%), Afrikaans (13%) and Zulu (15%). The language of instruction at UNISA is English.

In the second section of the questionnaire that dealt with the way the students accessed the live streaming sessions, 37% of the students used their phones, while 63% used their personal computers to participate in the sessions. The study leader also interacted with the students via a WhatsApp group [12]. In a question on what type of interaction they preferred, the majority (71%) said that they preferred a combination of WhatsApp and live streaming, while 17% preferred only live streaming and 12% preferred only WhatsApp. This correlates with literature that also indicates that students value and find the use of WhatsApp and live streaming valuable in relation to their studies [18][19].

Advantages of live streaming sessions were considered in the third section of the questionnaire. 97% of the students indicated (agree and strongly agree) that they better understood what was expected of them in their next assignment after attending the live streaming session (see Figure 1). A further 86% indicated that the information in the live streaming session was sufficient for them to avoid mistakes in their next submissions, while 94% said that they were satisfied with the amount of information provided. These responses can be an indication that the live streaming sessions contained adequate information and that the study leader need not add more content to the sessions.

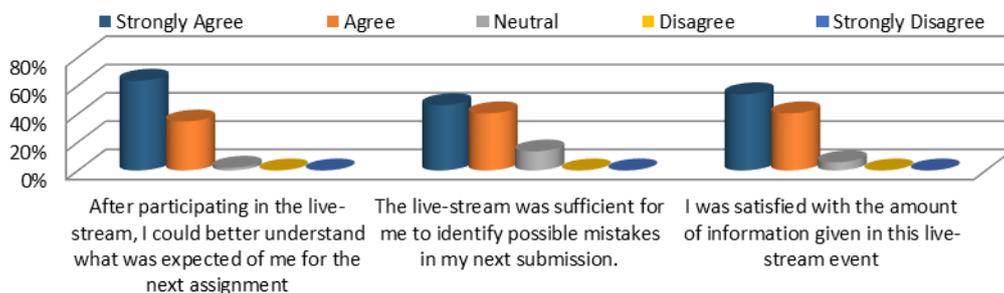


Figure 1: Students perceptions of possible advantages of live streaming - part 1.

Concerning the questions that were answered by the study leader during the live streaming session, 96% of the students indicated that the feedback was constructive (see Figure 2). Students also responded that the live streaming session was more personal (96%) than written feedback, and 100% of the students said that they would like to be part of the next live streaming session. These input by the students is a clear indication that their questions were adequately addressed during these sessions. Students also value the sessions in the sense that it is more personal than written instructions and that they want to take part in future sessions.

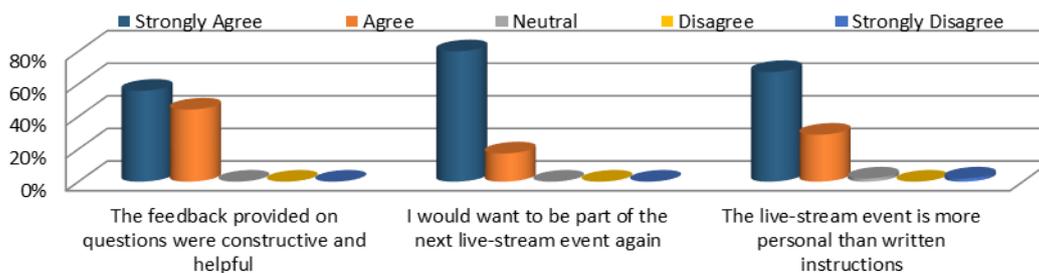


Figure 2: Students perceptions of possible advantages of live streaming - part 2.

As can be seen in Figure 3, students indicated that they extracted more information from the live stream than from written feedback (96%). Students also felt that due to the voice modulation and video content, they could better grasp

the intent of the message and the information (93%). This correlates well with research that suggests that the voice conveys mood, emotion, attitude, opinion, confidence, conviction, restriction, inhibition, as well as a multitude of subtle shades of meaning that influence the speaker and the listener [20]. Figure 3 further shows that 97% of the students agreed that they enjoyed the live streaming experience. Research shows that teacher enthusiasm is related to student enjoyment [21], which may be an indication of the level of enthusiasm conveyed by the study leader towards the participants. Studies also show that enjoyment positively influences an individual's ability to adopt a new technology [22], being live streaming in this context.

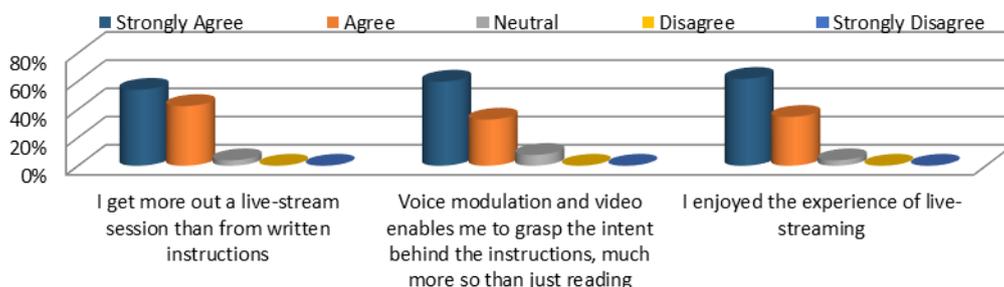


Figure 3: Students perceptions of possible advantages of live streaming - part 3.

Another advantage that the students highlighted is shown in Figure 4, and relates to better interaction between them and their study leader (noted by 97%). 94% of the students said that the live streaming sessions made it easier for them to communicate with their study leader. Good communication between students and the lecturer is a significant contributing factor for student success [23]. A further 98% indicated that the interaction was indeed relevant to their next assignment. This is important as studies have shown that if students are involved more actively in relevant communication, they will participate more in learning relevant courses [24].

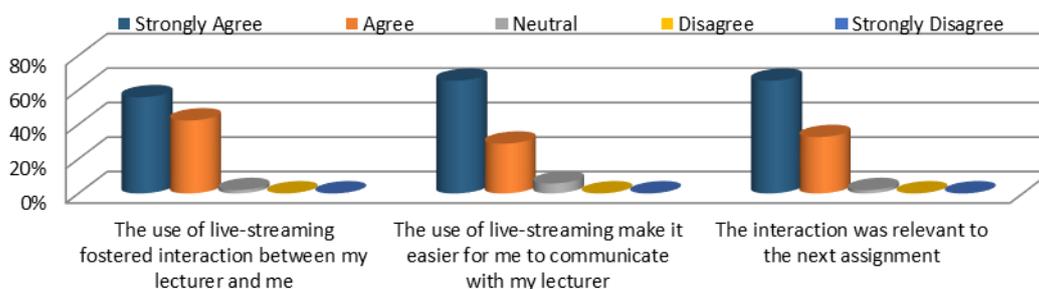


Figure 4: Students perceptions of possible advantages of live streaming - part 4.

The next section of the questionnaire dealt with possible challenges of live streaming. In a question that stated, *Live streaming was not time efficient for me*, 67% of the students disagreed with the statement, while 27% were neutral (see Figure 5). Only 6% felt that live stream was not time efficient for them. As most of the students are already working and exposed to a busy lifestyle, the effective utilisation of time is even more important for them. In a question regarding possible technical difficulties, 50% of students indicated no technical difficulties, with 35% being neutral and 15% indicated that they indeed had technical problems. Technical problems could relate to Internet connectivity, as well as software and hardware related issues. 75% of the responses indicated that the streaming was not difficult for them to access, and 4% indicated that they experienced difficulty in accessing the streaming. The reason why the students did not really encounter technical difficulties may be attributed to the fact that the technology of live streaming via YouTube live is already matured and widely used [25].

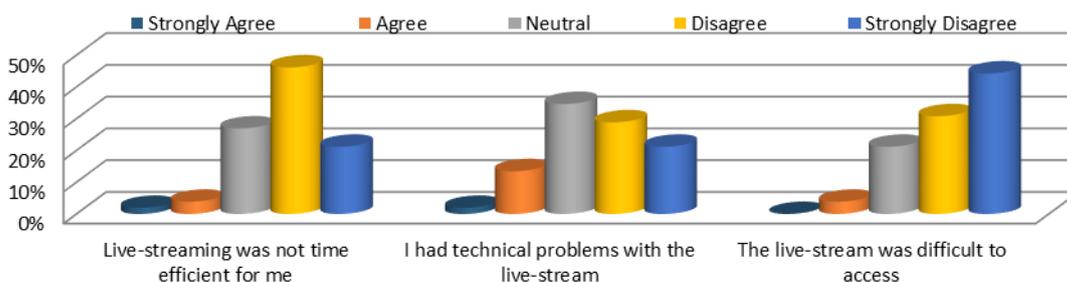


Figure 5: Students perceptions of possible challenges of live streaming - part 1.

On a question regarding Internet bandwidth, 15% indicated that they had bandwidth problems (see Figure 6). The cost of data was a problem for only 14% of the students. This may be due to the fact that most of the students were older and

already working, and thus could afford the data or had free access to Wifi [26]. On a question regarding the availability of WiFi, only 16% indicated that it was a concern to them.

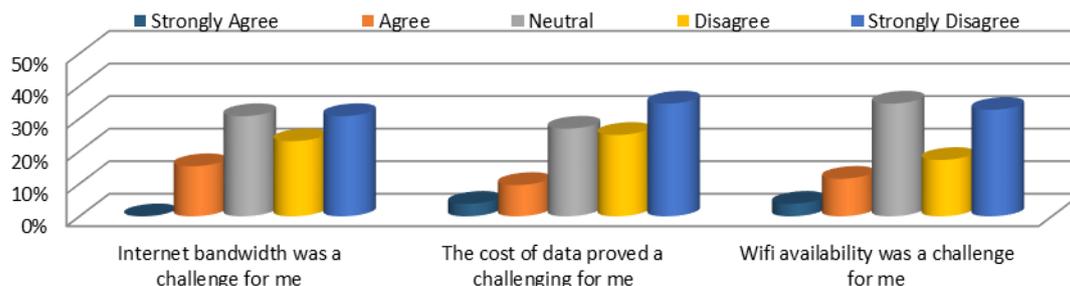


Figure 6: Students perceptions of possible challenges of live streaming - part 2.

In the last section of the questionnaire, students were asked to comment on their experience of participating in the live streaming sessions. Their responses were divided into six thematic themes and are presented in Table 2. From the written responses, 38% of the students indicated that it was a good learning experience and 10% mentioned that it was enjoyable. Due to the fact that many of the UNISA students are working and studying at the same time, time utilisation is an important factor to them [26]. 40% of the comments indicated that the live streaming led to better time utilisation, and students also appreciated the fact that their questions could be addressed immediately in the live streaming session. A further 62% of the students indicated that the sessions were helpful and 50% mentioned that it was informative. One of the significant findings in the analysis of student responses were that 79% of the responses pointed to better communication in the module. As most of the information that the students needed for successful completion of their assignments were communicated in the live streaming sessions, the study leader felt that it reduced the number of unnecessary individual questions by the students, and thus saved time.

Table 2: Thematic themes regarding live streaming.

Thematic themes	%	Unedited examples of student comments
Live streaming was a good learning experience	38	It is a good experience, distance learning has never been easy but with this kind of live streaming session it makes it easier.
Live streaming was enjoyable	10	You get a more personal feeling thus making it easier to connect with the subject and lecturer.
Live streaming led to better time utilisation	40	Live interaction that was super cool because questions were answered immediately.
Live streaming was helpful	62	Very helpful and will help me to excel in the module.
Received relevant information via live streaming	50	It is informative because the lecturer answers my questions face to face.
Live streaming improved the communication in the module	79	Almost like sitting in a lecture and questions asked by others benefit everyone.

## CONCLUSIONS

Live streaming was used as an educational tool by the author in a capstone design-based module; namely, Industrial Projects IV that is offered at a distance learning institute in South Africa; namely, UNISA. The aim of this article was to show how live streaming can be used to establish better communication and to highlight the perceptions of students regarding these live streaming sessions.

Students felt that live streaming was more personal than written feedback that the voice modulation and video enabled them to better grasp the intent behind the instructions, and that it was an enjoyable experience for them. Students also reported that it fostered interaction and that it made it easier for them to communicate with their study leader. This point was again emphasised in answers to open-ended questions where 79% of the students reported that the live streaming resulted in better communication in the module.

As the bulk of the information that the students need for their assignments was communicated in the live streaming sessions, the study leader felt that it reduced the number of individual questions from students, and was thus time efficient in this regard.

In cases where face-to-face communication is not possible, live streaming may be used as an alternative communication method. Considering the positive influence that the use of live streaming had on the communication between students and the study leader, it can be recommended that live streaming be adopted as an educational tool by more academics at open distance learning institutions.

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