THE CONTRIBUTION OF LECTURE CAPTURING TO THE LEARNING EXPERIENCE OF ACCOUNTING STUDENTS

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－Abstract－

Lecture capturing is the term used for the recording of lecture time and making it available to students in digital format on the learning management system. Lecture capturing was introduced to enable all students to use the recorded videos of lectures for revision, or if the class was missed by a full time student and for part-time students to be able to watch all the full-time classes.The objective of this paper is to determine whether the lecture capturing videos contribute to the learning experience of the students in a mixed method teaching environment. A mixed method study over a period of two years was done between the pass rate of third year level accounting students per module and their lecture attendance, before and after (pre-/post-) the introduction of the lecture capturing. A correlation analysis was also performed to test the relationship between student performance and lecture attendance, and compared the relationship for any changes with the introduction of lecture capturing. Other contributing factors impacting the success of lecture capturing were also considered like the number of downloads of videos compared to the number of downloads of the flipped classroom videos. The results from this study indicated that students' lecture attendance and the pass rate dropped compared to the previous year, where no lecturer capturing took place. The correlation relationship strengthened between student performance and lecture attendance with the introduction of lecture capturing. Videos were relatively long and students generally struggled to find additional time in their normal schedule to watch videos of the entire lecture.

Keywords: *Accounting, Lecture capturing, Flipped classroom, Undergraduate studies, Class attendance*

JEL Classification: I23 Higher Education.

1. INTRODUCTION

Video has been used for teaching as long as film and video have existed (Danielson *et al.*, 2014:121). Lecture capturing is the term used to refer to the recording of lecture time and making it available to students in digital format on the learning management system (LMS). Lecture capturing videos were introduced to third year level accounting students to equip them with more content material that could be used to catch up on missed lectures, revisiting difficult content and revision at the end of the semester for summative assessment. Students also have the opportunity to use these videos to study at their own pace, watch a video more than once, pause and play back the video to understand a certain concept in detail. The increase of student numbers and the difficulty to find lecture venues that can accommodate large undergraduate classes contributed to the initiative to search for alternative resources available.

In the case of the North-West University, lecture capturing software is made available on the LMS, called eFundi, to lecturers that book a certain venue for the lecture to be recorded (North-West University, 2017b). The booking is made for a certain period on the timetable and duration of the class. The software provides a method to record a lecture using a fixed camera mounted at the back of the lecture venue. The lecturer's voice is recorded using a wireless microphone and the lecture venue's fixed sound system. The recording includes a video of the lecturer, as well as the actual presentation or calculations that was recorded during the actual lecture, using a document camera or overhead projector(North-West University, 2017b). The software is developed in-house and has an automated start and stop time with no option to pause a recording during the lecture. The lecture capturing video takes between 1-2 working days to be processed and released on the LMS system for the students. Students then have the opportunity to download the videos from the LMS system, either by only downloading the video of the lecturer presenting, or the actual presentation (i.e. MS PowerPoint slides) or the calculations that were recorded, or all three of the options at once (North-West University, 2017b). The option is available to students to select the frame size and the quality (size) of the download videos. There are three scheduled lectures with an average length of 80 minutes per lesson, which adds up to 240 minutes per week of captured lectures that is available for students to watch.

For purposes of this study, blended learning pedagogy was used, with lecture time being used for working through difficult questions and concepts and lecturers working together with the students to find solutions. Flipped learning was implemented by way that students were expected to watch a video based on the theory of the study unit in accounting before the lecture (Lubbe, 2016:65). Therefore, significant time was spent working through sample questions, doing group work and having discussions between lecturer and students. Lecture attendance increased from the time flipped learning was introduced in class (Lubbe, 2016:70). The introduction of lecture capturing videos were seen as an added benefit for students who missed class, for part-time students who struggle with the work tempo in lectures and could spend more time watching the lecture capturing videos.

The primary objective of this study is to determine whether lecture capturing contribute to the learning of accounting students in a mixed method teaching environment. The secondary study objectives are:

- To determine whether the introduction of lecture capturing have an effect on lecture attendance and student performance;

- To conclude whether there is a correlation between physical lecture attendance, participation marks and examination marks; and

- Compare the number of times students downloaded the lecture capturing videos with flipped classroom videos.

2. BACKGROUND

Teaching methods have moved from the traditional classroom to a blended learning approach and students have become more digitally skilled (Aldamen *et al.*, 2015:294). Students have generally evolved into active learners and users of educational resources, therefore changing higher education as we know it (Duderstadt, 2001:55). Higher education institutions only recently started using lecture capturing software and making the videos available to students, especially for large undergraduate classes (Owston *et al.*, 2011:262). The accounting lecture's teaching method has also evolved from the traditional face-to-face method to incorporating video technologies (Holtzblatt & Tschakert, 2011:100).

From an extensive literature review it is evident that lecture capturing has received positive feedback. Students generally believe having access to lecture capturing videos improves their learning (Holbrook & Dupont, 2011:242).

Medical students felt they could study according to their preferred approach and liked the scheduling flexibility that lecture capturing entailed (Cardall *et al.*, 2008:1176). Pharmaceutical students preferred the self-directed learning that lecture capturing offered (Franklin *et al.*, 2011:22). Lecture capturing has shown favourable results in financial accounting in the past (Taplin *et al.*, 2011:186). According to Danielson *et al.* (2014:122) it enables students who study in their second language to slow down and repeat difficult content.

In more recent studies, students concluded that an advantage of the traditional classroom is listening, asking questions and sitting in lecture rooms with fellow students (Bosshardt & Chiang, 2016:1024). Aldamen *et al.* (2015:312) and Karnad (2013:2) reason that lecture capturing is not a substitute for class attendance and students miss these benefits if class attendance drops. Some of the challenges of lecture capturing is the use of low cost technology without the benefit of tracking the effectiveness of the approach (Brooks *et al.*, 2014:282).

3. RESEARCH DESIGN AND METHOD

A mixed method research approach was followed by conducting a literature review, followed by quantitative data collection over a two year period (four semesters) from 2015 to 2016, at the North-West University, Vaal Triangle Campus, in order to determine whether lecture capturing in general contributes to the learning of students in a blended-learning teaching environment. The research was divided into two semester modules per year. ACCF311 was the module code for the first semester and ACCF321 was the module code for the second semester.

3.1. Target population

The target population consisted of data collected from the 1st semester in 2015 to the 2nd semester in 2016 between 130 and 180 third year level accounting students' registered per semester for the four modules over the two years. Students were enrolled for two semesters per academic year. Students were divided into 1st semester 2015 (ACCF311), 2nd semester 2015 (ACCF321), 1st semester 2016 (ACCF311) and 2nd semester 2016 (ACCF321). All the students registered for these modules were included in the testing. Lecture capturing was introduced from the 2nd semester of 2015 to students for three semesters. Students were categorised into two groups in one semester, 1st semester 2015 (ACCF311), without the use of lecture capturing and then three semesters with the use of lecture capturing.

It should be noted that the students were taught over the two years by the same lecturers, using the same learning pedagogy, given virtually the same content material, study material and assessed on the same study outcomes across the two academic years, the only variable was the introduction of lecture capturing in 2015. The students enrolled for the first and second semester module were constant per year but differs between the two academic years.

Participation marks for students are assessed during the semester on their average summative assessments. No mark for lecture attendance is included in the calculation of the participation mark (North-West University, 2017a). Students should attain a participation mark of more than 40% to gain entry into the final examination (North-West University, 2017a). Final marks are calculated using the average between the participation mark and examination mark (North-West University, 2017a). Students have to obtain a final mark of more than 40% for their first semester module (ACCF311) to continue with the second semester module (ACCF321) (North-West University, 2017a). Students successfully completed the module if a final mark of 50% and more was obtained (North-West University, 2017a).

The 2nd semester 2016, student strikes (i.e. #FeesMustFall) halted classes for two weeks and lectures were forced to evaluate students using different assessments methods, due to the availability of lecture venues (SABC News, 2016). Therefor the assessment marks and lecture attendance per student of this semester, is not comparable to the other semesters in this study, but was included for completeness of this study selected.

3.2. Measuring instruments

The following data was collected: the participation mark per student, examination mark per student, final mark per student and average lecture attendance per student. The data was captured on an Excel spreadsheets. The pass rates, for students who successfully completed the module, was calculated using two methods; the percentage of the total enrolled students ('Enrolled') and the percentage of students meeting the minimum requirements to write the final examination ('Exam written'). The pass rates per module and average lecture attendance were analysed and compared using Excel over the four semesters.

The Pearson product-moment correlation coefficient (r) was calculated using the Statistical Package for the Social Sciences (SPSS – Version 24). The correlation coefficient (r) was used to measure the relationship between the continuous

variables: the students' participation mark, examination mark and average lecture attendance per student per semester. The Pearson correlation calculated between variables was also compared per semester over the two years. The relationship strength was determined within a range of -1 to +1, the size of the absolute value is an indication of the strength.

The number of downloads per video for lecture capturing videos and flipped learning videos were tracked using the LMS and the lecture capturing software. The number of downloads were compared between lecture capturing and flipped classroom, to identify if students have a preference to which videos to watch.

4. FINDINGS AND DISCUSSION

4.1. Pass rates and lecture attendance

The pass rates were compared, to determine whether there was a change due to the introduction of lecture capturing during the 2nd semester 2015. Figure 1 indicates the pass rate of students per module for the four semesters that successfully completed the modules, using the two methods ('Exam written' and 'Enrolled') of calculations. .

**Figure 1: Pass rate per semester module**
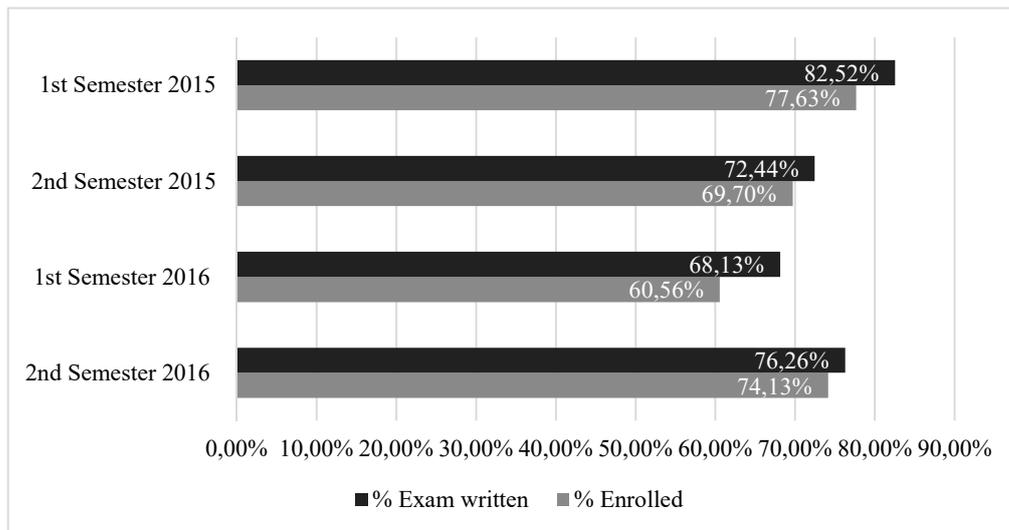
Source: NWU 2015 and 2016

There is a definite decline in the pass rates for the three semesters that the lecture capturing were used The pass rate for the 1st semester in 2015 compared to 2016, shows a decline of 14.39% for students that wrote the final examinations and a decline of 17.07% for students that were enrolled for the semester module with the inclusion of the lecture capturing. The sharp decline in the pass rate was contributed by students that did not comply with the minimum requirements of their participation mark to write the examinations.

It can also be noted that the 11% of the students enrolled for the module in the 1st semester in 2016, which did not meet the minimum requirements, could not continue with the 2nd semester in 2016. Even though, not taking into consideration the continuation factor, the pass rate is still lower with 3.62% for the 2nd semester 2016 compared to the 1st semester. The pass rates of 2nd semester 2016 students that lecture capturing was used, is not comparable. The students were assessed differently than the other three semesters, due to the lack of venues, as a result of the ongoing strikes for fees must fall in that semester.

Figure 2 compare lecture attendance for one semester (1st semester 2015) before lecture capturing was introduce with the mentioned semesters after the introduction of lecture capturing.

Figure 2: Average lecture attendance rate per semester
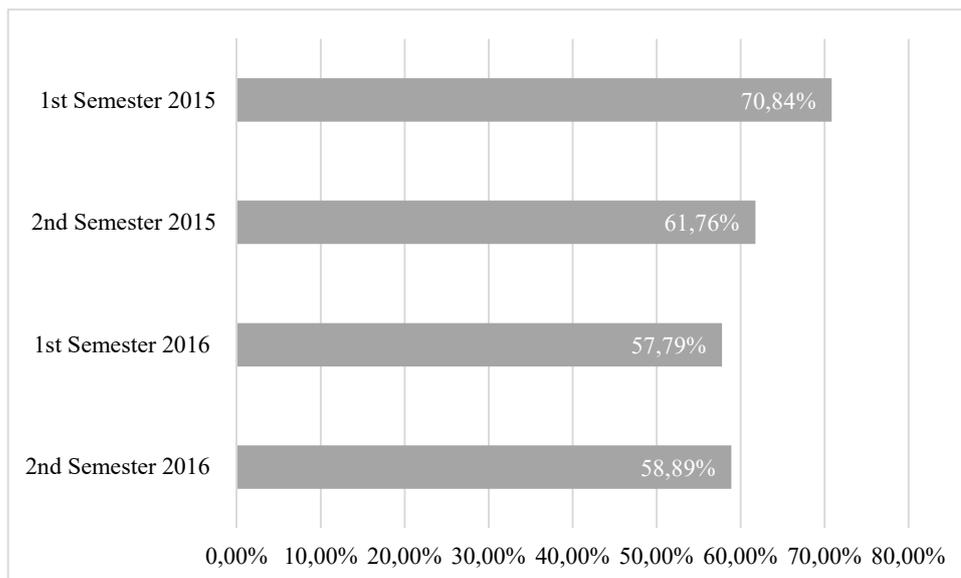
Source: NWU 2015 and 2016

Figure 2 reveal that the average lecture attendance rate by students dropped by 11% over the three semesters with the introduction of the lecture capturing during the 2nd semester in 2015. The average lecture attendance per student in the 1st semester 2015 without lecture capturing was 70.84% and with the lecture capturing it decreased to an average of 60% over the three semesters.

Students' performance and lecture attendance dropped with the inclusion of the lecture capturing for the three semester compared to the 1st semester in 2015. The relationship between the students' performance, specifically their participation mark, examination mark and their lecture attendance was tested for change with the lecture capturing.

4.2. Correlation analysis

The correlation analysis explains the relationship between the chosen variables; the participation mark, the exam mark and the attendance per students. The analysis was done per semester to compare the changes with the inclusion of lecture capturing and the correlation between the variables is explained in Table 1 to Table 4 for each of the four semesters.

Table 1 is an indication of the correlation between the participation mark, examination mark and the lecture attendance of the students for the 1st semester 2015 with no lecture capturing used.

Table 1: Correlations 1ˢᵗ Semester (2015) and Lecture Attendance

		Participation Mark	Examination Mark	Lecture Attendance
Participation Mark	Pearson Correlation	1	.764**	.385**
	Sig. (2-tailed)		.000	.000
	N	148	148	148
Examination Mark	Pearson Correlation	.764**	1	.320**
	Sig. (2-tailed)	.000		.000
	N	148	148	148
Lecture Attendance	Pearson Correlation	.385**	.320**	1
	Sig. (2-tailed)	.000	.000	
	N	148	148	148

**. Correlation is significant at the 0.01 level (2-tailed).

Source: NWU 2015

Indicative of Table 1 is a weak linear positive correlation exists between lecture attendance and the participation mark, $r=0.385$, $n=148$, $p<0.001$. There is a significant effect on the participation mark of students with their lecture attendance.

Table 2 compare the same variables for the 2ⁿᵈ semester 2015 with the introduction of lecture capturing.

Table 2: Correlations 2nd Semester (2015) and Lecture Attendance

		Participation Mark	Examination Mark	Lecture Attendance
Participation Mark	Pearson Correlation	1	.785**	.514**
	Sig. (2-tailed)		.000	.000
	N	130	130	130
Examination Mark	Pearson Correlation	.785**	1	.364**
	Sig. (2-tailed)	.000		.000
	N	130	130	130
Lecture Attendance	Pearson Correlation	.514**	.364**	1
	Sig. (2-tailed)	.000	.000	
	N	130	130	130

**. Correlation is significant at the 0.01 level (2-tailed).

Source: NWU 2015

There was a moderate linear positive correlation between lecture attendance and the participation mark, r=0.514, n=130, p<0.001, but a significant effect on the participation mark of students with their lecture attendance. The correlation between lecture attendance and the participation mark increased with the introduction of the lecture capturing in the 2nd semester of 2015 (Table 1), where r increased with 0.129.

Table 3 shows the correlation between the participation mark of the students, examination mark and the lecture attendance of the students for the 1st semester of 2016 where lecture capturing was used.

Table 3: Correlations 1st Semester (2016) and Lecture Attendance

		Participation Mark	Examination Mark	Lecture Attendance
Participation Mark	Pearson Correlation	1	.729**	.525**
	Sig. (2-tailed)		.000	.000
	N	180	180	180
Examination Mark	Pearson Correlation	.729**	1	.453**
	Sig. (2-tailed)	.000		.000

	N	180	180	180
Lecture Attendance	Pearson Correlation	.525**	.453**	1
	Sig. (2-tailed)	.000	.000	
	N	180	180	180

**. Correlation is significant at the 0.01 level (2-tailed).

Source: NWU 2016

As outlined in Table 3 there was a moderate linear positive correlation between lecture attendance and the participation mark, r=0.525, n=180, p<0.001, with a significant effect on the participation mark of students with their lecture attendance. The correlation between lecture attendance and the participation mark remained constant with the correlation in the 2nd semester of 2015 (Table 2).

Lastly, table 4 present the data for the chosen variables for the last semester compared (2nd semester 2016).

Table 4: Correlations 2nd Semester (2016) and Lecture Attendance

		Participation Mark	Examination Mark	Lecture Attendance
Participation Mark	Pearson Correlation	1	.472**	.442**
	Sig. (2-tailed)		.000	.000
	N	138	138	138
Examination Mark	Pearson Correlation	.472**	1	.219**
	Sig. (2-tailed)	.000		.010
	N	138	138	138
Lecture Attendance	Pearson Correlation	.442**	.219**	1
	Sig. (2-tailed)	.000	.010	
	N	138	138	138

**. Correlation is significant at the 0.01 level (2-tailed).

Source: NWU 2016

There was a weak linear positive correlation between lecture attendance and the participation mark, r=0.442, n=138, p<0.001. There is a significant effect on the participation mark of students with their lecture attendance. The correlation

between lecture attendance and the participation mark decreased with the student strikes and the interruption of lectures (SABC News, 2016). Lectures could not continue as normal and the correlation indicates a decrease from 2nd semester 2015 (Table 2) and the 1st semester 2016 (Table 3).

There was a positive linear relationship between lecture attendance and participation marks for the two semesters, namely 2nd semester and 1st semester 2016. The relationship between participation marks and the lecture attendance of students increased with the introduction of the lecture capturing (Table 2 and 3). The last semester (Table 4), the correlation decreased due to the ongoing strikes.

4.3. Downloads of videos

On average, 30 lecture capturing videos were made between the three semesters, 80 minute videos per semester for the three semesters tested. The average number of downloads per video was 35 downloads per semester. This is an indication that the lecture capturing videos was only downloaded by 23% of the enrolled students. The average number of downloads per video made for the flipped classroom, was 15 minutes, was 155 downloads per semester. Therefor 100% of the average class downloaded the flipped classroom video.

5. CONCLUSION

Student performance evaluated by the pass rates and lecture attendance of students dropped with the introduction of the lecture capturing. The decline in average lecture attendance percentage indicates that students felt that they could manage their time better and missed lecture classes as they had the opportunity to watch the videos at a later stage.

The relationship between lecture attendance and the participation mark of students increased with the use of lecture capturing. The benefits of attending lectures, reflected in the students' participation mark and therefor in their final mark. It can be concluded that there is still valuable lessons that can be learned by being in class, from the lecturer, fellow students attending the class and being able to ask questions.

The flipped classroom model depends on students attending lectures and with the introduction of lecture capturing the class attendance dropped. The two methods used were therefor contradicting to another. Students definitely preferred to watch the shorter flipped classroom videos compared to the longer lecture capturing videos as evident from the average number of downloads per class.

Although lecture capturing can be helpful tool, in the revision of difficult concepts and in the cases where classes were missed for valid reasons. Students did not take into account the extra time needed to watch the videos, with their normal workload and studying for tests. If the students were in class, they could just forward the video to the difficult concept explained in class and watch it again. Students that missed the lecture had to watch the full video of 80 minutes.

Some limitations of the software used for the lecture capturing meant that no tracking could be done on the number of downloads per lecture capturing video and the 2nd semester 2016 strikes (i.e. #FeesMustFall). The interruption of lectures meant the data could not be analysed in the same manner as the other semesters.

This study was limited to only analyse exit level accounting semester modules and can also be duplicated for other levels of accountings students or for other subjects within the field of study. Future research can also be done on the time management of students and the effective use of lecture capturing videos. Further research should also be done on guidance given to students on how to use lecture capturing effectively, while still attending classes. Students should be guided to see these videos as an added benefit in the learning experience and not a replacement for class attendance.

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