



COMMONWEALTH *of* LEARNING

Impact of Open Textbook Adoption at Antigua State College

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St. John's, Antigua and Barbuda



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Abstract

The purpose of this case study was to explore how the adoption of OER in the CAPE Entrepreneurship course was perceived and analyse its actual and potential impact at Antigua State College (ASC). Specifically, the research questions focused on resource costs, learning outcomes, and the use and perception of resources, guided by the COUP framework (Bliss, Robinson, Hilton, & Wiley, 2013). The participants comprised 20 first-year students and three faculty members, including the course instructor and two administrators. Data were collected using a variety of methods which supported content and descriptive analyses. The main findings were: (i) the use of an open textbook resulted in a modest savings of ECD 64.5 per student, with implications for savings of up to ECD 704 per student per year; (ii) the students who used the open textbook materials along with the traditional textbook performed significantly better than the previous cohort, who had used the traditional textbook only, showing an approximately 5.5% increase in their scores; and (iii) students perceived the main benefits of the open textbook to be cost effectiveness, accessibility, portability and relevance of information, and the main hindrances to be navigation from page to page or section to section of the open textbook, and concerns about format and personal physical factors. The research results show the significant value of adopting OER in ASC, which could potentially help save learners a total of up to ECD 904,640 per year. It also recommends that open textbook adoption may be further strengthened by using systematic design and guidelines. Further research may also be conducted to compare performance in the CAPE Entrepreneurship course between the 2015–2017 and 2016–2018 cohorts.

Introduction

UNESCO (2002) has defined open educational resources (OER) as “the open provision of educational resources, enabled by information and communication technologies, for consultation, use and adaptation by a community of users for non-commercial purposes” (p. 24). These include artefacts that are either available in the public domain or with an open licence for cost-free use, remixing and distribution, such as textbooks, audio files, videos and animations, lectures, projects and curricula. OER are generously shared (Wiley, 2010) primarily via online sources; as reiterated by Butcher (2015), there is no need to pay royalties or licensing fees.

The growing interest in OER over the past 15 years has been supported by several studies which outline OER’s importance, quality, and effects on cost and institutional culture (Bliss, Hilton, Wiley, & Thanos, 2013; Cox, 2016; Cronin, 2016; Wiley, 2013). The “opening” of resources by the Massachusetts Institute of Technology (MIT) in 2001 prompted similar action by other “world-renowned” universities (Kurelovic, 2016), who began freely sharing “knowledge and digital teaching, learning and research materials” (p. 136). Thus, the number of OER users has been growing (Hylén, n.d.). Over time, institutions, especially higher education institutions, have been exploring open education as a way of reducing costs while improving on related teaching and learning practices or ‘open pedagogy’ (Walji, 2016; Wiley, 2013).

One underpinning goal of OER is to provide more equitable access to educational opportunities. Cognisant of this, in 2015 the Antigua and Barbuda’s Ministry of Education, Science and Technology (MOEST) started a conversation with the Commonwealth of Learning (COL) during an Open Educational Resources Textbook Forum, which initiated a whole new outlook on the value of OER. MOEST with support from COL started developing open textbooks. The first intervention of this kind was undertaken at Antigua State College (ASC) in 2016 with the introduction of Entrepreneurship open textbook materials at the Caribbean Advanced Proficiency Examination (CAPE) level.

Context

COL has supported the development and implementation of an ICT in Education Policy in Antigua and Barbuda. In 2015–2016, MOEST with COL’s support developed as OER a course on entrepreneurship. The course is at the CAPE level of the Caribbean Examinations Council (CXC) and is being used by 20 first-year students and their instructor at ASC in Antigua and Barbuda.

ASC is a community college serving students in six post-secondary departments: teacher education, engineering and construction, business, nursing, pharmacy and A-levels. The teaching faculty numbers approximately 285 (full-time and part-time), with approximately 1,285 students. Students also take undergraduate courses supported by the University of the West Indies. The focus of this research is the Department of A-Levels, where students prepare for the CAPE. Entrepreneurship is one such course. The department has approximately 52 instructors (full-time and part-time) and 467 students.

The course provides a solid foundation for further studies in entrepreneurship and preparation for CAPE. Individuals starting and operating a venture and/or becoming an entrepreneurial employee (intrapreneur) can utilise the acquired knowledge and understanding of the entrepreneurial process to create sustainable ventures (entrepreneurship theory). Therefore, opening access to this entrepreneurship material should benefit students and instructors in a variety of ways.

The objective of this research project is to evaluate the cost-effectiveness, use, learning outcomes and perception of the quality of OER amongst the 2016–2017 cohort of students pursuing the Entrepreneurship course and amongst the faculty (administrators and course instructor).

Purpose of the Research

The main purpose of this research is to explore how the adoption of OER in the CAPE Entrepreneurship course is perceived and compare the effects when matched against other delivery practices. Evaluating the cost-effectiveness of the project will incorporate examining the overall quality of the project design, including the worthiness of the programme. This is the first cohort of students using the OER (open textbook) materials. The findings of the research should provide information for improving the administration, planning and delivery of the course, and for managing future OER initiatives and greater institution-wide adoption.

The research focused on reporting the following:

The main question was: How does the cost of implementing the Entrepreneurship programme using OER materials compare with the benefits it provides?

The research questions and sub-questions addressed were:

1. How much money was saved by adopting OER?
2. How did students' grades differ when they used OER and traditional textbook(s) versus traditional textbook(s) only? Was there any improvement in student learning outcomes?
3. How did students use and perceive the quality of OER?
 - a. What benefits/successes, if any, did the students derive from the course?
 - b. What problems/challenges, if any, did they experience?
4. What differences are there between the perspectives of the administrators and the instructor?

During the first semester, September to December 2016, 22 students registered for the Entrepreneurship first-year class; however, only 20 students actually took the course and used the entrepreneurship open textbook over two semesters. Students and their instructor responded to student and teacher surveys; these were adaptations of Bliss, Robinson, Hilton and Wiley (2013) and Jhangiani, Dastur, Le Grand and Penner (2016).

In the second semester, a survey was administered to four administrative staff members. Observations of a lecture and tutorial were made, and a focus group session was conducted with seven students. The data from the Student Activity Log were also accessed.

Theoretical Framework

The COUP framework (Bliss et al., 2013) guided the development and implementation of the research. The COUP framework (Cost, Outcome, Use, Perceptions) encompasses the impact on cost, impact on outcomes, use patterns, and perceptions of quality of OER. The foundational research by Bliss et al. (2013) amongst faculty and students at eight community colleges across the United States has triggered much interest in understanding the various effects of the growing implementation of OER. The present case-study approach was also useful to help answer the research questions using the surveys of ASC's students and faculty.

Cost of Resources

Several other alternatives to the traditional textbook system have emerged — for example, e-books and e-readers — but none has had the impact on the cost to the learner as the open textbook option (Allen, 2010). Allen noted that although e-alternatives are less costly, “open textbooks can reduce the cost for all students and have the potential for long-term sustainability” (p. 5). The author calculated a summary of annual savings for an open textbook to be 80% when compared to e-books (eight per cent), e-readers (one per cent) and rentals (33%). One underlying factor supporting this result was the higher level of interest in open textbooks; noticeably, when combined, the alternative competition to open textbooks does not have a comparable effect of lowering the cost of learning.

In one study comparing a traditional chemistry textbook to an open textbook alternative, Allen et al. (2015) concluded that ChemWiki is a viable, cost-saving alternative to traditional textbooks. Pawlyshyn, Braddlee, Casper, and Miller (2013) brought to light the Project Kaleidoscope Open Course Initiative (KOCI), wherein the focus was on collaborations amongst educators across institutions to develop materials with an open licence by applying the four Rs: reuse, revise, remix, redistribute. One goal of the initiative was to reduce textbook cost. Post-pilot assessment of the mathematics implementation revealed that in Phase 1, in the first year, there were savings of USD 125,000. This was achieved just by replacing one costly math textbook with the KOCI (OER) materials in an algebra course. OER are therefore an affordable option, reducing the gap between “the haves and have nots” (Kurelovic, 2016) because materials are accessible at low or no cost (Butcher, 2015).

Outcomes

The success of the MIT Open Courseware Model cannot be overlooked. According to EDUCAUSE (2010), MIT highlights that “teaching, learning and research are improved when educational resources are more open and more accessible.” Research by Allen et

al. (2015) found that the performance of students using the open textbook materials at ChemWiki was not inferior to the performance of those who read from the traditional text. This is evidence of similar outcomes using the two formats. It also highlights that with the input of faculty, successful models can be used to cut the cost of learning by as much as 50% when using an open textbook (Wiley et al., 2012). The results from the surveys also suggest that the two classes were similar in their beliefs about the subject and the minimal overall study time. Further, the openness and low cost supported editing and tailoring of the available material to meet teaching and learning needs. The focus in OER use should be not just on high quality but also on effectiveness (Wiley, 2016).

Application of KOCI OER modules in literacy and mathematics at Mercy College also highlights another achievement: improved retention of diverse learners (Pawlyshyn et al., 2013). In literacy, there were higher assessment scores (5.73/8) after the use of KOCI OER than after the use of non-KOCI materials (4.99/8). Students also showed improvement in performance tasks. The mathematics pass rate also increased as a result of using KOCI materials, rising from 48.4 to 68.9%. Thus, overall there were greater gains in scores and a reduction in course failures.

Use of Resources

Student and teachers are free to reuse, remix, revise and redistribute copyrighted materials distributed under an open licence (Moore & Butcher, 2016). “The permission enabled in an OER . . . enable[s] free access . . . [and] potentially opens up . . . possibilities around both the use of the content . . . and the teaching and learning practices” (Walji, 2016). This blogger was quoting Wiley, who referred to these uses as “open pedagogy.” Allen (2010) shared the concern of one faculty member, who had noted that more students were forgoing the purchase of textbooks and benefiting from the huge savings which resulted when he switched to open textbooks. In support, one of the key findings by Donaldson and Shen (2016) was that the high cost of traditional books had had a negative impact on student “access, success and completion” (p. 5); they also highlighted the financial waste connected to lack of use when students purchase books but fail to use them to supplement instruction.

Although OER add variety in the classroom (Hilton, Gaudet, Clark, Robinson, & Wiley, 2013), and there are data to show learner improvement, there must be good educators as well as “high quality . . . [and] need-targeted” content to support the process (Butcher, 2015). Hilton’s (2016) review of a number of studies on the efficacy and perception of OER and on college textbook choice cited cases which concluded that only a small percentage of faculty are familiar with or aware of OER (Allen & Seaman, 2014; Morris-Babb & Henderson, 2012). Allen and Seaman (2014) emphasised the role of faculty awareness coupled with assurance about the effectiveness and quality of open textbooks in the quest to replace commercial texts.

Perception of the Quality of Open Textbook Resources

Bliss et al. (2013) reported that overwhelmingly, teachers (89%) and students (94%) perceived OER materials to be as good as or better than traditional materials. Notably, the most negative responses (11%, 6%) were attributed to technology issues and text quality, with reference to images, text overload and typos or grammatical issues. Accessibility appeared to be the clincher for some students (25%). This factor could reduce the instances of students being unable to or refusing to purchase books readily at the start of the school semester, a phenomenon which can hamper their grades and even prevent them from completing the course (Donaldson & Shen, 2016).

Research (Hilton et al., 2013) amongst a sample of teachers and faculty at a community college in Utah revealed more positive than negative views of the use of the open textbook materials in mathematics. Based on the data, out of 18 faculty members, only a few were not pleased with the materials' quality (three) or adequacy to support learning inside and outside the classroom (two). College students also lauded the "free and better" option due to OER's accessibility, cost and quality (Hilton et al., 2013; Pawlyshyn et al., 2013). Rowell (2015) conducted a survey amongst a sample of students at a two-year community college who were enrolled in OER-only courses. The results revealed that the students were motivated to learn. However, they had only a slightly positive view regarding the quality of OER. Rowell suggested this perception could be attributable to indecision because the students had little or no previous experience with OER.

Teachers must be encouraged to package their courses, individually or collaboratively. Some critics point out that, over the years, designers have produced ineffective content, and sometimes it is a challenge to judge OER quality when there seems to be excess availability of the same type of materials. Hardware glitches can also hamper accessibility and ease of use (EDUCAUSE, 2010). Pawlyshyn et al. (2013) in their work at Mercy College outlined a process to design and create quality material. It was not a one-size-fits-all situation; collaboration amongst faculty was necessary, and they worked in a professional learning community to address the varying needs of the students.

The following factors (Butcher, 2015; EDUCAUSE, 2010; Hilton et al., 2013) are important for supporting the use of OER:

- buy-in from staff members;
- understanding of OER;
- time for creating and updating materials;
- adequate, sustainable funding; and
- reliable Internet services and software.

Thus, taking cognisance of the preceding factors could lessen the challenge when developing high-quality resource materials.

Summary

The research presented above bears evidence of the short- and long-term effects of implementing OER in higher education institutions (EDUCAUSE, 2010; Pawlyshyn et al., 2013). Firstly, cost-saving through using open textbooks can be significant and sustainable when compared to using traditional textbooks or other e-alternatives. Secondly, student performance shows improvement from their first exposure to OER, with or without traditional materials, highlighting the benefits for students of varied abilities in different subject areas (Allen et al., 2015; Wiley, 2016). Thirdly, the use of OER is encouraging, mainly because the materials are easily accessible and cost-effective (Bliss et al., 2013). Fourthly, faculty and students strongly support the adequacy of OER inside and outside the classroom for improving teaching and learning. Undoubtedly, administrators and instructors must be willing to lead the change and understand that in this era, they must create their materials and circulate them to students while using the opportunity to “reuse, remix, revise and redistribute” OER within and across institutions (Butcher, 2015; EDUCAUSE, 2010).

ASC has adopted OER materials in just one course, the CAPE Entrepreneurship course. Conducting this research at ASC should: (i) provide information to create awareness of the possible benefits and challenges and the role of administration in similar innovations; and (ii) provide recommendations to guide the introduction and management of courses using OER, and to incorporate the skills of faculty in the development of OER materials.

Research Methodology

Instruments

Data were collected via the following methods.

The Sample Student Questionnaire adapted from Bliss et al. (2013) and from Jhangiani et al. (2016). The student questionnaire comprised 39 questions, twelve of which were taken from the Bliss et al. (2013) student questionnaire and the additional 27 from the Jhangiani et al. (2016) questionnaire. The teacher questionnaire was adapted from the Bliss et al.'s (2013) faculty questionnaire, while some of the questions were developed by the researchers. The following instruments were also developed to obtain supporting information: Observation Schedule; Student Focus Group Interview Schedule; and Administrator's Questionnaire. Data were collected from the Student Activity Log regarding their access to the entrepreneurship open textbook.

Participants

The participants were selected by purposive sampling. The sample included:

- 20 first-year CAPE Entrepreneurship students, comprising six males and 14 females, ages ranging from 17 to 19, who responded to the Open Educational Resource Student Questionnaire. Further sampling enabled five females and two

males to participate in the focus group interview.

- The course instructor.
- Four administrators: Principal, Vice Principal, IT Department Head and A-Levels Department Head.

Data Collection Procedures

The Open Educational Resource Student Questionnaire was administered on 23 November 2016 in the lecture room, located on the lower level of the Science Block. The Teacher Questionnaire was administered to the instructor simultaneously. The Administrator's Questionnaire was conducted via email (with three participants) and face-to-face (with one participant) from February to March. Only two administrators responded – one face-to-face and one via email.

Two observations were conducted during February – one lecture and one tutorial – in addition to the focus group interview with seven student volunteers. The instructor's grade book was also examined to obtain students' scores on the six assessments which had been administered to two cohorts of students between 2015 and 2017. The Student Activity Log was examined to determine the frequency of students' access to the open textbook.

Data Analyses

Descriptive statistics were used to present all closed-ended survey items and the data from the Student Activity Log. For cost estimates, since ranges were used, the mid-interval value was calculated for each range to estimate the cost. When the last option in an item did not have an upper value, an assumption was made that the class size was the same as for the other ranges, and an upper limit was assigned.

Content analyses were used to analyse open-ended data from the questionnaires as well as the focus group session. From the instructor's mark book, nine assessments were identified for both the 2015–2016 cohort, which used the traditional textbook only, and the 2016–2017 cohort, which used the open textbook in addition to the traditional textbook. However, only six pairs of internal assessments were similar in nature, according to the course module. These assessments were: (i) Theorist Essay, (ii) Entrepreneurial Challenges Essay, (iii) Midterm Test, (iv) Oral Presentation, (v) Test on Entrepreneurial Process and (vi) Case Study End-of-term Exam; therefore, they were selected for analysis. Of the 64 students who used the traditional textbook, 21 were not included because of missing data. Of the 20 students who used the open textbook, five were not included because of missing data.

A mean score was calculated for each student, using Microsoft Excel, then the difference between the score for students who used the traditional textbook and those who used the CAPE Entrepreneurship open textbook and the traditional textbook was estimated using an independent samples *t*-test in SPSS. Means and standard deviations were reported along with the *t*-test.

Limitations

The number of student participants in this research is small; all of them used both OER and traditional textbook(s), which introduced a new variable into the expected CAPE Entrepreneurship open textbook adoption experiment. The teacher distributed a pdf copy of the open textbook to students in November, after the students complained about problems with navigating the platform. This resulted in a reduction of their online usage of the open textbook materials. Three observations were scheduled; however, only two were actually undertaken because a faculty meeting was convened on one of the dates. Students' scores were drawn from two different first-year cohorts for comparison, notwithstanding the difference in class size and other intervening variables. The time of the research enabled the use of various internal test marks but not marks from the final CAPE Entrepreneurship (external) test.

Presentation and Analysis of Data

According to Figure 1, of the total number of participants, four students had taken a course that was taught entirely or partly online. Thus, the other 16 students were novices to the online platform prior to the CAPE Entrepreneurship course.

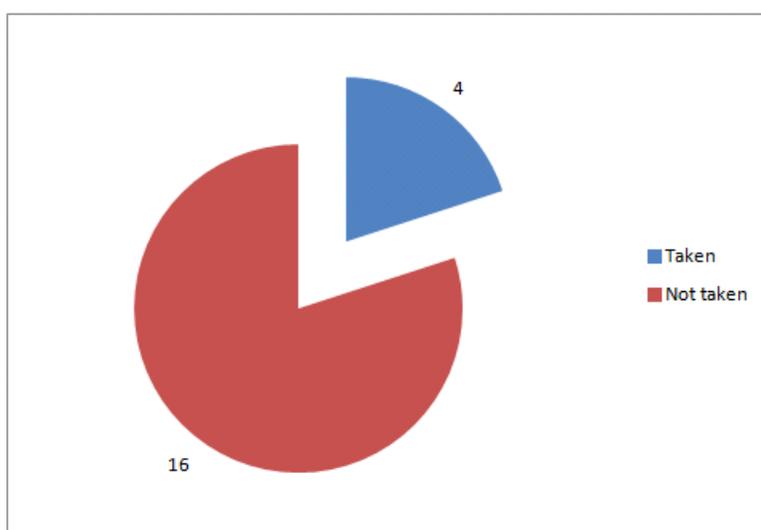


Figure 1. Participants' involvement in a course taught entirely or partly online.

Research Question 1: How much money was saved by adopting OER?

Notably, all the students paid their own tuition, and the majority (17) took four courses for the semester (see Figure 2). Seven students revealed that they had spent ECD 200 or less on textbooks for the courses taken during the past six months; ten students had spent from ECD 201 to ECD 600, and two students had spent more than ECD 800 (see Figure 3). Most students (14) had bought textbooks from a source other than the campus bookstore, six students had shared textbooks with their classmates, and one student had downloaded a textbook from the Internet (see Table 1). Four students revealed that the cost of textbooks had not led them to attempt to reduce cost, so they

had purchased them at regular cost. On average in the semester, the students had spent about ECD 360 for textbook purchases.

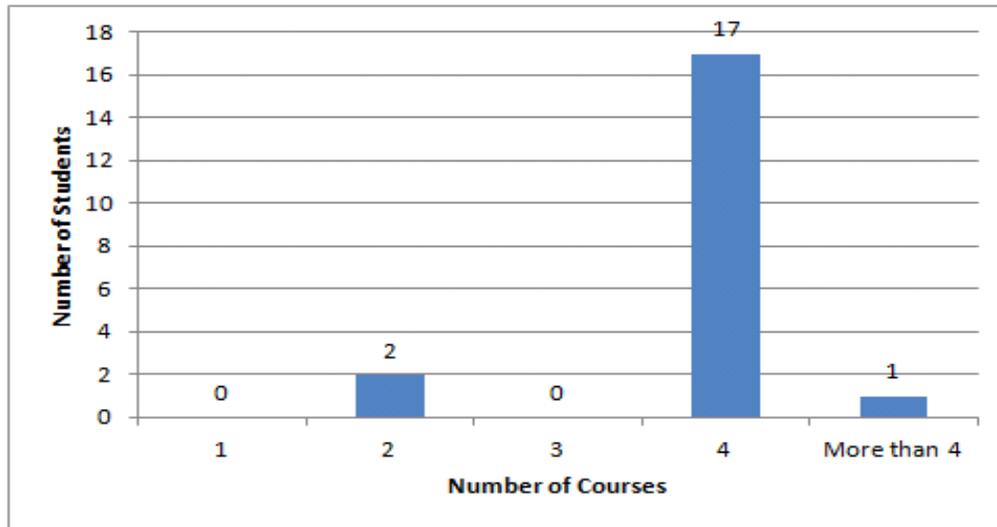


Figure 2. Number of courses taken in the semester.

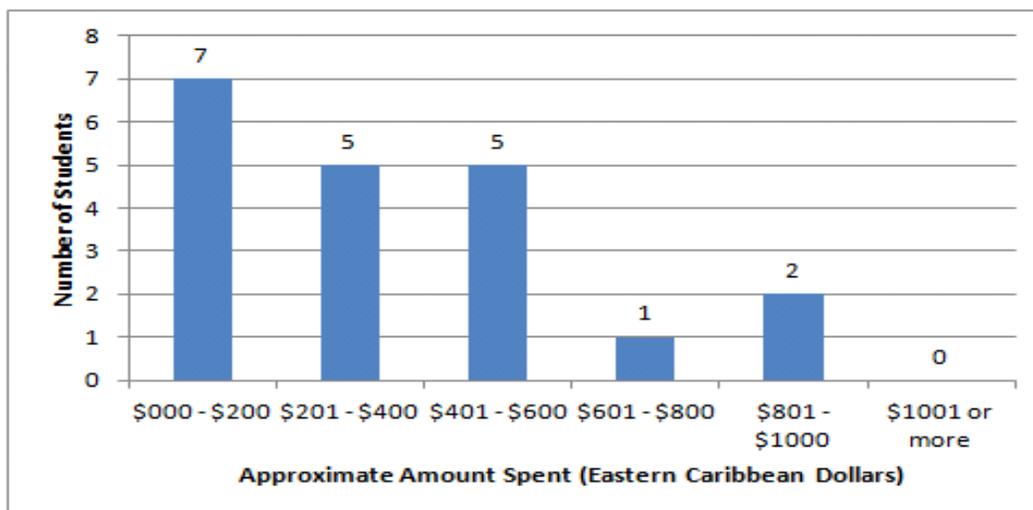


Figure 3. Amount spent on textbooks in the past six months.

Table 1. Ways the Cost of Textbooks Influenced Students

Outcome	Number of Students
Bought used copies from the campus bookstore.	5
Bought books from a source other than the campus bookstore.	14
Used a reserved copy from the campus library.	2
Shared books with classmates.	6
Downloaded textbook from the Internet.	1
The cost of the textbook has not led me to attempt to reduce textbook cost (bought books at regular price).	4

Note: n = 20.

The results indicate that generally, textbook cost never (nine) or rarely (seven) negatively affected students' grades. Moreover, cost did not prohibit most students from purchasing a textbook (see Figure 4). Eleven students generally never (six) or rarely (five) purchased the required textbooks for the courses they took, while six students revealed that they often (five) or always (one) purchased the required textbooks (see Figure 5).

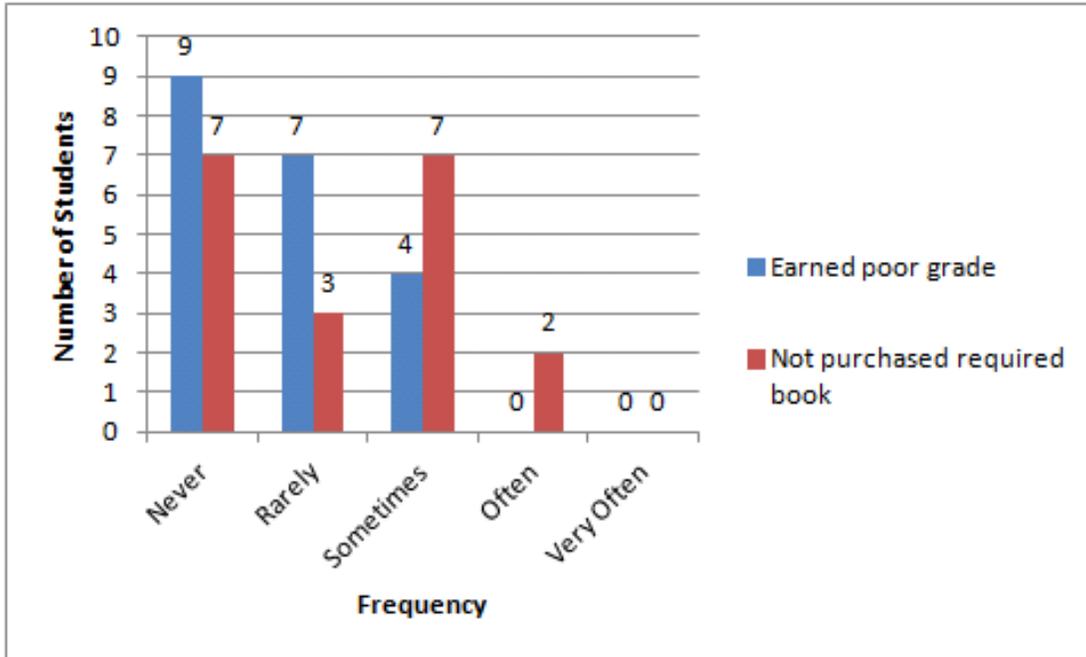


Figure 4. The results of textbook costs.

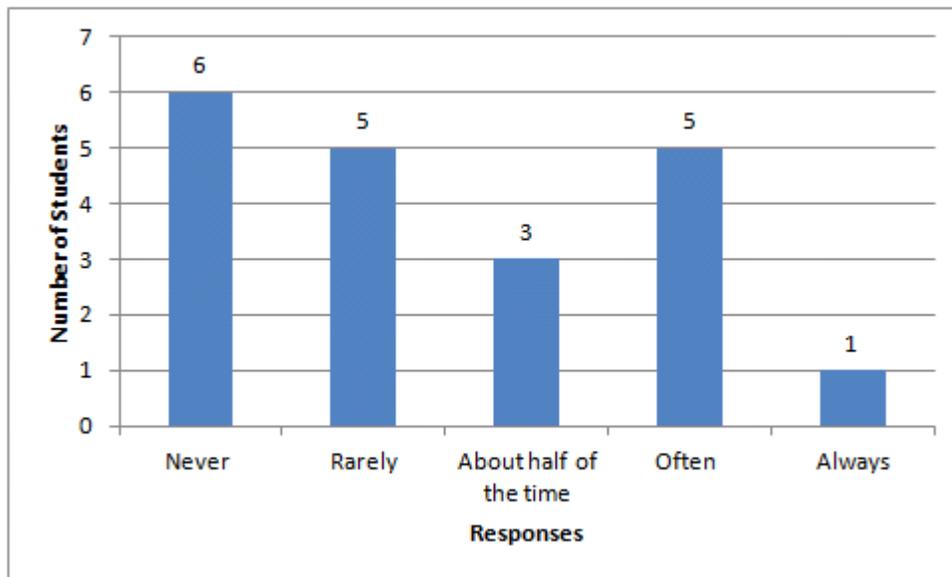


Figure 5. Students' responses to how often they purchased required textbooks.

Figure 6 shows that 15 students purchased the required traditional textbook (new or used) for this course. In Table 2, the five students who did not purchase the

traditional textbook revealed: they could not afford to purchase it (two); they used library copies (one); they borrowed someone else’s textbook (one); or the text was not available for purchase (one).

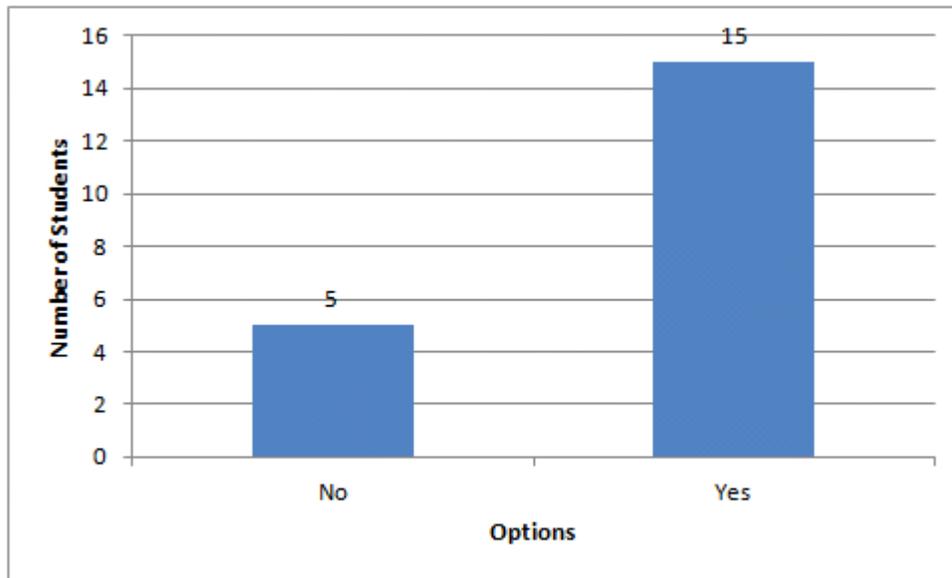


Figure 6. Purchase of traditional textbook for this course.

Table 2. Reasons for Not Purchasing Traditional Textbook for CAPE Entrepreneurship Course

Reason	Number of Students
The text was not available for purchase.	1
The text was available free of charge online.	0
I simply didn’t want to purchase a text for this course.	0
I borrowed someone else’s text.	1
I used library copies.	1
I heard the instructor does not use a text for this course.	0
I could not afford to purchase the text.	2
The text was sold out.	1

As shown in Figure 7, the most frequently selected response, reflecting the amount of money students spent on the traditional textbook for this course, is ECD 40 to ECD 60 (eight students). This totals approximately ECD 400. However, five students spent more than ECD 140 on the textbook (approximate total of ECD 752.50). The course instructor confirmed that in the past, students have generally been asked to spend more than ECD 140 on the required traditional CAPE Entrepreneurship textbook. The responses show that most of the students who indicated they bought the traditional textbook would have bought used books (between ECD 40 and ECD 60); therefore, the others seemingly bought new books. On average, students spent approximately ECD 88 to buy the traditional textbook for the course.

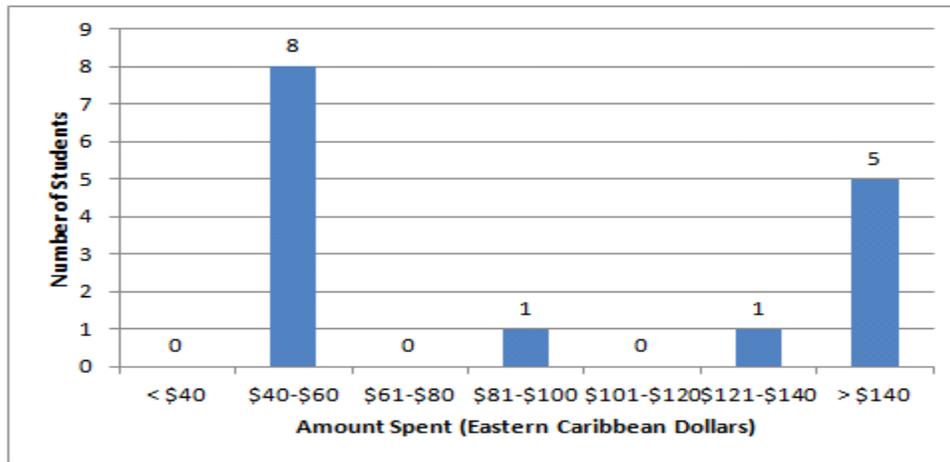


Figure 7. Amount spent on the traditional textbook for the CAPE Entrepreneurship course.

Sixteen students did not print additional textbook materials for the course (see Figure 8). Only four students printed additional textbook materials because they could not afford to purchase the textbook, the textbook was sold out or the textbook was not available for purchase (see Table 2).

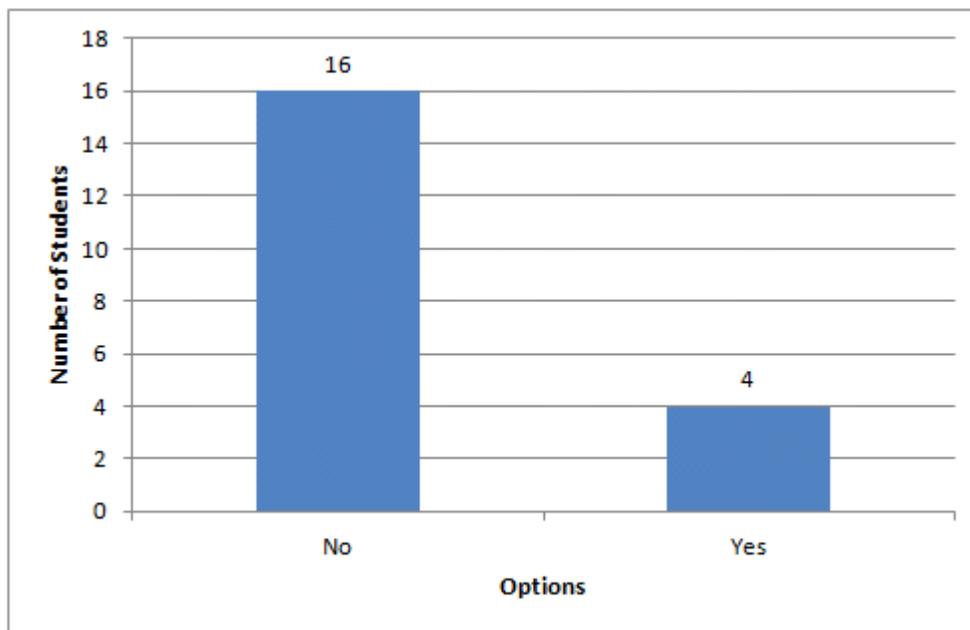


Figure 8. Printed additional textbook materials for the course.

However, of the four students who printed additional textbook materials, three spent less than ECD 20, whilst one student spent between ECD 21 and ECD 40. Thus, the average spending for additional textbook materials was about ECD 22. Eighteen students indicated that they did not print their CAPE Entrepreneurship open textbook (see Figure 9). Two students printed the open textbook by sections or pages as needed, and each spent less than ECD 20 for the printing. Overall, students spent approximately ECD 1,510 on resources (textbook and printed materials) for the CAPE Entrepreneurship course. Hence, on average, the students spent about ECD 75 to

purchase educational materials for the course, so we can deduce that student spending for this course was between ECD 75 and ECD 88. While the use of the CAPE open textbook in this case did not alter the learners' purchasing habits, if this OER replaced the existing textbook, the students of ASC could save between ECD 771,000 and ECD 904,640 per year if we assume that students take an average of four courses in a semester.

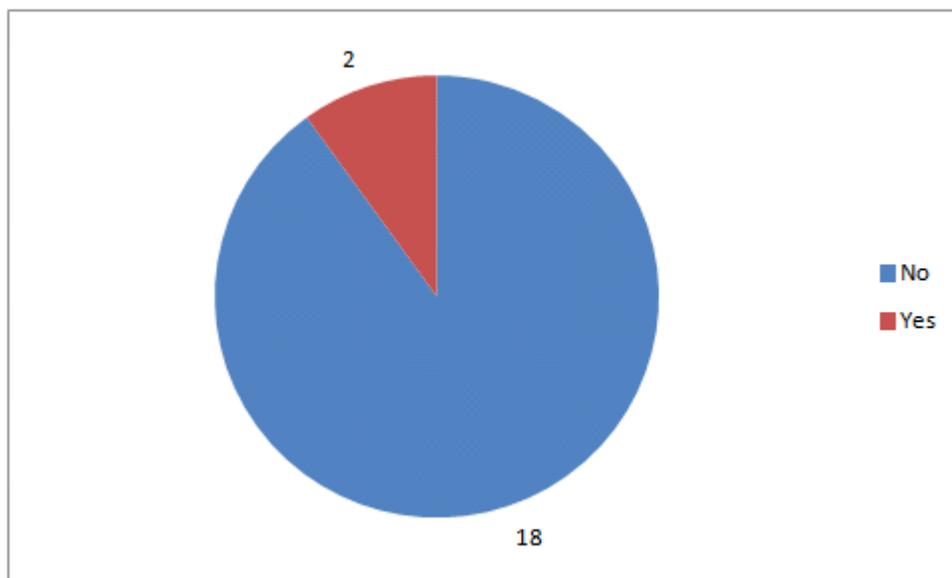


Figure 9. Printed CAPE Entrepreneurship open textbook.

In the past, students have generally been asked to spend more than ECD 140 on the required traditional CAPE Entrepreneurship text. Thus, in a class of 20 students, at least ECD 2,800 would be spent on purchasing the traditional textbook. Since the students in this study spent a total of about ECD 1,510, approximately ECD 1,290 was saved by adopting the CAPE Entrepreneurship open textbook in this instance, which is not very much. This implies that each student saved ECD 64.50 due to OER adoption – a modest savings – although a few students bought a new book, and most of the students bought a used textbook.

Research Question 2: How did students' grades differ when they used OER and traditional textbook(s) versus traditional textbook(s) only?

Below is the analysis of six tests/assignments which were done by the 2015–2016 and 2016–2017 cohorts of students who took the CAPE Entrepreneurship course. In determining how the students' grades differed when faculty used OER and the traditional textbook instead of just the traditional textbook, the mean scores were analysed using an independent samples *t*-test. As can be seen in Table 3, the mean scores were significantly different ($t = 1.524, p = 0.134$). Students who used the open textbook and the traditional textbook, the Year 1 2016–2017 Cohort, obtained higher scores (61.220) than the students in the Year 1 2015–2016 Cohort (56.633), as outlined in Table 4. Thus, the results show that students who used the open textbook and the traditional textbook performed better than those who used the traditional textbook

alone. There was an average increase of 5.5% in the scores in the cohort that used the OER in addition to the traditional textbook.

Table 3. SPSS Output Showing Results of the Independent Sample Test (*t*-Test)

		Levene's Test for Equality of Variances		<i>t</i> -Test for Equality of Means						
		F	Sig.	<i>t</i>	Df	Sig. (two-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Final Grade	Equal variances assumed	2.519	.119	1.524	52	.134	4.5867	3.0097	-1.4527	10.6261
	Equal variances not assumed			1.363	20.885	.187	4.5867	3.3642	-2.4118	11.5852

Table 4. Mean and Standard Deviation of Final Grades

	Cohort_Year	N	Mean	Std. Deviation	Std. Error Mean
Final_Grade	Year 1_2016–2017	15	61.220	11.7310	3.0289
	Year 1_2015–2016	39	56.633	9.1424	1.4640

Research Question 3: How do students use and perceive the quality of OER?

Use of the Open Educational Resource

All of the students specified that during the first semester, they used the open textbook. Assuming cost is not a factor, most students (12) would prefer using both print and digital textbook formats, while only three students would prefer a digital textbook format (see Figure 10). Five students prefer a print textbook format only; of these, four said they are not interested in using digital textbook because they like to have a printed copy to write in and highlight, while one student said it was difficult to move to different pages/sections of the open textbook book (see Table 5). In contrast, the focus interview revealed ease of navigation to be one of the perceived benefits of the open textbook, especially since “objectives are outlined” and it is “easy to find information.” However, one student identified the following challenge: “[it was] too time-consuming to find the page, [I] have to scroll to get back to the information.”

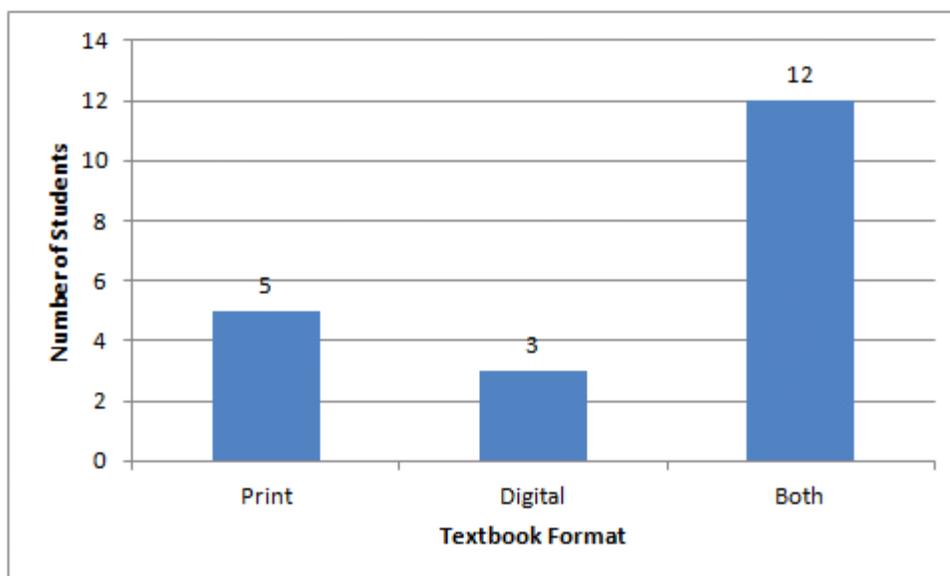


Figure 10. Students’ textbook format preference if cost is not a factor.

According to the questionnaire responses, use was limited to completing assigned readings and studying for exams, but the degrees of usage varied, even though most students (18) acknowledged that the instructor encouraged them to read the open textbook materials. Most students (13) shared that throughout the semester, they used the open textbook two to three times per week, and five used it daily (see Figure 11). This supports the course instructor’s belief about the number of times the students actually used the open textbook. Nonetheless, the students’ login data showed a slackening two months into the first semester.

Table 5. Reasons for Students’ Lack of Interest in Digital Textbooks

Reason	Number of Students
They are inconvenient to read.	0
I like to have a printed copy to write in and highlight.	4
English is my second language.	2
It is difficult to move to different pages/sections of the book.	1
Some digital textbook are not compatible with my print disability solutions.	0
Some digital e-reader devices are not compatible with my print disability solutions.	0
I do not have access to the technology to take advantage of digital textbook.	1
Other (Using a digital textbook may cause vision problems.)	1

Note: n = 5.

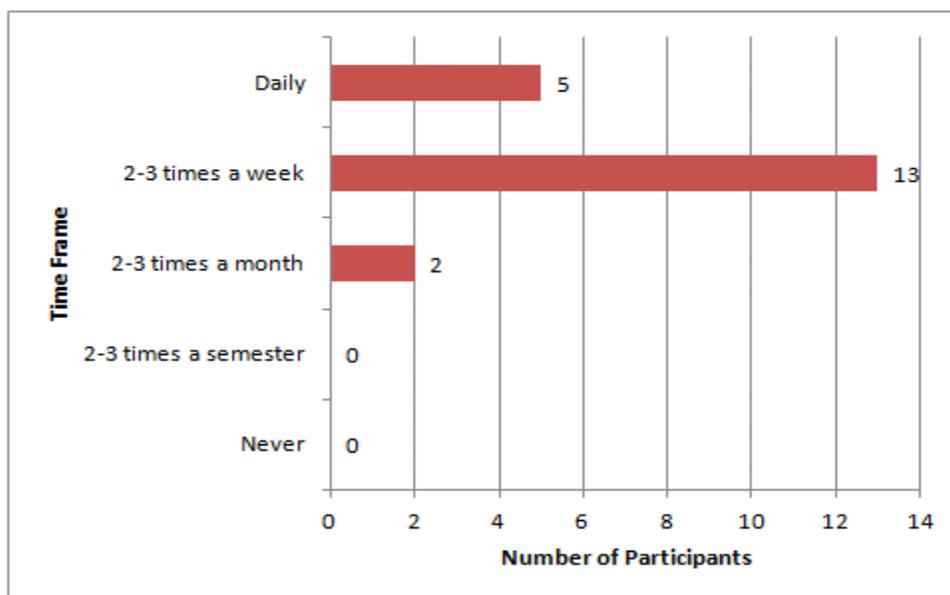


Figure 11. Time spent using open textbook during semester one.

From examining the Student Activity Log, we found that all of the students viewed the open textbook at least three times, as shown in Table 6. The median number of page views is 19, with a range from three to 99.

Table 6. Number of Page Views per Student

Student	Page Views	Student	Page Views
Student 1	3	Student 11	7
Student 2	39	Student 12	18
Student 3	15	Student 13	9
Student 4	16	Student 14	9
Student 5	5	Student 15	49
Student 6	63	Student 16	10
Student 7	99	Student 17	9
Student 8	48	Student 18	17
Student 9	43	Student 19	17
Student 10	58	Student 20	8

Most of the page views occurred in semester one in October, when students used the open textbook at least two to three times a week for four weeks (see Table 7). A decrease in the students' access to the online open textbook is evident from mid-November. Students accessed the online open textbook only once between February and March. In addition, students used the open textbook in February during the class assignment to make a comic strip; however, this is not reflected in the Student Activity Log. Further

questioning to understand this phenomenon revealed that the instructor had downloaded and distributed a pdf copy of the open textbook to the students to counteract the navigational issues they were experiencing. Thus, this is evidence that the students were using the CAPE open material at times other than what the Activity Log indicates.

Table 7. Number of Days Open Textbook was Viewed by Students per Week

	Semester 1			Semester 2		
	October	November	December	January	February	March
Week 1	6	2	0	0	0	0
Week 2	7	2	1	0	0	0
Week 3	5	0	0	0	0	0
Week 4	3	0	0	2	0	0
Week 5	0	0	0	0	0	1

During one of the tutorial observations undertaken in semester two, it was further revealed that all of the students, within assigned groups, used the open textbook to complete an in-class assignment to create comic strips to explain various module concepts, such as branding, patent, copyright and trademark. It was later confirmed during the focus group session that the open textbook was helpful for tutorials because “it was clear, concise and easy to understand”; “the videos and activities held . . . [my] attention more than just reading texts”; and “it was very useful in helping to develop [the] comic strips, as it explains terms such as copyright and its advantages and disadvantages, [and] intellectual property rights.” However, one stated shortcoming was that there were “not enough examples to illustrate . . . information.”

Other positive outcomes identified in the focus group interview about the usefulness of the open textbook included “the development of critical thinking” and the “opportunity to engage in group work.” Generally, students had no concern about lacking electricity, since there was “little chance of devices not being chargeable in order to access information.” All but one student agreed that all subjects should have open textbook materials, to lessen the “bulk of physical texts” and because the students could have the materials “for a lifetime” after download; they all agreed the open textbook was “accessible” on the go, which could make it more “cost-effective” for the students to pursue courses.

Nineteen students stated that the course instructor had communicated to them the experimental nature of the open textbook approach used in the course (see Figure 12). Although one student indicated that the course instructor had rarely encouraged them to read the open textbook, the majority of the students (16) responded that the instructor had frequently or always encouraged them to do so (see Figure 13).

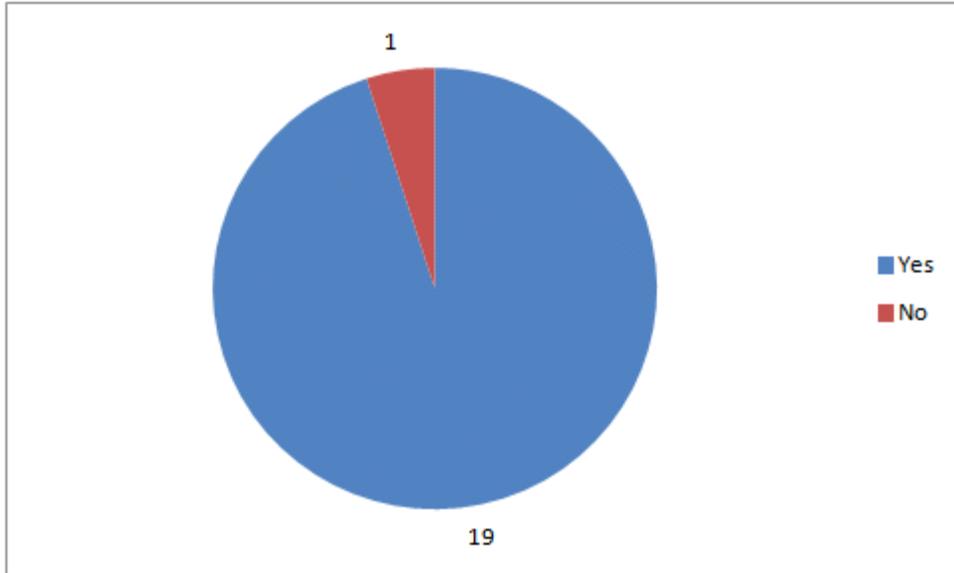


Figure 12. Instructor communicating the experimental use of the open textbook.

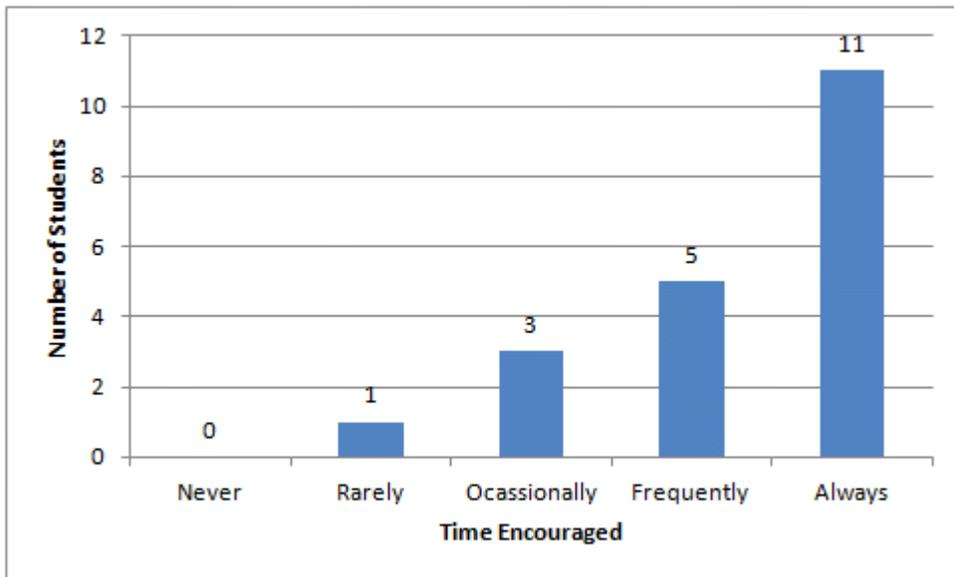


Figure 13. Encouragement of instructor to use the open textbook.

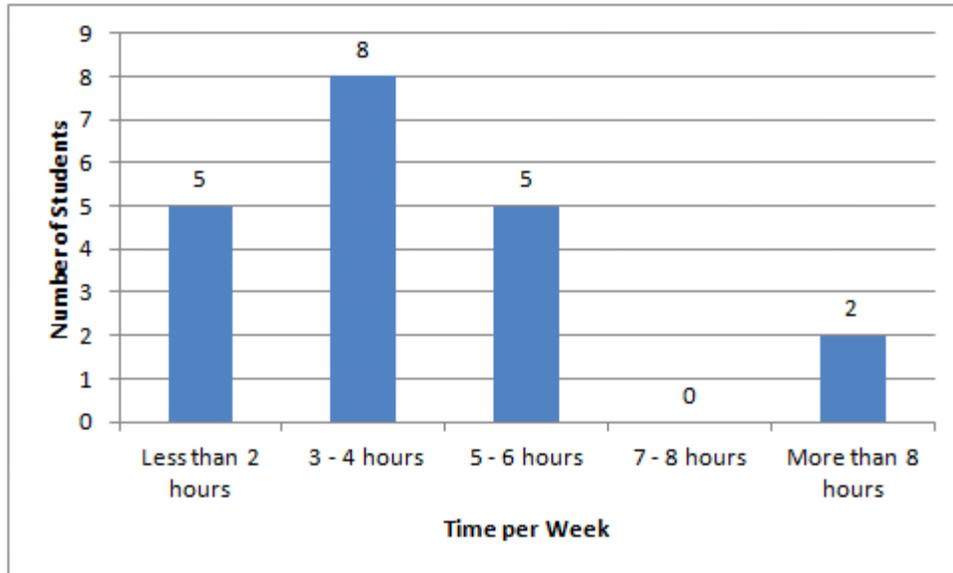


Figure 14. Time students devoted to studying for CAPE Entrepreneurship per week.

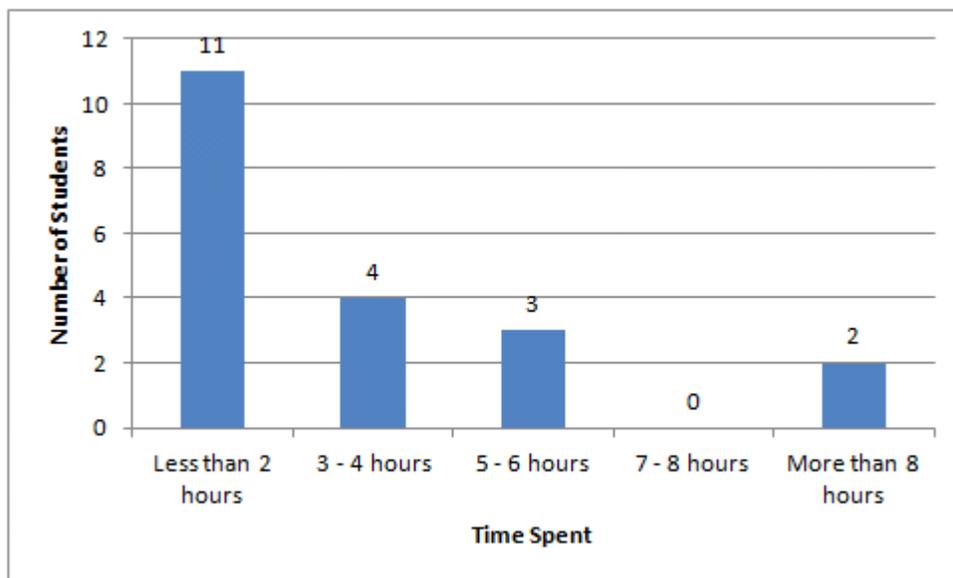


Figure 15. Use of open textbook when studying for an exam.

Most students (13) spent four hours or less per week studying for CAPE Entrepreneurship (see Figure 14). Most students (11) spent less than two hours using the open textbook when studying for an exam in the CAPE Entrepreneurship course; only two students spent more than eight hours (see Figure 15).

Four students typically completed at least 81% of their weekly readings for CAPE Entrepreneurship; six students completed 61–80%; five students completed 41–60% (see Figure 16). Only two students completed less than 21% of their weekly readings.

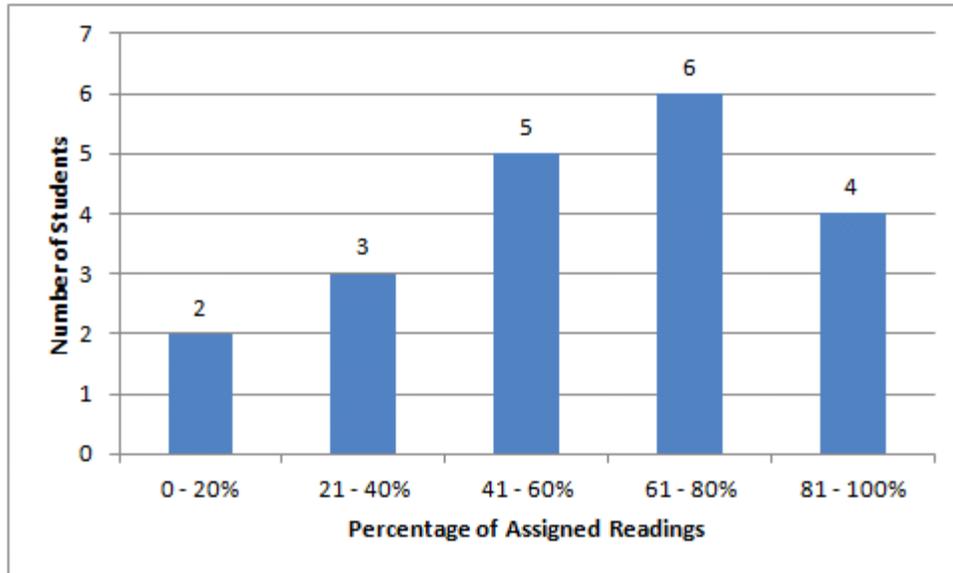


Figure 16. Completion of weekly assigned CAPE Entrepreneurship readings.

Normally for a course, most students (15) used the required textbook two to three times a week (see Figure 17). Quite similarly, most students (13) used the traditional textbook two to three times a week for the CAPE Entrepreneurship course (see Figure 18).

Some positive comments from the focus group were that a student “can study on the go if a student is working — e.g., to read ahead of class.” However, one recurring challenge was the “inability to insert notes or information in the open textbook.” One student shared: “my device allowed me to use Microsoft Word to highlight points.” A solution was offered: “since manipulation of the text is only possible on some devices, use the ones that can access and format information in Microsoft Word.” Despite the concern, it is evident that students used and studied from the open textbook. Although most students acknowledged their awareness of the experimental nature of using the open textbook material, they still showed a preference for using both digital and commercial texts during the course of the study. Notably, there were no electricity/charging issues to thwart on-campus log-in activity, and students had their devices to access the open textbook when needed.

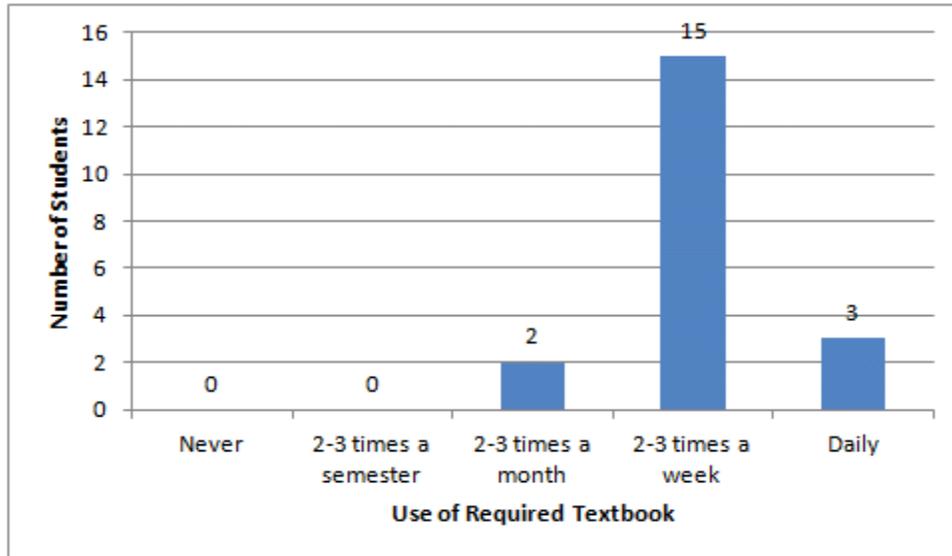


Figure 17. Students’ use of required textbook for a typical course.

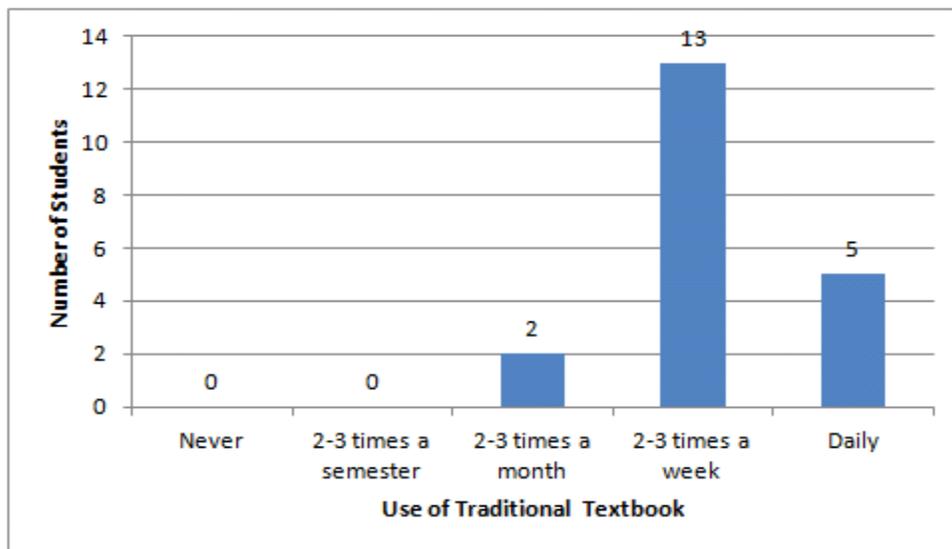


Figure 18. Students’ use of traditional textbook for CAPE Entrepreneurship course.

Perception of the Quality of Open Educational Resources

As shown in Table 8, most students indicated that cost savings, immediate access, convenience and portability, and ability to keep the open textbook forever are very important or absolutely essential features of the open textbook. This finding was supported during the focus interview, when students commented that it is “very cost-effective,” “easily accessible” and “light to carry,” and that they “just have to download the information once and it lasts a lifetime.” The questionnaire responses indicate most students believed that the ability to share and to print were of average or little importance.

Table 8. Important Features of Open Textbooks

Open Textbook Features	Not Important	Of Little Importance	Of Average Importance	Very Important	Absolutely Essential
Cost savings	0	0	5	9	6
Immediate access	0	0	0	12	8
Convenience & portability	0	2	5	4	8
Ability to print pages	1	4	6	4	5
Ability to keep it forever	0	1	3	7	9
Ability to share	1	3	9	4	3

Note: n = 20.

When asked about the qualities of the Entrepreneurship open textbook, most students found that the tables, photographs and research examples were easy to understand and helped their comprehension of the text or materials; they were “clear, concise and easy to understand, with the same information as the physical book.” Most students ranked the open textbook as mostly not or not at all visually distracting. While some students indicated “the font size is very good” and the “material is as concise as possible without losing value,” others expressed challenges, such as “[the] print is too small” and “the great amounts of words and paragraphs are unappealing.” Importantly, one student indicated “eyesight” as one hindrance to open textbook use. Most students indicated that the figures were somewhat easy to understand and helped their comprehension of the text (see Table 9). One student felt the authors needed “to include activities, for example, multiple choice.”

All students used a traditional textbook along with the CAPE Entrepreneurship open textbook. Seventeen students estimated that there was at least 51% overlap between the lecture content and the open textbook materials (see Figure 19). Of that number, seven students seem convinced that there was a high percentage overlap (75–100%). According to Figure 20, 11 students rated the overall quality of the open textbook as “average,” while nine students rated the quality as above average or excellent. During the interview, it was noted that the open textbook had the “same information as in the physical book,” but one student felt that “it was not as detailed as the [traditional] textbook.”

Table 9. Student Opinion about Entrepreneurship Open Textbook

				Rank			
About Your Open Textbook	Not at all 1	2	3	4	5	6	Very much 7
Figures help you understand text	0	2	3	6	5	2	2
Figures easy to understand	0	2	2	7	5	3	1
Tables help you to understand text	0	0	2	2	5	6	4
Tables easy to understand	0	0	1	2	6	6	4
Relevance of photographs in relation to material presented	0	1	1	3	4	3	8
Research examples used to explain material	0	0	1	4	5	5	5
Research examples help you to understand material presented	0	0	1	5	4	4	6
Everyday life examples used to explain material	0	1	0	1	5	5	8
Everyday life examples help you understand material	0	1	0	0	5	4	10
Relevance of everyday life examples	0	0	0	1	9	4	6
Adequacy of study aids	1	1	1	4	3	7	3
Helpfulness of study aids	0	0	0	8	5	3	4
Visual appeal of textbook	0	2	2	5	2	5	4
Visual distraction of the textbook	5	7	3	1	1	0	2
Engagement/interest of writing	1	0	7	4	3	4	1
Clear/understandable writing	0	3	0	4	4	3	6

Note: n = 20. **Boldface** indicates the highest frequency for students' rating of the open textbook.

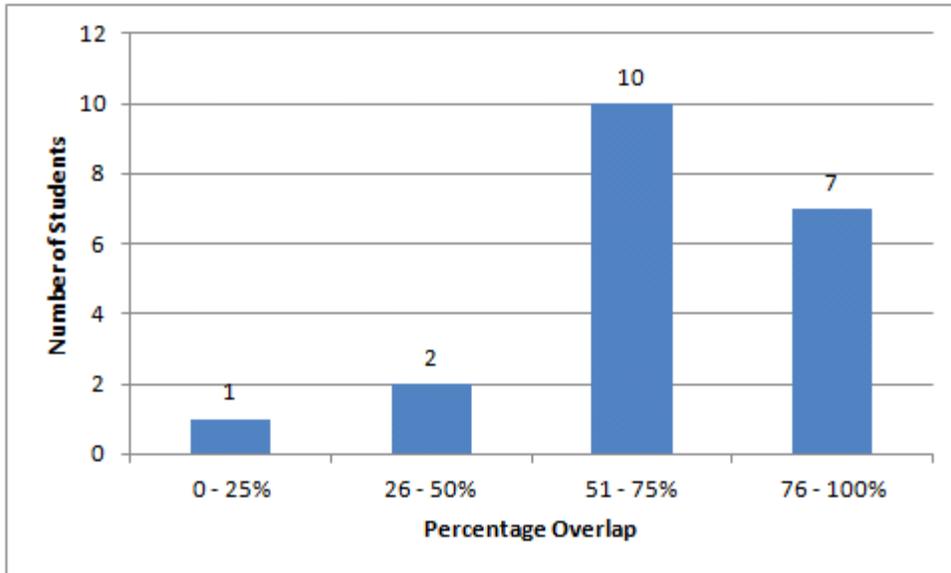


Figure 19. Overlap between lecture content and open textbook material.

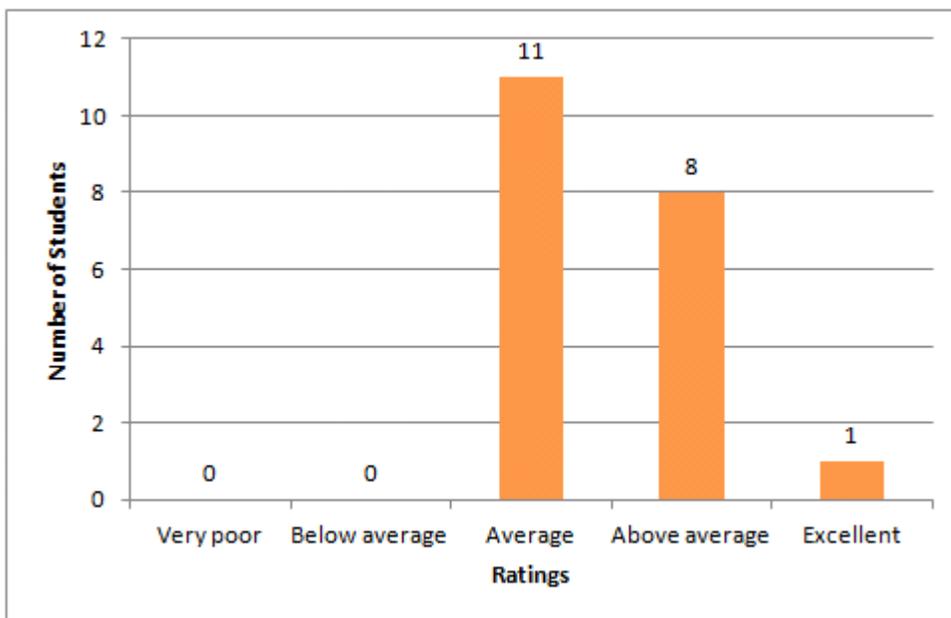


Figure 20. Quality of the CAPE Entrepreneurship open textbook.

As indicated in Figure 21, when asked to what extent they agreed with the statement “I would prefer to purchase a traditional textbook for this course,” most students (11) were in agreement, in comparison with two students who strongly or slightly disagreed; the remaining students (seven) were ambivalent. In trying to understand this ambivalence and students’ preference, responses once more brought to the fore the navigational challenges, which were a major concern despite the textbook’s accessibility inside and outside the classroom. Further probing showed that a traditional textbook was preferred, because the hard copy was considered “easier to study from, as the open text was difficult to navigate from page to page.” The students’ inability to manipulate the content because of the platform could account for this response. Thus, the technology

used is important, as seen in the response of one student who on her device was able to use “Microsoft Word to highlight points.”

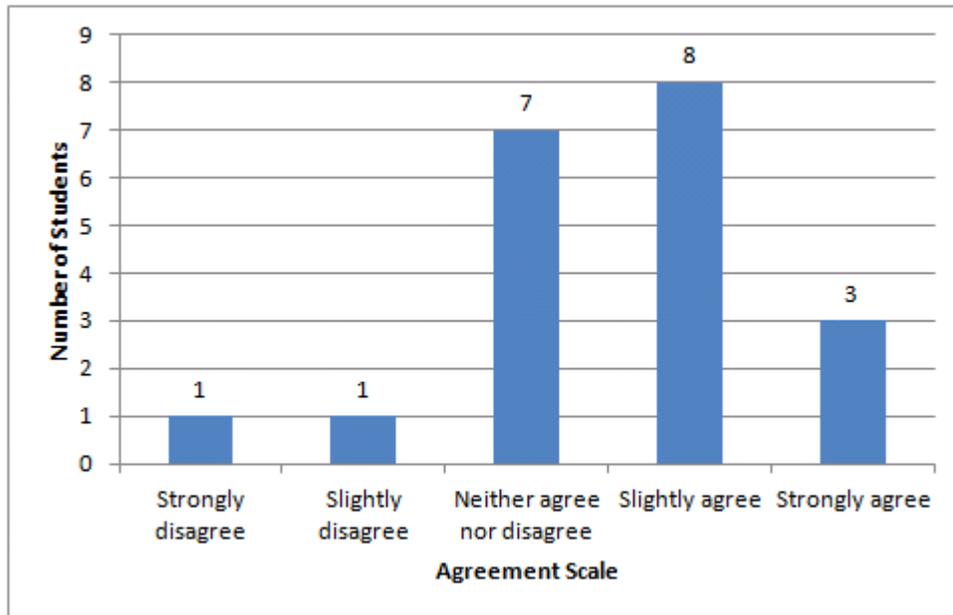


Figure 21. Preference for purchasing the traditional textbook.

However, when asked how likely they were to register for a future course with online texts like the one used in this course, most students (16) stated they were somewhat or very likely to register, while four students were very or somewhat unlikely to register (see Figure 22). During the focus group session, all students except one wished for all subjects to have open materials.

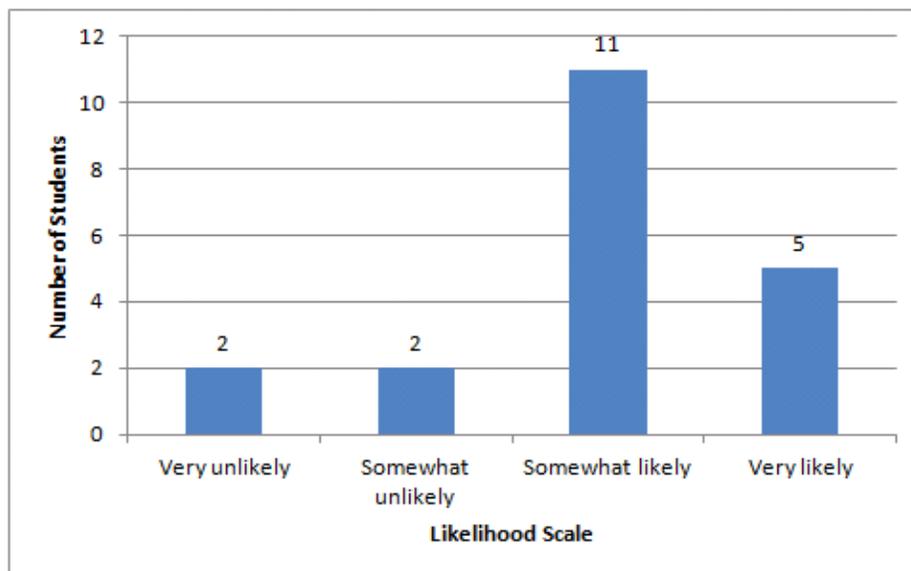


Figure 21. Students' likelihood to register for a future course with online texts.

When asked to imagine a future course they would be required to take, offered by the same instructor during equally desirable time slots but in two different sections, the same number of students (seven) either had no preference or stated they would prefer to enrol in the section with texts like those offered in this course (see Figure 22). One student did not respond to this question.

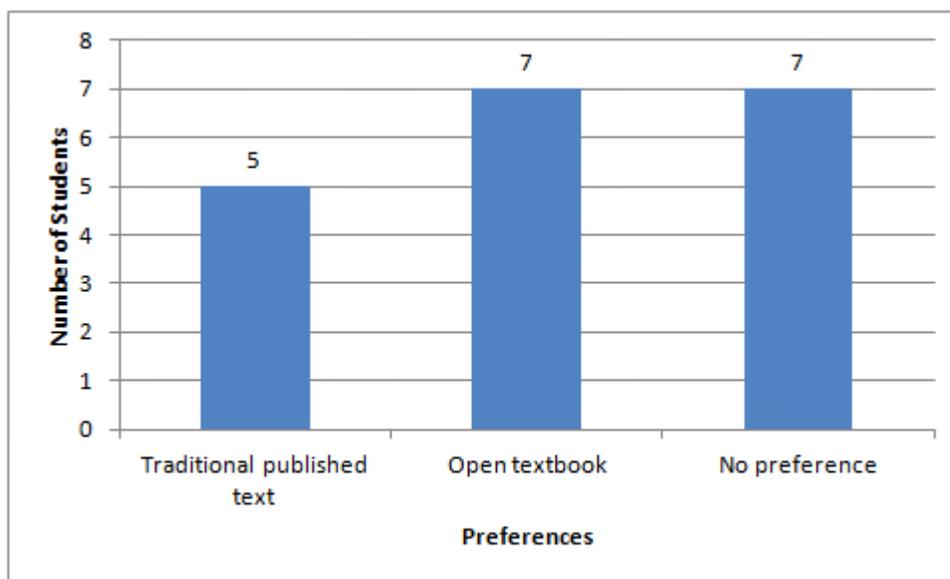


Figure 22. Preferences about course uptake from the same instructor with two different options.

The students showed some motivation to use the open textbook, although for most, this was their first exposure to the online platform. They offered positive views on the quality, accessibility, portability and relevance of the open text. Concomitantly, drawbacks were associated with navigation of the open textbook, coupled with physical concerns and other personal needs for more information.

Research Question 4: What is the difference between the perspectives of the administrators and the instructor?

Course Instructor

When asked how often the experimental nature of the open textbook approach was communicated to the students, the course instructor stated eight to ten times. She realised that the students used the resource more frequently than previous groups that had had access only to the traditional textbook. Even though the instructor had worked on the development of the open textbook, she said that in future courses, it was somewhat likely that she would use an open textbook like the one used in this course. Further discussion with the instructor revealed her opinion that the open textbook “needed to provide more hands-on activities for the students to engage in.” She also shared that “because of the restrictive nature of the CAPE syllabus, I have to use other resources with the open textbook . . . [and] update the information [or resources] in the open textbook as better technologies become available.” When asked to rate the quality

of the open textbook, the instructor stated that it was about the same as the quality of texts in the other courses. However, she described the open textbook as “more interactive,” said the “students [could] use [the] resources more frequently,” and felt that the textbook had a “better layout [and was] student friendly.”

College Administrators

The administrators rated their knowledge of open educational resources as basic and minimal. One administrator was not aware that an open textbook was being used in the CAPE Entrepreneurship course. Neither administrator played a role in the development of the open textbook, nor did they receive any feedback from the students or course instructor about the open textbook used in the course. However, one administrator would support faculty developing open textbook materials for their courses, while the other had no comment. When asked how often they thought the students used the CAPE Entrepreneurship open textbook throughout the semester, one indicated two to three times a semester, the other two to three times a week. There was a difference in the administrators’ likelihood of recommending the use of OER open textbooks in other courses at the college, with one indicating somewhat likely and the other very likely.

The main objective of this research was to determine the worthiness of the programme through its cost-effectiveness and students’ and faculty’s perception of the quality of the OER. The findings from the adoption of the CAPE Entrepreneurship open textbook are as follows.

Summary of Findings

1. The Year 1 students (2016–2017) on average saved ECD 64.50 due to the adoption of the open textbook materials for the CAPE Entrepreneurship course.
2. The 2016–2017 students, who used both the traditional textbook and the open textbook, performed significantly better than the 2015–2017 cohort who used the traditional textbook only, with the former having about 5.5% higher scores than the latter.
3. The main benefits of the open textbook from the learners’ point of view were cost-effectiveness and the accessibility, portability and relevance of the information, and the main disadvantages were the difficulty of navigating from page to page or section to section of the open textbook, the textbook’s format, and personal physical concerns.
4. One administrator was unaware of the implementation of open textbook materials in the CAPE Entrepreneurial course. Unlike the instructor, neither administrator had been involved in the development of the open textbook. One administrator was very likely to encourage the application of the open textbook in future courses.

Discussion of Main Findings

The Year 1 students (2016–2017), who used the open textbook materials for the CAPE Entrepreneurial course, deemed it cost-effective, and its use resulted in total savings of ECD 1,290. This positive result is supported by past research (Allen, 2010; Bliss et al., 2013; Pawlyshyn et al., 2013). The sample was relatively small in comparison to sample sizes in the supporting research, but it is significant in the context and augurs well for the future, especially if the students get their wish of all courses being conducted with open textbook materials. This study also indicated that open textbook adoption in all ASC courses could save students ECD 904,640, or about ECD 704 per student.

The teacher encouraged the students to use the open textbook materials for the course, and the evidence shows the materials were used during tutorials and lectures and for study purposes. However, some issues might have impacted their use of the traditional textbook. Firstly, despite the experimental nature of the innovation, the traditional book was not *replaced* by the open textbook, as in the research by Allen (2010). Secondly, as in the research by Rowell (2015), the students had little or no experience with OER, and this might have affected their confidence; thus, they needed backup materials instead of relying solely on the open materials. This factor was compounded by the availability of the traditional text and the lack of strict guidelines for the use of the open textbook.

The first-year students in 2016–2017, who used the open textbook materials, also performed significantly better (61.220) than the first-year students in 2015–2016, who used only the traditional textbook (56.633). This is a promising outcome supported by previous research (Allen, 2010; Pawlyshyn et al., 2013), despite the anomaly that the 2016–2017 students used the traditional materials as well. It is also evident that the materials positively impacted their experience, that most are *open* to working with open materials if given a chance, and that they do welcome the probability in all subjects, even providing suggestions to lessen the navigation and format challenges. Students lauded the quality of the open textbook material, so it is somewhat incongruous that most indicated they would have preferred to purchase a traditional textbook for this course; but based on the responses in the focus group, one might interpret this response to mean “in addition to the open textbook materials.” Notably, the teacher indicated she had shared a pdf of the open textbook material after students complained of the navigation issues. The teacher’s action might explain the downturn in the attempts to access the open material, as observed in the Student Activity Log data, because responses from other data sources indicate that students used the open textbook throughout the research period.

The implementation of the CAPE Entrepreneurship open textbook materials was experimental. Importantly, all students except one attested to the fact that the teacher made them aware of the experimental nature of the implementation. However, no strict rules of experimentation were applied, since all students used both the open textbook and the traditional textbook. Hilton (2016) has cautioned against the weakness of such research designs, which can render the findings flawed. However, he suggested that the ideal approach is for “research [to] be structured in such a way that students are randomly assigned to open and traditional textbooks” (p. 587).

The students also found that the open textbook materials were high quality, easily accessible, portable and relevant, motivating them to engage in learning. As noted earlier, accessibility is considered the “clincher” (Bliss et al., 2013), and this was no less the case in this research. Unlike in the Bliss study, however, the students did not have issues with typos and grammar, and they lauded the applicability and usefulness of the videos and photographs. Their main challenge was navigating the materials, which proved to be time-consuming during tutorials and lectures, and it was noted that they did not find tools to aid them in navigation between pages or sections. In addition, the open textbook did not always cover everything that the students needed to know in all the topics, so they had to obtain “more information” from other sources, including the traditional course text. Personal shortcomings such as “eyesight” also should be considered when recommending the use of an open textbook. To improve navigation, the students suggested the following tools could be provided: “footnotes, bookmarks, table of contents [and] hyperlinks to easily access needed information.”

With reference to faculty, it was found that unlike the instructor, the administration had minimal knowledge of the open textbook initiative. The research also concluded that faculty differ in their perception of the present open textbook materials and the future use of the same across subjects. Pawlyshyn et al. (2013) reiterated the importance of college leaders working in a professional learning community to design quality open materials. Suggestions proffered to promote faculty involvement in the process of preparing need-targeted content and open materials include staff buy-in and improved understanding of OER (Butcher, 2015). Interestingly, the open materials discussed in this research were prepared by local educators — a subject supervisor and teachers. Thus, one would hope the high quality of the information can be replicated, and suggestions to resolve navigational and format challenges should be considered when new open materials are developed.

Implications and Recommendations

These findings have implications for leadership and students at ASC. This is groundbreaking research at a relatively small college; however, the results show the significant value of adopting OER into ASC’s programmes, and they suggest how design flaws and guidelines for the materials’ implementation might be addressed in the future by following structured procedures from the start. Curriculum adoption or implementation outlined in the literature review provide successful points of reference, especially for the design (Allen, 2010; Hilton, 2016) and development of open materials (Pawlyshyn et al., 2013).

Recommendations include:

1. Review the Entrepreneurship open textbook materials to add supporting tools that will (i) improve navigation by providing hyperlinks, bookmarks and footnotes, and (ii) allow students to add to the information by highlighting points and inserting notes.

2. Start a conversation with college faculty — administrators and instructors — to create awareness and to explore the benefits and challenges of introducing OER for other subjects in the college curriculum.
3. Ensure faculty buy-in to improve future management of the adoption and implementation of open materials through proper planning and structured guidelines.

Further research could be done to compare the performance of previous cohorts of students in the final CAPE Entrepreneurship examinations with this 2016–2018 cohort, who will be sitting the CAPE Entrepreneurship examinations in 2018.

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