Effective use of video lectures for design project students

Pierre E. Hertzog

Central University of Technology
Bloemfontein, Free State, South Africa

ABSTRACT: Videos are used as an educational tool in many higher education institutions around the world. At the University of South Africa, video lectures were used to communicate essential information to the students regarding the module Design Project III. The question can thus be asked, how can video lectures be used to establish better communication between the study leader and students in Design Project III, and what are student's perceptions on the use of video lectures? In this research, a case study was used, where lecturing videos were recorded and communicated to the students in the module Design Project III. Student perceptions regarding the videos were recorded with a questionnaire. Several advantages and disadvantages were identified and reported on. Students felt that the video lectures were relevant, easily accessed and beneficial to their studies. Some of the disadvantages were the cost of data to access the videos. The positive responses from students may be an indication that video lectures can be used with great success in design-based modules in South Africa.

INTRODUCTION

> *The great thing about YouTube is there are no gatekeepers. No one is waiting to tell you if you are good enough. It is just your audience* [1].

These words by the American musician Lindsey Stirling is also true for video lecturing, where the students will be the judge of your work. Many universities make use of lecturing videos, where the lectures are either recorded in a classroom setting or in a more private setting [2]. The availability of free platforms like YouTube enables the lecturer to produce and publish lecturing videos by providing a link to his or her students.

Guest lecturers are also commonly engaged in face-to-face lecturing situations, but pose to be more difficult in a distance learning environment. This can quickly be eliminated by the use of pre-recorded video lectures [3]. Although there are many researched benefits to the use of lecturing videos the question may arise, what are the perceptions of students in a design-based module regarding lecturing videos?

This article aims to highlight how video lecturing can be used to establish better communication and to present the perceptions of students regarding video lectures, which were made available in a design-based module; namely, Design Project III. In the next section, the use of video lectures in education will be discussed. Secondly, the study will be brought into context regarding the specific module and its structure, whereafter the method that was followed will be discussed. The results and discussion of results will then follow, and lastly, the conclusion will be drawn.

LECTURING VIDEOS

Lecturing videos is a handy tool that can be used not only for distance education, where the students do not enjoy the privilege of face-to-face contact with their lecturers, but also as a mixed approach with live lectures [4]. As students can not learn from lecturing videos, if they do not watch the videos, it is essential for the lecturer to find ways to improve student engagement with the videos. Engagement time is the time that the viewer watches the video and is measured by YouTube, as well as other free video providers [5].

This measured data can be used by the lecturer to track the level of engagement by the students. To improve student engagement, several techniques can be used. One of the techniques may include shorter videos [6]. In fact, it was found that students become bored and are easily distracted, if the recorded videos were longer than 15 minutes [7]. Student engagement with the videos can also be promoted by assigning tasks to the student that must be derived from watching the video [8]. These tasks may be in the form of visual searches and summarisation of the video content [9].

There are also disadvantages to the use of video lectures. One of the disadvantages is the time that it takes to produce and edit the video before it is released to the students [10]. Another disadvantage is the amount of data used by the students to access the video lectures and being dependant on an Internet connection [11]. In some cases, depending on the platform used, it could also be difficult for the lecturer to do updates on the published videos [12].

From the above, it can be concluded that there are many advantages in the use lecturing videos, and that with the use of YouTube and other free platforms it is accessible and easy to use by lecturers.

CONTEXT

This study is based on a module Design Project III, which is offered in the Department of Electrical and Mining Engineering at the University of South Africa (UNISA). UNISA is a distance education institution, and the Department of Electrical and Mining Engineering offers engineering diplomas and degrees.

Design Project III is a capstone module that is offered in the National Diploma of Electrical Engineering. In this module, students use knowledge gained in previous modules to design and construct a complete electronic project. Due to the large number of students for Design Project III, UNISA makes use of external study leaders to give individual guidance to the students during this module. Study leaders are assigned to students based on their field of expertise about the individual student projects. Design Project III students that were assigned to the author were doing Arduino microcontroller based projects.

The final mark for Design Project III is derived as illustrated in Table 1. Assignments one to four are formative, and assignment five is summative. The first assignment is the study field definition, where the student outlines the intended field of study. This assignment is used to assign study leaders to individual students. The next assignment is a detailed project proposal. The study leader uses this second assignment to guide the student towards a project that is on the correct level regarding complexity, duration and components used. In assignment three, the student gives a detailed block diagram of the project hardware, as well as a flow diagram of the project software. By the time the student hands in assignment four, he or she must have a working prototype of the project on a breadboard. Part of this assignment is a YouTube video, where the student shows the working of the designed project. The final report consists of a complete portfolio of evidence that contains all the information regarding the design and construction of the project. It also contains a link to a YouTube video, where the student gives a short presentation from a poster that the student has compiled and also shows the working of the final project.

Table 1: Assignment contribution towards the year grade for Design Project III.

Assignment	Description of formative assessments	Contribution to the year grade
1	Study field definition	2%
2	Progress report 1 (project proposal)	4%
3	Progress report 2 (detailed block and flow diagram)	6%
4	Progress report 3 (video of a project that is working on a breadboard)	8%
5	Final report (completed portfolio of evidence with poster and video of the completed working project)	80%
Total		100%

METHOD

This case study involved the use of lecturing videos by the study leader for the module Design Project III at UNISA. The advantage of a case study is the depth to which it allows complex processes to be researched [13]. Quantitative and qualitative data were collected via a questionnaire at the end of 2018. The questionnaire was based on questionnaires used in previous research, and consisted of open and close-ended questions regarding lecturing videos that were given to the students before formative assessments. The relevant assignments are discussed in the context section and presented in Table 1.

At the start of the academic year, a WhatsApp group was formed, and students could join the group via a link that was provided in the learning management system. The student's first post, after he or she joined, had to contain the student's student number. The study leader then used the student number to name the contact on his phone. This enabled the study leader to identify the student and to send a private message to the specific student when necessary. The WhatsApp group were also used to communicate the link of the questionnaire regarding video lectures to the students.

Google forms were used to generate the questionnaire and to record the responses. Quantitative data were collected by the use of a 5-point Likert scale (strongly agree to disagree strongly). At the end of the questionnaire, there were also some open-ended questions, where qualitative data were collected. The anonymous questionnaire consisted of the following sections; namely, student demography, a method of Internet connectivity, advantages and challenges of

video lecturing, and open-ended questions. A total of 73 students responded to the questions that were posted at the end of 2018.

In the results section of this article, bar graphs are used to present quantitative data of the student's perceptions concerning lecturing videos. Qualitative data is presented in a table from where it was coupled with six thematic themes that were derived from the responses. Relationships and patterns can easily be identified in data by the use of thematic themes [14].

RESULTS AND DISCUSSION

Students responded to questions regarding demography, Internet connectivity, possible advantages and challenges using lecturing videos, and some open-ended questions are presented and discussed in this section. Of the students that responded 11% were female. This is in line with other research publications that state that there are more male than female students in engineering [15]. The age distribution of the students is represented in Figure 1. As can be expected for UNISA students that are mostly working only 6% were younger than 25 years, and 66% were 30 years and older.
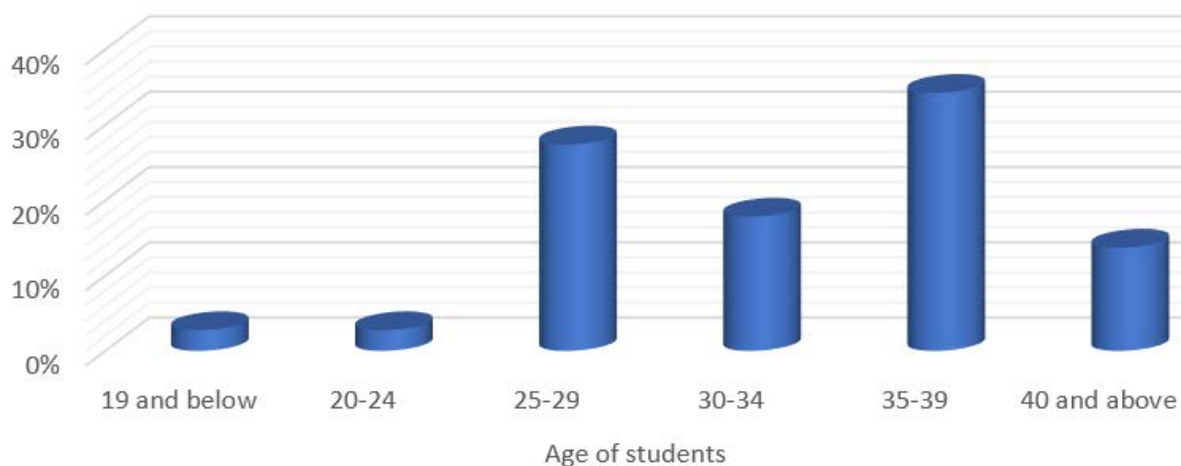

Figure 1: Age distribution of students.

A total of eight home languages were recorded amongst the students and are presented in Figure 2 with English (29%), Afrikaans (15%), Zulu (12%) and Xhosa (11%) being the most prominent. Although South Africa has 11 official languages, the medium of instruction at UNISA, and most other universities in South Africa, is English.
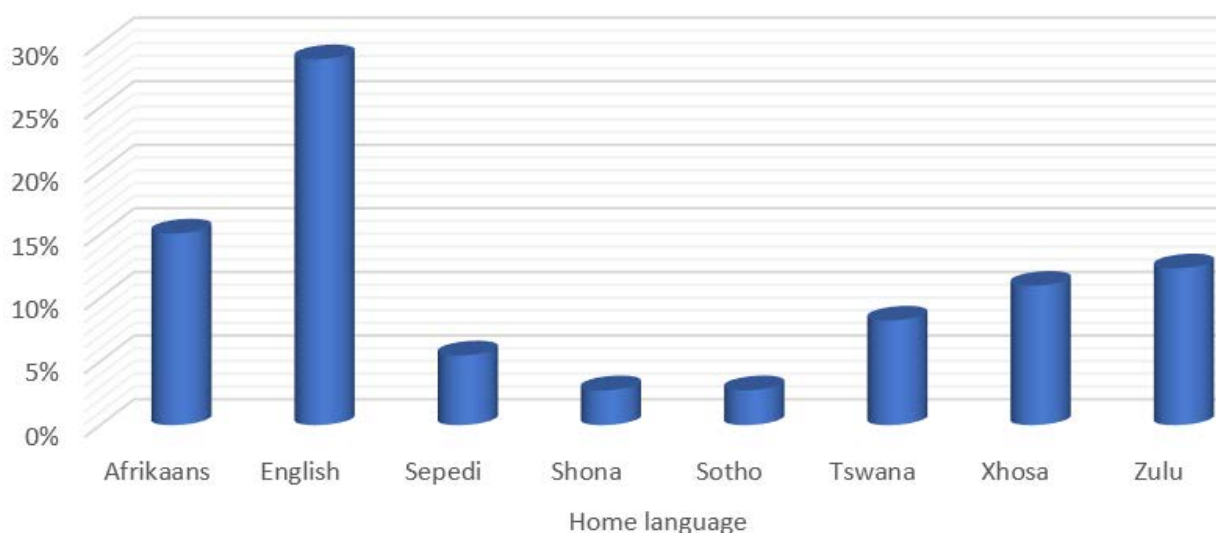

Figure 2: Student home languages.

The next section of the questionnaire was regarding the possible advantages of using YouTube videos as an educational tool for Design Project III. Student responses were positive, and they reported that after viewing the videos they could better understand what was expected of them in their next assignments (see Figure 3). Students also felt that the amount of information that was provided in the lecturing videos was sufficient, and that they could identify and avoid possible mistakes in their next assignment. These answers are an indication that the videos were relevant and helpful for the students, it also shows that the amount of information conveyed in the videos was enough.

Figure 3: Students perceptions of possible advantages of live streaming - part 1.

The study leader asked the students to pose any questions that they may have via the module's WhatsApp group before the video was made. During a relevant section in the video, the study leader responded to these questions received from the students. 87% (strongly agree and agree) of the students reported that the feedback on their questions was constructive and helpful, as shown in Figure 4. This can be an indication to the study leader that adequate time was allocated to the answering of student questions during the production of the videos. 96% of the students reported that they would like to receive future videos. This positive response may be an indication that they found the video helpful in their studies. 82% mentioned that the video was more personal than written instruction. With the lack of face-to-face communication in distant education institutions, any initiative that betters the communication and personal interaction between lecturer and student may have a positive effect on student satisfaction. Student satisfaction is a well-researched topic, and is linked to better student performance [16].
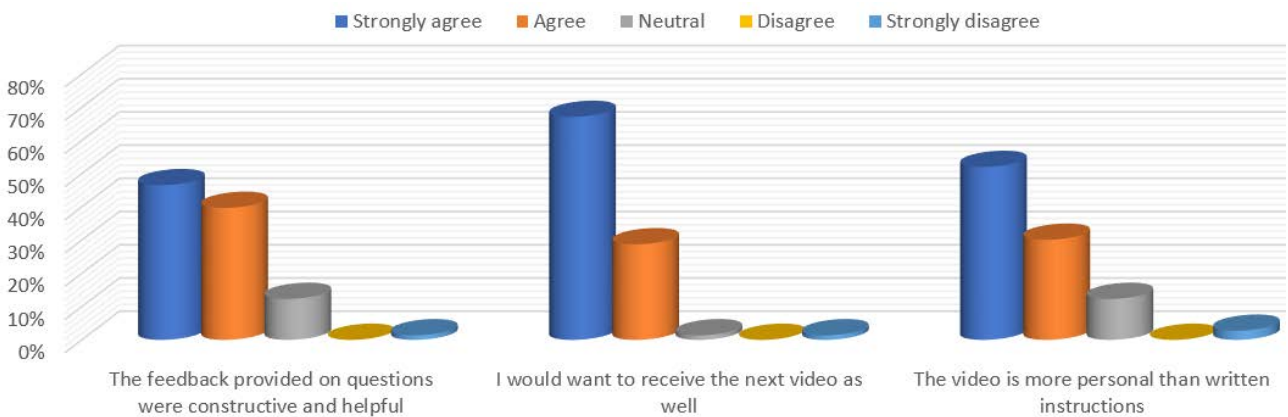

Figure 4: Students perceptions of possible advantages of live streaming - part 2.

Figure 5 shows that students felt that they get more from a video than from written instructions, and that they enjoyed the videos. Again, this response can be linked to student satisfaction as discussed earlier in this section. 96% indicated that the voice modulation helped them to grasp the intent behind the instructions, helping to enhance the effectiveness of the communication between the study leader and student [17].
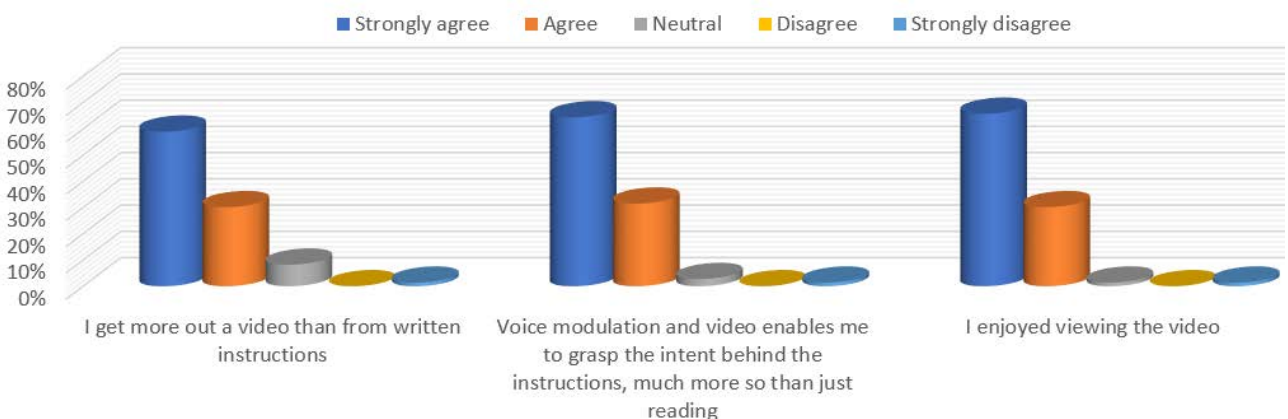

Figure 5: Students perceptions of possible advantages of live streaming - part 3.

In the next section of the questionnaire, questions regarding possible challenges were answered. In Figure 6, students responded that the videos were indeed time efficient, that they did not experience technical problems and that they were easy to access. Only 3% of the students said that the videos were not time efficient for them. The positive answers regarding the ease of access and lack of technical problems can be expected as the videos are posted on a mature and easy to access platform; namely, YouTube [18].
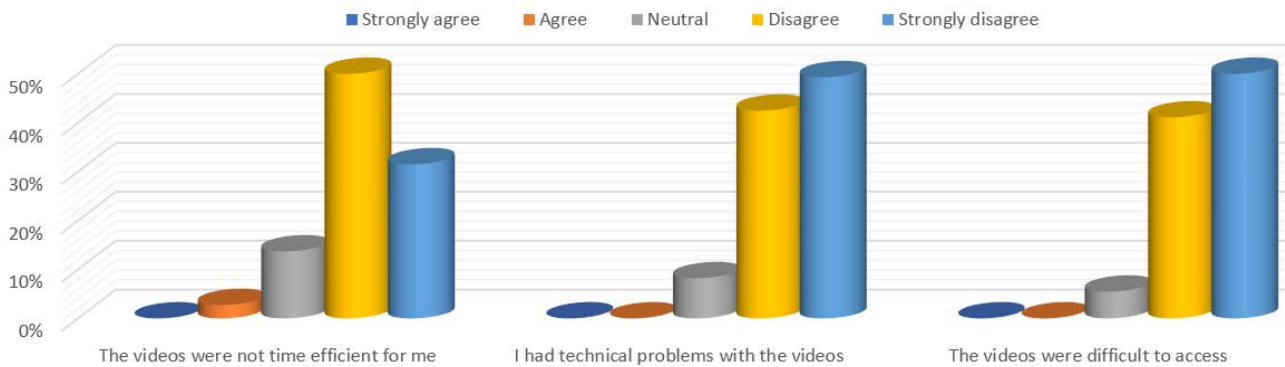

Figure 6: Students perceptions of possible challenges of live streaming - part 1.

As can be seen in Figure 7, Internet bandwidth (2%), the cost of data (10%) and WiFi availability (7%) were only a problem for a few students. This could be expected as most of the students are working, while studying part-time, having access to the Internet via the companies, where they are employed or having access to the Internet from home [19].
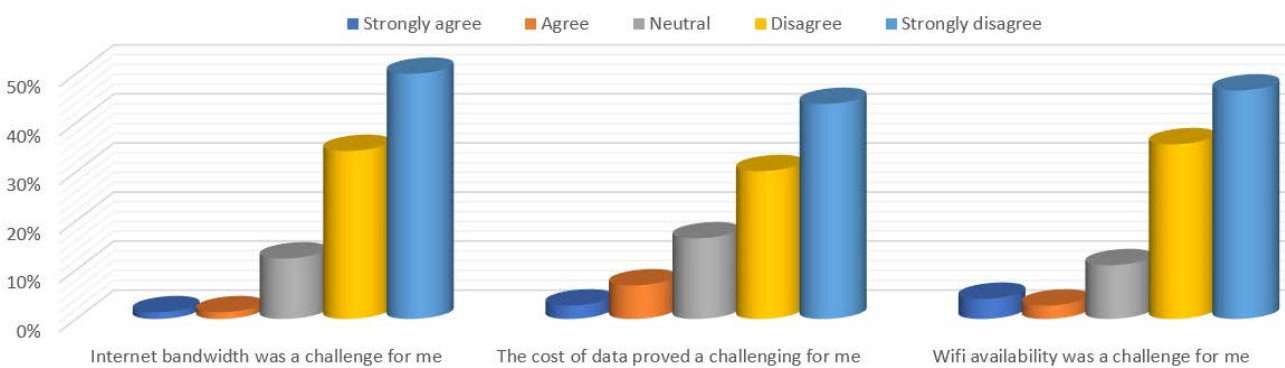

Figure 7: Students perceptions of possible challenges of live streaming - part 2.

The responses of the students regarding the open-ended questions are presented in Table 2. The overwhelming number of students had positive remarks regarding the video lectures. Students felt that the lecturing videos were informative (58%), helpful (40%) and enjoyable (18%) that it saved them time (3%), enhanced the communication (11%) and was overall a good learning experience (14%). Of the 73 students, two students made suggestions for the improvement of the system. One suggestion was that the videos must be shorter in duration, and the other suggestion was that the videos must be made available earlier in the year of study. The suggestion regarding the duration of the videos correlates well with the literature discussed in previous sections of this article, where it was found that it is beneficial for videos to be shorter [7]. These comments will be considered by the study leader for future implementation in the module.

Table 2: Thematic themes regarding videos.

Thematic themes	%	Unedited examples of student comments
Video lecturing was a good learning experience	14.0	Nice having the lecturer going over the assignment with you.
Video lecturing was enjoyable	18.0	It makes learning easy and feels like I am in the same room as my lecture.
Video lecturing led to better time utilisation	3.0	It was informative, and I could watch it when my schedule allowed.
Video lecturing was helpful	40.0	It was informative and beneficial.
Video lecturing was informative	58.0	Informative, the professor proactively answered questions I would have asked.
Video lecturing improved the communication in the module	11.0	Very efficient method of communication. Makes life less complicated.

CONCLUSIONS

The aim of this article was to highlight how video lecturing can be used to establish better communication and to present the perceptions of students regarding video lectures, which was made available in a design-based module; namely, Design Project III. Lecturing videos were recorded by the study leader and uploaded on the YouTube platform.

The link to the videos were communicated to the students via a WhatsApp group that was formed at the start of the year of study. The responses of the students were overwhelmingly positive regarding the video lectures. They reported that it positively enhanced the communication in the module that it was more valuable to them than written notes and that it was enjoyable. There was one comment that the videos could be shorter that correlates with literature and will be considered by the study leader in the production of future lecturing videos. A small percentage of the students reported difficulty regarding available bandwidth and the cost of data.

In this research, the audience of students positively judged the effectiveness of the videos used by the study leader. It is recommended that the study leader may continue to use video lecturing to the overall benefit of the students and the University.

REFERENCES

1. BrainyQuote. Lindsey Stirling Quotes at BrainyQuote.com (2001-2019), 10 November 2018, http://www. brainyquote.com/authors/lindsey_stirling
2. Radha, N., Video retrieval using speech and text in video. *Proc. Inter. Conf. on Inventive Computation Technologies,* 1-6 (2016).
3. Li, L. and Guo, R., A student-centered guest lecturing: a constructivism approach to promote student engagement. *J. of Instructional Pedagogies,* 15 (2015).
4. Zureick, A.H., Burk-Rafel, J., Purkiss, J.A. and Hortsch, M., The interrupted learner: how distractions during live and video lectures influence learning outcomes. *Anatomical Sciences Educ.,* 11, 366-376 (2018).
5. Guo, P.J., Kim, J. and Rubin, R., How video production affects student engagement: an empirical study of MOOC videos. *Proc.First ACM Conf. on Learning@Scale Conf.*, 41-50 (2014).
6. Brame, C.J., Effective Educational Videos. Vanderbilt University Center for Teaching (2015).
7. Gilboy, M.B., Heinerichs, S. and Pazzaglia, G., Enhancing student engagement using the flipped classroom. *J. of Nutrition Educ. and Behavior,* 47, 109-114 (2015).
8. Wu, S., Rizoiu, M.-A. and Xie, L., Beyond views: measuring and predicting engagement in online videos. *arXiv Preprint arXiv:1709.02541* (2017).
9. Kim, J., Guo, P.J., Cai, C.J., Li, S.-W.D., Gajos, K.Z. and Miller, R.C., Data-driven interaction techniques for improving navigation of educational videos. *Proc. 27th Annual ACM Symp. on User Interface Software and Technol.*, 563-572 (2014).
10. Boyraz, S. and Ocak, G., The implementation of flipped education into Turkish EFL teaching context. *J. of Language and Linguistic Studies,* 13, 426-439 (2017).
11. Dai, N.H.P., Van Thinh, D. and Zoltán, R., Learning attitude in XXI century. *Proc. IEEE 14th Inter. Symp. on Applied Machine Intelligence and Informatics*, 115-119 (2016).
12. Schlender, A.B. and Ahuja, A., Adaptive content delivery for online education. (Ed), Google Patents (2018).
13. Arbussa, A., Bikfalvi, A. and Marquès, P., Strategic agility-driven business model renewal: the case of an SME. *Manage. Decision,* 55, 271-293 (2017).
14. Whittemore, R. and Knafl, K., The integrative review: updated methodology. *J. of Advanced Nursing,* 52, 546-553 (2005).
15. Cheryan, S., Ziegler, S.A., Montoya, A.K. and Jiang, L., Why are some STEM fields more gender balanced than others? *Psychological Bulletin,* 143, 1 (2017).
16. Yilmaz, R., Exploring the role of e-learning readiness on student satisfaction and motivation in flipped classroom. *Computers in Human Behavior,* 70, 251-260 (2017).
17. Campbell-Whatley, G.D. and Rodriguez, D., English Learners: It's more than getting an Interpreter. In: *A School Leader's Guide to Implementing the Common Core*, Routledge, 85-97 (2016).
18. Nichols, J., Hux, A., Nichols, C., McBride, J. and Bradley, M.J., Out of sight, out of mind? Improving on-line instruction in educational leadership graduate courses through YouTube. *Proc. Inter. Confe. of the Society for Infor. Technol. & Teacher Educ.*, 886-891 (2018).
19. Balfour, R.J., Van der Walt, J.L., Spamer, E.J. and Tshivhase, A.C., Blended learning, and open and distance learning: implications for best practice in higher education: leading article. *Progressio,* 37, 1-18 (2015).