Assuring Academic Integrity of Online Testing in Fundamentals of Accounting Courses

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Abstract
Demand for online courses continues to grow. To remain competitive, higher education institutions must accede to this demand while ensuring that academic rigor and integrity are maintained. The authors teach introductory Fundamentals of Financial and Managerial Accounting courses online. Previously, there was no proctoring of the exams. Prior experience teaching these courses led the professors to suspect a high likelihood that academic integrity on these tests was low and that cheating was high. To address academic integrity concerns, the professors utilized a remote proctoring service employing a lockdown browser with screen and webcam monitoring. The program monitors the students remotely, recording sound, video and the information appearing on the students' screens. The videos are reviewed for detectable instances of breach of academic integrity prior to releasing the grades. Data was collected and analyzed for the average exam scores prior to and after the implementation of the remote proctoring software. The data analysis reveals a significant difference in the two sets of scores, with the average exam scores after the implementation of the remote proctoring being significantly lower than the ones before implementation. These results indicate that concern about academic integrity in online test-taking in the accounting curriculum is valid.

Keywords: Academic dishonesty, online courses, proctored versus non-proctored exams, cheating

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Online education became a requirement when the 2020 COVID-19 pandemic impacted traditional learning all over the world. Noorbehbahani et al. (2022) report the pandemic forced 1.5 billion students and 63 million educators to the online learning environment. Even before the pandemic, the popularity of online courses was increasing as students wished to complete their higher education in a time and manner most convenient for them as individuals. To remain competitive, higher education institutions have acceded to this demand. As a result, they face difficulties in ensuring that the academic rigor and academic integrity established in traditional face-to-face courses are maintained in the online environment.

There is a vast amount of literature regarding academic cheating, academic misconduct, and academic integrity. In much of this literature, the terms are often intertwined. The various studies have focused on concepts such as the cheaters' personality and characteristics, motivating factors for cheating, methods of cheating, and detection and prevention methods.

Giluk and Postlethwaite (2015) conducted a meta-analytic review of the relationship of the Big Five personality factors to academic dishonesty. The five-factor model (Big Five) is one of the dominant models of personality (Digman, 1990.) The factors included are neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness. This model has been used to predict academic performance (Poropat, 2009). Conscientiousness and agreeableness were, as expected, negatively related to academic dishonesty, and had the strongest relationships of the five factors. The other three factors, neuroticism, extraversion, and openness to experience were all positively related to academic dishonesty. However, they did not have the level of relationship shown with conscientiousness and agreeableness, even though previous studies had mainly given attention to extraversion and stability (vs. neuroticism which exhibits emotional instability, irritability, depression, and other negative effects) (Williams et al., 2010). These personality factors exist and present a concern about academic dishonesty whether exams are in person or online and whether proctored or not.

Many different motivations are cited by students as reasons for cheating. Studies indicate that academic misconduct at universities has been on the rise for years (Turner & Beemsterboer, 2003; Marsden et al., 2005) and that misconduct is significantly even higher during exams and assessment tests (Desalegn & Berhan, 2014). Students are, in fact, more motivated to cheat when there are higher stakes (graded) assessments (Farland & Childs-Dean, 2021). Some reasons that students cite for cheating are greed for high scores, what their peers think of them, and lack of understanding about the university polices regarding cheating (Passow et al., 2006). Radwan et al. (2022) posit that students cheat in general for three reasons: fear of failure, a desire to take risks, and a lack of concern about their cheating being detected. Academic cheating is found in universities and other levels of education throughout the world (Iqbal et al., 2021).

There are a seemingly endless number of methods that students employ to cheat. The three main cheating methods observed by Ozgen et al. (2021) while using computer metrics were using another person, device, or absence. Cheating practices include copying and pasting, plagiarizing, looking at another student's work, making up data, using unauthorized materials, and a plethora of other means (Ercegovac & Richardson, 2004; Błachnio & Weremko, 2011).

Fortunately, there are methods for detection and prevention of cheating. Some detection methods use computer technologies that identify head and neck movements (Malhotra et al., 2021), facial expressions (Ghizlane et al., 2019), and posture (Nishchal et al., 2020) that suggest cheating. Online exam proctoring, using live proctors and/or video and audio which is reviewed later is a useful tool for detection of cheating. One author posits that using proctoring may give students fewer or no opportunities for academic dishonesty (Reisenwitz, 2020). Assuming that holds true, online proctoring of exams also serves as a method for prevention of cheating. Based on a review of literature on cheating in online exams from 2010 to 2021, Noorbehbahani et al. (2022) categorize cheating prevention in two ways: before-exam prevention and during-exam prevention. Beforehand prevention includes exam design, authentication of students, clustering students into groups and lowering cheating motivation. During-exam prevention includes cheat-resistant systems such as browser lockdown (Chua & Lumapas, 2019) and other methods such as cutting down on bribery of proctors by using random assignment of proctors right before exams (Kigwana & Venter, 2016) and using online proctoring of exams.

The focus of this study is on ensuring that academic integrity is maintained in the online environment. The study worked to achieve this goal by adding remote proctoring to the design of the online assessments to help in both detecting and preventing cheating. Prior experience teaching the Fundamentals of Financial and Managerial Accounting courses led the authors to suspect a high likelihood that academic integrity on the exams in the classes was low and that cheating was high. To address these academic integrity concerns, a remote proctoring service was utilized, employing a lockdown browser with screen and webcam monitoring. The authors compared student exam performance in the same learning modality (online), with no changes in the course structure or content. The only change in the assessment design was the inclusion of webcam-based online proctoring of the exams. This inclusion revealed significant differences in exam scores when compared to scores with no proctoring, large enough to imply that cheating had been occurring prior to the proctoring requirement. The contribution of this research is that it adds to the body of literature by emphasizing the necessity of adding proctoring as a component of the design of online exams.

Literature Review

Unethical behavior such as fraud, deception, and cheating have been reported amongst the greatest challenges faced by individuals and society alike (Shalvi et al., 2015). In academia, academic dishonesty has been and continues to be of real concern. In a recent survey conducted by Wiley of over 2,800 instructors in the United States and Canada, a reported 77% of instructors believed that students are more apt to cheat in online courses than in traditional face-to-face courses (Carrasco, 2022). In an analysis of over three million tests, conducted by ProctorU, cheating, or attempts to cheat, were found in 7.2% of higher education assessments (Williams, 2022). This is a reported increase of over 14 times prior to the pandemic (Williams, 2022).

Disregarding any academic code of conduct previously signed, student perception that cheating is acceptable—especially in non-proctored environments—is high. Several studies have shown that students feel it is easier to cheat in the online environment and thus they are more likely to resort to cheating in online courses. In a survey of 141 students, 118 reported that cheating in online examinations was an issue (Berkey & Halfond, 2015) while 88 out of 121 students in another survey felt it was much easier to cheat in online courses compared to

traditional courses (King et al., 2009). Watson and Sottile (2010) surveyed 635 students and discovered that the students reported a much higher likelihood (greater than four times) of cheating in the online environment versus a face-to-face setting. The reason may be because students attributed the absence of exam proctoring to the belief that the teacher was not serious in prohibiting outside resources (Dyer et al., 2020). Therefore, Newton (2021) maintained the decision to not utilize assessment proctoring in online courses sends the students the message that the course is not as serious or valuable as traditional, face-to-face courses and the assessment's integrity is not that important, otherwise proctoring would be in place to protect it. This is consistent with Harmon et al.'s (2010) conclusion that the main factor that mediates cheating, according to students, was the inclusion of proctoring.

There are multiple cheating methodologies, and a number of students have used several methods of cheating while working on earning their degrees (Josien & Broderick, 2013). Online cheating often occurs in the form of utilizing forbidden items to complete assignments. These items include textbooks, notes, and offline and online electronic resources (Fontaine et al., 2020; Holden et al., 2021) and having others in the room with them during the exam (Williams, 2022). Corrigan-Gibbs et al. (2015) reported that cheating largely occurred in the online environment as the students utilized the Internet to look up the answers to examination questions. In the online environment, impersonation is also a threat to academic integrity. By sharing one's academic account credentials with another, someone other than the student is allowed to complete the work (Dobrovska, 2017). The sharing of credentials is a form of "contract cheating," which is using a third party to help a student complete their work and submitting it as if they prepared it themselves (Quality Assurance Agency, 2017). This is a large challenge to safeguarding assessment security (Gamage et al., 2020).

Even though the academic situation changed during Covid-19 resulting in much more online assessment, academic integrity and assessment security are "still indispensable in the higher education sector" (Gamage et al., 2020). Allowing cheating to go unchecked is a threat to higher education. It makes it very difficult for colleges and universities to properly conduct assurance of learning, devalues the student's education and degree, making their diploma essentially worthless (Bergmans et al., 2021; Williams, 2022). The impact of cheating in the online environment on students' education is concerning to many instructors. Seventy-four percent of instructors surveyed had concerns that cheating severely impacts students' learning and 52% feared this leaves the students underprepared for their future careers (Carrasco, 2022).

The exam design is the highest contributing factor motivating students to cheat on exams (Noorbehbahani et al., 2022). Poorly designed exams providing the same or similar true/false or multiple-choice questions for each student, along with the ease of locating test bank solutions, incentivizes cheating (Noorbehbahani et al., 2022). Additionally, exams that are overly complex and irrelevant to the course materials covered can also motivate students to cheat (Srikanth & Asmatulu, 2014).

Liken to the Fraud Triangle elements of Opportunity, Pressure (Motivation) and Rationalization (Cressey, 1973), all three must be perceived to be present for a student to be able to cheat on an exam. The perceived notion of opportunity + pressure + rationalization = an increased risk for such behavior (Metts, 2021). Academic misconduct often occurs when

opportunities are present, but surveillance is obsolete or minimal (Faucher & Caves, 2009). While the motivation and rationalization compelling a student to cheat lies solely with the student, the examiner controls the opportunity element. Hence, the examiner should do what they can to remove or lessen the opportunity to cheat. The use of online proctoring, whether human or automated, can assist examiners with this endeavor. In fact, research has shown that the average score on an online examination can drop close to a letter grade when proctoring or monitoring is used (Newton, 2021). Thus, proctoring online test-taking can assist in promoting academic integrity. It creates accountability similar to traditional face-to-face courses (Newton, 2021). Live proctoring of online test-taking can help detect and stop cheating as it is happening. However, it is expensive and not always available. An alternative to live proctoring is the use of proctoring software that requires a webcam. Using a webcam, the student's testing environment can be continuously monitored to ensure forbidden materials are not in the room. The student can also be required to show a picture ID that will provide evidence that the student taking the exam is the student enrolled in the course.

There have been multiple studies comparing student exam performance with proctored and non-proctored exams in the online environment whose findings suggest cheating was occurring in the latter. Daffin and Jones (2018) compared scores with students enrolled in online psychology courses at Washington State University. Using a sample of close to 1,700 students over the Spring 2015 to Spring 2016 terms, the authors discovered that exam performance was 10-20% better in the non-proctored environment than when administered in a proctored setting (Daffin & Jones, 2018). Both Alessio et al. (2017) and Fask et al. (2014) studies revealed similar findings. Alessio et al. (2017) had compared the exam scores for an online medical terminology course at Miami University while Fask et al. (2014) compared elementary statistics exam scores for students attending a private university in the northeastern region of the United States. Elevated exam scores were once again present in the non-proctored setting as compared to the proctored setting. Dendir and Maxwell (2020) also found significant differences in student performance scores between proctored and non-proctored exams given in an online course. They compared the examination scores of students enrolled in multiple sections in one or both of principles of microeconomics and geography of North America at a comprehensive midsized public university in the United States. Keeping their course structure, content, and assessments the same, the authors introduced online proctoring of assessments. The results revealed an average reduction of 16 percentage points across the six exams (three economics and three geography) when the exams were proctored. Hylton et al. (2016) also discovered an increase in examination scores for students taking non-proctored exams in online courses. The authors randomly assigned students to complete their exams either in a non-proctored setting or a webcam-based proctored setting. Not only did they find that the students who took the exam in the non-proctored environment had elevated exam scores, the students in the non-proctored setting also took a much longer time to finish their exam which they attributed to students looking up answers. All the aforementioned authors attributed the reduction in proctored exam scores and elevated scores in non-proctored exams to cheating and thus, determined that web-cam monitoring was an effective deterrent to mitigate cheating in an online course (Alessio et al., 2017; Dendir & Maxwell, 2020; Fask et al., 2014; Hylton et al., 2016).

The Hechinger Report (2020) revealed that proctors reviewing the video recordings of an exam in a pre-med chemistry class at a well-known mid-Atlantic university discovered that the

same person had taken exams for at least a dozen students at seven universities. There was a spreadsheet on his wall, which was caught on camera, that showed student names, schedules, and login credentials and passwords for him to use for websites that would "feed" him answers. The video proctoring and review of these exams thus documented these multiple incidents of contract cheating. The report further shared that students at some universities, during the COVID lockdowns, were given extra time to complete their exams online (with no proctoring) and students were setting up video conferences to share answers. Software that locks the students' browser is helpful but doesn't stop schemes such as video conferencing. Proctoring (live or video review at a later date) helps with detecting cheating and the report cited one professor at Purdue as saying, "You cannot give an exam if it is not proctored." They also cited Scott McFarland, CEO of ProctorU: "We can only imagine what the rate of inappropriate testing activity is when no one is watching."

Methods

Participants

The participants for this study included undergraduate business majors enrolled in online, 7-week, Fundamentals of Accounting courses during the Spring 2020 and Spring 2021 terms. Both the Fundamentals of Financial Accounting and Fundamentals of Managerial Accounting courses were included in the study. There were 67 students initially enrolled in the Spring 2020 Fundamental Financial Accounting course and 65 enrolled in the Spring 2021 offering. Forty-two students were initially enrolled in the Spring 2020 Fundamental Managerial course and 47 were enrolled in the Spring 2021 course. Students enrolled in these courses may have been either part-time or full-time students. As the courses were 100% online, it is important to note that the demographics for online students are often different from those of traditional, F2F students coming straight from high school. While some of the students in the course may have been traditional students, it is likely that many were non-traditional students (older, working adults possibly with families and maybe attending school on a part-time or full-time basis). Additionally, different genders, ages and ethnicities were most likely present, but were not collected for inclusion in this study. Both the Fundamentals of Accounting courses satisfy a portion of the business core required for all business majors at the university, whether accounting, finance, general business, management, or marketing.

Materials

The only instruments used in this study were the course exams, consisting of three exams covering three chapters each and one comprehensive final exam covering all the chapters in the course. In both the Fundamentals of Financial and Fundamentals of Managerial classes, the first three exams were each worth 100 points. The final exam in Fundamentals of Financial Accounting was worth 100 points while the final exam in Fundamentals of Managerial Accounting was worth 150 points. Most of the exams were in true/false and multiple-choice question format with a few short application problems. The course structure and content of the online exams remained constant in the classes of both professors, whether non-proctored or proctored.

Procedure

All Fundamental of Accounting courses involved in this study were taught in the Blackboard learning platform, integrated with the partner content platform, and taught by both authors of this paper. The classes were 100% online and thus, all instruction, coursework—including exams—were online. The exams were open for a period (over several days) allowing students to take the exams at a time most convenient for them. Prior to the use of proprietary proctoring software, which only became available from the publisher and integrated with the partner content platform in 2021, the exams were non-proctored. When the proprietary proctoring software became available for use with partner content platform in Spring 2021, it was subsequently incorporated for all exams in the two courses.

With or without proctoring, students were advised that except for a 3 x 5 card with formulas, blank scratch paper, pen/pencil and a basic calculator, no notes, books, or other outside help of any kind (e.g., people or internet) were allowed. Before the use of the proprietary proctoring software, the students were completely on an honor system to abide by the rules. The proctoring software used for all the exams utilizes lockdown browsing and videotapes the students as they take the exams. The proctoring software provided the instructor with a report that alerts them to various levels of suspicious activity. The videos for each student were available for the professors to review for rule violations. At the end of the non-proctored and proctored semesters, only the data related to the exams were downloaded. The student names were omitted, and the data were analyzed for any significant difference using SPSS.

Analysis

An independent samples *t*-test was used to examine the differences in student performance on the non-proctored and proctored exams in both courses. The *t*-test was conducted for all the exams in the courses. The mean scores on the exams that were non-proctored in one semester were compared with the scores of the exams that were proctored in another semester. There were 67 students initially enrolled in the Spring 2020 Fundamental Financial Accounting course and 65 enrolled in the Spring 2021 offering. Forty-two students were initially enrolled in the Spring 2020 Fundamental of Managerial Accounting course and 47 were enrolled in the Spring 2021 course. The change in the number of students taking the different exams may indicate those who did not take one or more exams or dropped the course between exams. As mentioned previously, the exam content remained the same across both semesters. The only variability was the addition of online proctoring and a different set of students taking the exams. The authors believed that cheating was occurring on the non-proctored exams and thus hypothesized that student performance would significantly decrease when the exams became proctored.

Results

Student performance was examined for non-proctored and proctored exams in the online Fundamentals of Accounting courses during the Spring 2020 and Spring 2021 semesters. Figures 1 and 2, respectively, show the average exam scores for all three-chapter exams and the final exam for the Fundamentals Financial Accounting course and Fundamentals of Managerial Accounting course. The average exam scores in both courses decreased for all proctored exams with significant decreases seen in Exam #1, #3 and the final for Fundamentals of Financial

Accounting (Figure 1 below) and for all four exams in Fundamentals of Managerial Accounting (Figure 2 below).

Figure 1
Fundamentals of Financial Accounting Average Exam Scores Comparison

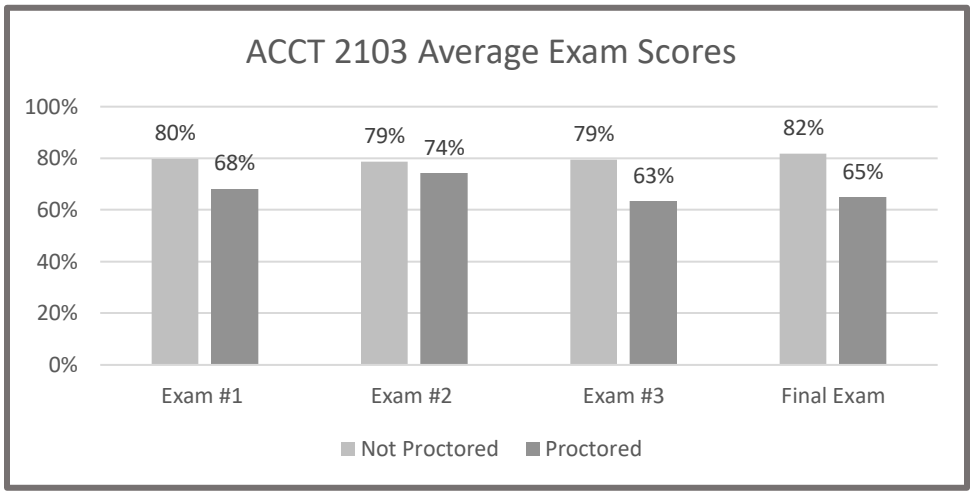
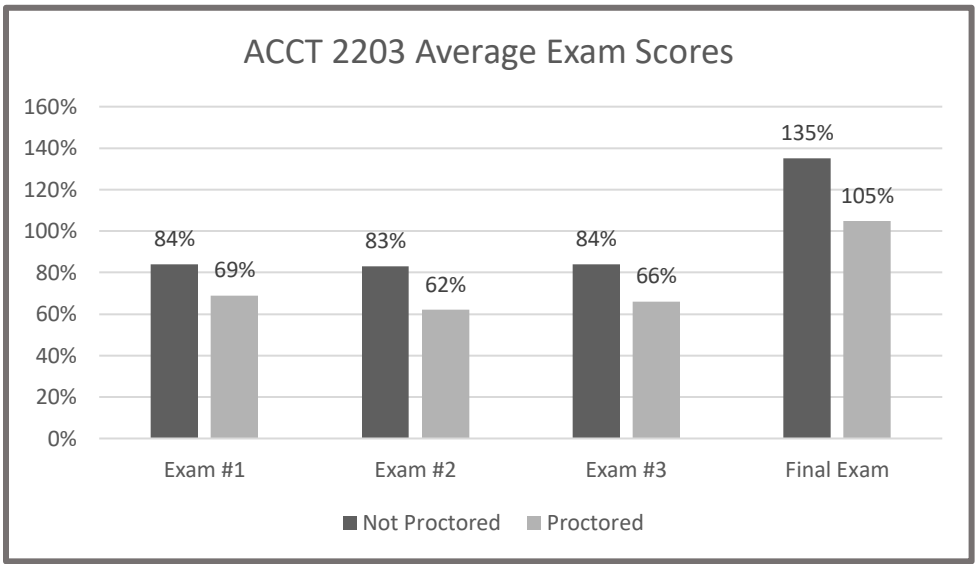


Figure 2
Fundamentals of Managerial Accounting Average Exam Scores Comparison



An independent sample *t-test* was conducted to compare the scores earned on all three-chapter exams and the final exam when the exams were not proctored with those when they were proctored. The samples statistics and the differences in the mean scores for the exams in Fundamentals of Financial Accounting and Fundamentals of Managerial Accounting are shown in Tables 1 and 2 below. As highlighted in Figures 1 and 2 (above), the results for both courses were significantly lower on the proctored exams than on the non-proctored exams.

Table 1
Fundamentals of Financial Accounting Independent T-test Sample Statistics

	Condition	N	Mean	Std. Deviation	Std. Error Mean
Exam_1_Tests_Scores	Not Proctored	67	79.93	13.435	1.641
	Proctored	65	68.23	14.006	1.737
Exam_2_Tests_Scores	Not Proctored	65	78.69	14.931	1.852
	Proctored	63	74.27	13.585	1.712
Exam_3_Tests_Scores	Not Proctored	57	79.56	15.257	2.021
	Proctored	58	63.43	17.804	2.338
Final_Exam_Tests_Scores	Not Proctored	59	81.78	11.010	1.433
	Proctored	62	65.10	13.849	1.759

Table 2
Fundamentals of Managerial Accounting Independent T-test Sample Statistics

	Condition	N	Mean	Std. Deviation	Std. Error Mean
Exam_1_Tests_Scores	Not Proctored	42	83.48	12.468	1.924
	Proctored	47	69.09	15.150	2.210
Exam_2_Tests_Scores	Not Proctored	42	83.00	11.910	1.838
	Proctored	42	61.93	14.729	2.273
Exam_3_Tests_Scores	Not Proctored	40	83.85	11.575	1.830
	Proctored	41	65.88	14.297	2.233
Final_Exam_Tests_Scores	Not Proctored	41	135.22	11.279	1.762
	Proctored	41	105.54	24.568	3.837

The independent samples test results for Fundamentals of Financial Accounting and Fundamentals of Managerial Accounting, shown in Tables 3 and 4 below, reveal there was a statistically significant difference (p-value is less than 0.05) in the exam scores for all but Exam #2 in the Fundamentals of Financial Accounting course between the proctored and non-proctored exams.

Table 3
Fundamentals of Financial Accounting Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference Lower	Upper
Exam_1_Tests_Scores	Equal varianceassumed	.234	.630	4.896	130	.000	11.695	2.388	6.969	16.420
	Equal variances not assumed			4.893	129.327	.000	11.695	2.390	6.966	16.423
Exam_2_Tests_Scores	Equal variances assumed	.101	.751	1.751	126	.082	4.422	2.525	-.575	9.420
	Equal variances not assumed			1.754	125.505	.082	4.422	2.522	-.568	9.413
Exam_3_Tests_Scores	Equal variances assumed	2.510	.116	5.213	113	.000	16.130	3.094	10.000	22.261
	Equal variances not assumed			5.220	110.954	.000	16.130	3.090	10.007	22.254
Final_Exam_Tests_Scores	Equal variances assumed	6.555	.012	7.312	119	.000	16.683	2.282	12.165	21.201
	Equal variances not assumed			7.353	115.397	.000	16.683	2.269	12.189	21.177

Table 4

Fundamentals of Managerial Accounting Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Exam_1_Tests_Scores	Equal variances assumed	5.928	.017	4.859	87	.000	14.392	2.962	8.504	20.279
	Equal variances not assumed			4.912	86.441	.000	14.392	2.930	8.568	20.216
Exam_2_Tests_Scores	Equal variances assumed	4.716	.033	7.209	82	.000	21.071	2.923	15.257	26.886
	Equal variances not assumed			7.209	78.559	.000	21.071	2.923	15.253	26.890
Exam_3_Tests_Scores	Equal variances assumed	1.732	.192	6.209	79	.000	17.972	2.895	12.210	23.733
	Equal variances not assumed			6.225	76.422	.000	17.972	2.887	12.222	23.721
Final_Exam_Tests_Scores	Equal variances assumed	26.718	.000	7.031	80	.000	29.683	4.222	21.281	38.085
	Equal variances not assumed			7.031	56.145	.000	29.683	4.222	21.226	38.140

Discussion

General

Academic integrity is important to higher education. Academic dishonesty threatens higher education as it makes assurance of learning more difficult, jeopardizes accreditations, devalues students' education and degree, making their diploma essentially worthless (Bergmans et al., 2021; Williams, 2022). Student cheating impacts learning and leaves students underprepared for their future (Carrasco, 2022). When opportunities to cheat are present and surveillance is obsolete or minimal, academic dishonesty transpires (Faucher & Caves, 2009). In the absence of any exam proctoring, students believe that it is okay to cheat because the instructor was not serious about the prohibition of outside resources (Dryer et al., 2020). To demonstrate the importance of assessment integrity and to assist in removing the opportunity to cheat, online webcam-based proctoring of examinations should be implemented.

Main Findings

While the Spring 2020 semester was characteristically different from any other semester given the worldwide lockdown due to the COVID-19 pandemic, the Fundamentals of Accounting courses used in this study had been previously taught 100% online and in a 7-week format prior to the COVID-19 pandemic that forced all learning to move to the online environment. Additionally, the 2020 course offering of Fundamental Financial Accounting was completed prior to the COVID-19 worldwide lockdown as the course started in early January 2020 and finished the last week of February 2020. As subsequent courses have also had the same results, there appears to be no significant differences between the groups of students that would have dramatically impacted the results.

Prior experience in teaching the introductory Fundamentals of Accounting courses led the instructors to suspect a high likelihood that cheating was occurring within the online examinations. However, prior to the Spring 2021 semester, there was not a monitoring software compatible with the learning management system and partner content utilized in the courses. When the monitoring software became available within the partner content platform for the Spring 2021 term, the instructors incorporated the use of this proctoring software for exams to help deter and prevent the suspected cheating.

The software is embedded within the partner content platform. Using a webcam, the software monitors students taking exams. While the instructors preferred live proctoring, live proctoring by the proprietary software within the partner content platform was not an option at the time of the study. However, the webcam records the student's testing environment and actions while taking the exams. After the examination period, the software provides the recordings along with reports that flag suspicious activity for the instructors to review. Since the examination content, examination settings (e.g., use of algorithmic questions) and materials permitted for use during the exams were the same under non-proctored and proctored testing, the only design variant was the use of the proctoring software.

The results of this study reveal evident and significant grade disparities between the proctored and non-proctored exam scores. These results are consistent with previous research where student scores on the proctored exams were significantly lower than the student scores on

non-proctored exams (Alessio et al., 2017; Daffin & Jones, 2018; Dendir & Maxwell, 2020; Fask et al., 2014; Hylton et al., 2016; Peterson, 2019; Reisenwitz, 2020). The Fundamentals of Financial Accounting course saw an average grade reduction of 12 points across the four exams while the Fundamentals of Managerial Accounting course observed an average reduction of 21 points.

Absent any monitoring, Kennedy et al. (2000) maintain cheating is much easier for students in online courses. The findings of the current study suggest that cheating was most likely occurring in the non-proctored exam environment as evident by the reduction of scores equivalent to one letter grade in Fundamentals of Financial and a two letter grade drop in Fundamentals of Managerial. The authors acknowledge that there may be other explanations in addition to cheating for the notable differences in the non-proctored and proctored exam scores, such as an increase in test anxiety, which can be associated with the proctoring environment's webcam and recording requirements due to privacy concerns (Fask et al., 2014). However, the lower exam scores on the proctored exams versus the non-proctored exams continued throughout all exams in both the consecutive classes, past when anxiety over using the proctoring software would be expected to have dissipated. Thus, the authors believe this indicates that a lack of academic integrity exists for many students when they are not monitored while taking exams (Faucher & Caves, 2009).

Limitations

It is important to consider the potential limitations to the generalizability of the results of this study. First, our focus was on students taking online, 7-week accelerated accounting courses without any comparison to traditional, face-to-face (F2F) accounting courses. Secondly, the demographics of students enrolled in online courses can differ largely from those enrolled in F2F courses. Non-traditional students are often older, likely working adults with small children, and may be attending school on a part-time or full-time basis.

Conflicts of Interest and Human Subjects Research

The authors are not aware of any conflicts of interest in this study. Additionally, no informed consent was provided or necessary as our research did not require Institutional Review Board (IRB) approval. According to our institutions' IRB exemption list, our research was exempt because it involved the study of the effectiveness of or the comparison among instructional techniques, curricula, or classroom management methods.

Future Research Ideas

Recommendations for future research are to replicate the study in other accounting courses as well as in other disciplines in and outside the business school. Additionally, this study used a video recording proctoring service. It would be interesting to see any differences between when live proctoring is used or the use of lockdown software without the use of video monitoring. Finally, future studies could look at the exam performance in courses with exam proctoring that allow the use of notes or other resources.

Conclusion

Students enrolled in the online Fundamentals of Financial Accounting or Fundamentals of Managerial Accounting courses with required proctored exams scored much lower on the exams than students enrolled in the same courses with no exam proctoring requirement. Students

in Fundamentals of Financial Accounting scored, on average, 12 points lower while students in Fundamentals of Managerial Accounting scored an average 21 points lower across all exams. Thus, the inclusion of monitoring software significantly negatively impacted the exam scores. A lack of academic integrity (cheating) is a strong explanation for the difference in proctored exam scores versus non-proctored exam scores in an online testing environment. Therefore, webcam monitoring appears to have been an effective deterrent to cheating in online courses, consistent with the findings of Alessio et al. (2017), Dendir Maxwell (2020), Fask et al. (2014) and Hylton et al. (2016).

Allowing cheating to go unchecked is a threat to higher education. Academic dishonesty makes it difficult for institutions to properly conduct assurance of learning and devalues the students' education and their degrees, making their diplomas essentially worthless (Bergmans et al., 2021; Williams, 2022). As the demand for online education continues to surge, educators must take measures to help ensure that cheating is curtailed, and academic integrity is maintained in online teaching. The use of proctoring software can help in this endeavor to deter and prevent cheating in the online environment. The results of this study reveal the positive impact that the use of proctoring software can have on reducing the opportunity to cheat thus assuring higher academic integrity in online courses.

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