College Students' Academic Performance: from Online to on Campus Learning During the Aftermath of a Pandemic

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Abstract:

Education is an important sector that was highly and negatively impacted by the COVID-19 pandemic. Starting with ceasing education then transitioning to fully online learning, education was severely affected which resulted in lower academic performance. Many research papers studied the effect of such change on education, however, in this research we focus on the aftermath of the pandemic since many countries declared the end of COVID as a world pandemic. In this research, we conducted an

online survey to 214 college students mainly from Saudi Arabia to assess how several factors affect academic performance during the transitioning period from fully online to blended or fully on campus learning. We looked at three factors namely: test competence, engagement, and attention span. We found that test competence and engagement in the classroom positively and significantly affect students' academic performance. Tactical and technical implications are suggested and discussed to improve online educational platforms and on campus learning which will help enhance academic performance.

Keywords: Education; Educational platforms; Online learning; Academic performance; COVID pandemic

Introduction

Since the beginning of the COVID-19 pandemic, many aspects of our mundane life have changed. People worked from home, groceries were done online, and educators' homes became mini classrooms where teachers broadcasted lectures to students everywhere (D'lima n.d.). Although most areas were adversely affected, education was hit the most. Due to the sudden spike in COVID cases, paired with minimum knowledge about the disease and treatments, many schools and universities decided to abruptly close and shift to online learning. This led to a decline in students' performance in many areas of the world (Sintema 2020). Students who were seniors in their schools were affected the most since they had to conduct national testing to qualify them for higher education (Kathula 2020).

During the pandemic, many education ministries and universities in all specializations utilized technology to combat the effects of the pandemic. Universities and schools shifted to running classes on platforms such as Blackboard and Microsoft Teams, where lectures would be conducted online along with exams, communication, and everything else. Some disciplines, such as dermatology, tried to benefit from the online visits by involving students in the virtual visits to get more exposure and increase their learning (Loh et al. 2020).

The COVID pandemic hit the hardest at the beginning of 2020, however, after about two years, the world is opening up again. Many countries in Europe declared the end of the pandemic. Countries around the world lifted their travel restrictions, and the education system went back to being fully on-campus. But this transitioning period entails dealing with students who got accustomed to viewing lectures online, doing exams virtually, and communicating -mostly - asynchronously through email and messages left on educational platforms. In this research, we would like to gauge the effect of the aftermath of the pandemic on college students' performance. How are they transitioning back to on-campus learning and how is their education experience affected? In particular, we investigate the effect of three variables: test competence, class engagement, and attention span as possible factors affecting academic performance during the transitioning period from online learning to on-campus. In this research we ask the research question: How do test competence, class engagement,

and attention span individually and collectively influence academic performance for students returning to on-campus learning after the COVID-19 pandemic?

Literature Review

Technology Impact on Education Outcomes

It is undeniable how technology changed the way we live. It has radically impacted and changed every aspect of our life, and education is one of the major fields that has been revolutionized. Classrooms started utilizing technology beginning with radios in the 1920s, moving on to more advanced tools such as overhead projectors, smartboards, and personal computers reaching the era of handheld tablets in 2010 to assist in the education process and improve student learning. It is worth mentioning the emergence of the Internet that transformed the way technology was used. Students became able to access an ocean of information sources instantly. Research on the impact of technology on education is extensive with numerous findings. Kulik (1994), conducted a meta-analysis study aggregating the findings of 500 individual research studies on computer-based instruction software. The study concluded that the classes which include computer-based instructions take less time to learn, are more likable, and allow students to develop stronger positive attitudes. Three individual studies have been conducted by Rockman et al (1997; 1998; 2000), with the aim of evaluating the effectiveness of Microsoft's "Anytime, Anywhere Learning Program" and positive outcomes were documented. The program was launched in 1996, and students included in the program were from different schools across the United States. Each student was provided with preloaded Microsoft Office software, and teachers were trained to integrate this technology into the classroom. The results of the studies showed that students with laptops had more access to information, improved research analysis skills, higher writing quality, and adopted active learning strategies. They also get to spend more time doing their assigned homework on their computers and participate in collaborative work with their peers.

Covid Impact on Education

The COVID pandemic had a profound effect on the education system. Beginning of the pandemic, several schools shut down before

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transitioning to online learning. Prior studies found a significant reduction in Math scores when schools shut down for any circumstances (Hoofman and Secord 2021). Students' general well-being and mental well-being was adversely affected during the pandemic (Karademir et al. 2020; Cifuentes-Faura et al. 2021). A study found that a large percentage of students reported increased rates of depression and lower satisfaction in life (Liang et al. 2020), which would affect their education experience (Hoofman and Secord 2021). Another issue exacerbated by covid is the widening of the socioeconomic gap between students. In order to have an education during COVID time, students needed to have access to proper technology and the internet (Hoofman and Secord 2021). Students also have varying levels of technical literacy. Although technology generally proved its positive effect on education and academic performance, lacking resources and technical skills will adversely affect education outcomes. In a study conducted recently, researchers found that during COVID, students reported unreliability of internet connections and lack of resources which negatively impacted their education experience (Dutta and Smita 2020).

Academic Performance

Students' academic performance is a central feature of the education system. The literature presents several studies that define academic performance and draw attention to its importance. It has been stated that academic performance contributes to the quality of the graduates (Abaidoo 2018) and is used as a measure of the success and failure of the educational institution (Narad and Abdullah 2016). It was defined as the level of knowledge obtained and measured by teacher-assigned grades (Narad and Abdullah 2016) such as grades obtained from continuous assessments or tests. Also, Ward et al. (1996, as cited in Arshad et al., 2015, p.4) stated that academic performance is the outcome of education. It is the students', teachers', or institutions' achievement of an educational goal over a period of time. Different studies have been conducted to identify the various factors that influence students' academic performance in various academic institutions. Academic performance is important since it determines students' educational attainment results both during their studies and after they graduate. During the lockdown caused by the outbreak of COVID-19 disease, there was a significant shift in education. Traditional on-campus learning has been replaced by home-based virtual learning. As a result of

the pandemic, schools and colleges, as well as tutors and learners, were obliged to shift to an unfamiliar online environment. The learners were not mentally prepared for such a change. This change had an impact on the academic performance of some students, both positively and negatively. For example, prior research found that the abrupt conversion to online learning and the introduced challenges that accompanied the sudden transition negatively affect academic performance (Bin Abdul Aziz et al., 2021). According to Ghaleb A. El Refae et al. (2021), during the outbreak, students performed better academically in E-learning than in face-to-face instruction. The implementation of E-learning resulted in fewer low-achieving students and a rise in the number of students with higher GPAs. Moreover, students benefited from E-learning since they have limitless access to learning materials such as recorded lectures. "Innovative teaching methods used in distance learning help sustain student's interest and make the learning process more productive and interesting." (Natarajan, M., 2005, as cited in Ghaleb A. El Refae et al., 2021, p. 104). Colleges and universities have different qualities that may influence students' academic performance. Teachers' and students' knowledge and experience, teaching methods and techniques, and the availability of required learning and teaching materials and equipment are all examples of these. Since academic performance is a great predictor to students' success and is an important gauge for students' knowledge acquisition, we look into several factors that may influence this metric during the transitioning period back to on campus. Examples of such factors are: class engagement, attention span, and test competence.

Test Competence

There is a general lack of sources in the literature discussing test competence. In the found material, the academic performance of students is fully and positively associated with academic competence, test competence, and time management (Kleijn et al. 1994). Test competence is defined as the student's capacity to cope with a large quantity of the course content to prepare for examinations (Kleijn et al. 1994). However, Test competence is the most important factor that can help students with their academic performance (Sansgiry 2006), and is positively associated with time management and time anxiety according to the result of Talib's (2012) study. There was a study conducted among pharmacy students by

Sansgiry (2006) that shows that students who are struggling in coping with large numbers of courses for exams will have a lower GPA regardless of other factors. Griffin et al. (2012) conducted a study on 107 university students to understand the factors that influence their academic performance. The valid and reliable Learning and Study Strategies Inventory (LASSI) 10-scale assessment, that is originally developed by Weinstein et al. (1987), was used to measure how the stated skills and abilities will improve the students' capacity of learning and good performance in an academic context and whether it has an impact on the GPA. Out of the 10 scales, the study concluded that eight scales, including the Test Strategies (TST) scale, have strong statistically significant correlations with the students' academic performance measured by the GPA. Test Strategies is defined as the scale that assesses students' capacity to successfully take tests and prepare for them.

In this research, we investigate the relationship between test competence and academic performance during the aftermath of the COVID pandemic. Therefore, we hypothesize:

- H1. After coming back to on-campus learning during the aftermath of COVID, test competence positively affects academic performance

Engagement

Engagement, in an academic context, refers to the level of effort students pursue to attain desired measurable outcomes (Kuh et al. 2007) and build their knowledge and critical thinking (Knowles & Dixon 2016). Miller et al. (2011) stated that engagement is the students' willingness to continue their active learning process regardless of any obstacles. It is also defined by Briggs (2015) as the amount of interest and motivation students show towards the topic they are learning and their interaction with their instructors, classmates, and the course. The most famous engagement framework is Fredricks's et al. (2004) framework where engagement is discussed as a multidimensional construct that can be categorized into three-dimension: (1) behavioral, (2) emotional, and (3) cognitive engagement. (Each dimension can propose both a positive pole (describes attitudes that show compliance to expectations and productivity) and a negative pole (describes attitudes that can be seen as obstructive or

counter-productive). Behavioral engagement refers to student participation in various academic, social, and extracurricular activities. It can describe the student's observable actions such as effort and compliance with behavioral norms (e.g., attendance) (Daniels et al. 2016) which is seen as an important dimension for high academic achievement. Emotional engagement refers to the student's feelings, both positive and negative, toward their classmates, instructors (Wester et al. 2021), and course (Daniels et al. 2021). Student feelings can range from negative or unpleasant feelings such as boredom, sadness, and anxiety to positive or pleasant feelings such as interest, happiness, and trust (Fredricks et al. 2004; Daniels et al. 2021). Last but not least, cognitive engagement refers to the student's investment in their learning; the extent they would exceed the stated academic requirements and accept challenges. It can be demonstrated when students search for additional resources to help them understand the content of the taken course. Alternatively, cognitive engagement is also defined as the set of cognitive processes such as problem-solving and critical thinking (Appleton et al. 2008).

Engagement is important as studies proved its effectiveness on learning outcomes (Prince 2004; Carini et al. 2006) and academic success (Docherty et al. 2018; Dyment et al. 2020). Hake (1997) studied 6,000 students' pre/post-test data in an introductory physics course and found that students in classes with significant use of interactive-engagement methods have substantially improved performance. Also, tests measuring conceptual understanding results from classes promoting engagement were two times higher than test results obtained from the traditional classes. Robbins et al. (2004) conducted an integrative meta-analytic study on the degree to which college success can be predicted by student engagement. Two college outcomes were studied as a measure of success: academic performance measured using cumulative grade point average (GPA) and persistence or retention. Nine constructs related to college success were used to categorize over 100 studies. The academic-related skills construct showed a relationship with academic performance and a stronger relationship with retention.

As a result of the COVID-19 pandemic and the explosion of online learning worldwide, today, more than any time ever, student engagement importance is highlighted and emphasized as all students were facing while

taking their courses was only a screen. Courses were delivered with the use of platforms such as Blackboard, Zoom, and Microsoft Teams and the use of PowerPoint slides and reading materials. Although these platforms provide means for students to interact and collaborate including, but not limited to, discussion forums and chat boxes, they weren't sufficient to remove the barrier and isolation the students felt. Hill and Fitzgerald (2020) stated that there was a noticeable reduction in students' participation in optional learning forums considering the time students needed to make sure what they are sharing reflects academic writing standards. They also stated that the usage of these platforms for learning hindered students' engagement because of their life commitments that had them go back and forth; thus, making it harder to achieve the "sense of belonging".

Previously, students' engagement showed profound effects on academic performance. However, since prior studies found that students' engagement was affected by online learning (Hill and Fitzgerald 2020), we would like to investigate if engagement still has a significant effect on academic performance during the transitioning period from online learning to on campus. Therefore, we hypothesize:

- H2. After coming back to on-campus learning during the aftermath of COVID, class Engagement positively affects academic performance

Attention Span

"Learning in the age of the goldfish" was the headline of an article published after the release of Microsoft Corporation research in 2015 stating that the human average attention span has dropped to 8 seconds after it was 12 seconds in 2000, which is less than the goldfish attention span by 1 second. The study sampled 2,000 Canadians that are 18 years old and above that play online games; and aimed to study the impact of today's technology on the attention span.

For a long time, lectures have always been delivered inside the classrooms with physical attendance of students. Schools' libraries, textbooks, and reading materials were some of the main sources of learning materials at that time. Today, the education system witnessed a huge transition by applying online learning delivery methods such as Blackboard and Zoom, especially after the spread of COVID-19. It enabled

other new learning materials to be utilized with the use of the internet such as recorded lectures, virtual classrooms, video presentations, and scheduled tasks with extensive reading materials (Lathrop 2011). These materials, despite the opportunities they offered, are seen to have a negative impact on the attention of the students (Geri et al. 2017).

Multiple definitions of attention span are available from different sources. First, Cicekci and Sadik (2019) states that attention span is a mental condition of awareness and focus. Statistic Brain (2015) also defined it as "the amount of concentrated time on a task without becoming distracted." It adds on stating that educators and psychologists consider being able to pay attention in performing tasks is central for attaining desired goals. Students' attention span is an important indicator of their performance and is a very significant trait for the students to possess to be successful in school. A previous quantitative study found that students who are more involved in online gaming are more likely to have a less attention span than their counterparts (Kokoç et al. 2021).

The large amount of material content delivered through online media exhaust the students, causing them to shift their attention to other things. As a consequence, students take advantage of their freedom in accessing the internet and using their devices to decrease the stress and boredom they feel in class (Rosegard and Wilson 2013). There are a number of factors that cause students to ignore lectures and turn to their electronic devices. For example, as previously mentioned, boredom occurs for a variety of reasons, including the fact that students feel that if instructors do not make an effort to offer the best possible visuals for their lectures, students will not dedicate their complete attention and time to that presentation, according to Bradbury (2016). The learning materials given to students can include one-hour video lectures or scheduled tasks with extensive reading materials, which can severely impact some students' attention spans. Teachers reading large sections of presented content, for example, can possibly significantly distract students' attention. Another factor that impacts students' attention is the environment in which they attend their online classes; including the sounds and noises surrounding students. According to Zhang and Zhang (2018), losing attention during a virtual class depends on environmental noise conditions, and the results indicate that noise levels greater than 75 decibels have a serious impact on students' attention.

During online learning, and the reliance on technology and online classes, students' attention span was affected. In this research, we would like to investigate if during the transitioning period back to in campus learning, does attention span have an effect on academic performance? And how can we amend technology designs to improve students' attention span. Therefore, we hypothesize:

- H3. After coming back to on-campus learning during the aftermath of COVID, attention span positively affects academic performance

Methodology

In the past two years, the effect of COVID on education has been documented through many valuable scholarly works. We decide to collect data by running online surveys. The sample consisted of male and female college students. The survey was administered using Survey Monkey and initially was distributed to students in a college in Saudi Arabia. Participants consented to vulnerability taking the survey and were informed of their rights to anonymity and confidentiality. Upon consent, only participants with the age of 18 and older and college students were allowed to take the survey as these two were the inclusion criteria for the study. Participants answered demographic questions and hypotheses related questions. At the end of the survey, participants were offered a chance to enter a random draw of three 100 SR gift-cards from Starbucks as a thank you from the researchers. Data collection took one week, then the random draw was done using a computerized tool to select the winners. The overall survey time took about five minutes.

After the data collection was complete, the data was analyzed using SPSS and running regression models to understand the effect of the aftermath of COVID and other variables on education and students' performance.

Results

The survey was administered online and was posted on Blackboard for students to take if they were interested. The survey was also shared by participants voluntarily using the snowball method. Initially, we collected 270 responses and found that 214 are complete and usable. We collected demographic data including Country. Participants were from Saudi Arabia

(93.5%), United States (4.7%), Turkey (0.9%), Germany (0.5%), and Yemen (0.5%). Our sample consisted of 90.7% female and 9.3 male participants. The majority of our sample (89.7%) reported an age ranging from 18 to 24 years old. 8.9% of participants reported an age ranging from 25 to 30 years old. The remaining participants reported an age between 31 and 35 years old. Our sample included 86.9%, non-employed students. Participants reported the following income range in Saudi Riyal: below 1,000 (68.2%), 1,000-5,000 (26.6%), 6,000-10,000 (2.3%), and above 10,000 (2.8%).

We also collected data regarding the number of online and on-campus courses each participant has. Table 1 includes the percentages reported by our sample.

		On-campus percentage	Online Percent
Valid	.00	19.2	24.8
	1.00	8.9	27.1
	2.00	13.6	14.5
	3.00	16.4	9.3
	4.00	16.4	6.1
	5.00	17.8	8.4
	6.00	7.9	9.8
	Total	100.0	100.0
	Table 1: Percentages of online and on-campus courses taken during the semester of the data collection.		

The dependent variable (Academic Performance) was a scale borrowed from the literature (Sansgiry et al. 2006). Academic performance (M=3.90, SD= 0.62) included five items (α = .74) was measured using a 5-point Likert type scale, ranging from strongly disagree = 1, to strongly agree = 5. We also collected independent variables data as scales from prior literature. Test competence scale (Sansgiry et al. 2006) (M= 3.21,

SD= 0.79) was measured using a 5-point Likert type scale, ranging from strongly disagree = 1, to strongly agree = 5. The scale originally had four items, however, after conducting Cronbach's alpha reliability test, it was found suitable to remove the fourth item to have a reliable scale. Therefore, the used scale included three items with acceptable reliability (α = .69). The engagement scale (Handelsman et al. 2005) (M= 3.68, SD= 0.77) was measured using a 5-point Likert type scale, ranging from: not at all characteristic of me = 1, to very characteristic of me = 5. The scale included six items (α = .77). Lastly, attention span (Boersma and Das 2008) (M= 3.47, SD= 0.49) was measured using a 5-point Likert type scale, ranging from: not at all characteristic of me = 1, to very characteristic of me = 5. The scale included ten items (α = .60). All variables were tested for skewness and proved to be normally distributed and within the acceptable range of -2 to +2.

To test for the hypotheses, we ran a regression model using SPSS. Table 2 includes the Coefficients.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.853	.326		5.690	.000
	Test Competence	.269	.048	.344	5.600	.000
	Attention Span	.111	.075	.088	1.473	.142
	Engagement	.263	.049	.330	5.401	.000
	Age	-.065	.109	-.038	-.594	.553
	Income	.006	.058	.007	.110	.913
	Online Courses	-.020	.018	-.063	-1.066	.288
	On-Campus Courses	-.021	.019	-.065	-1.082	.280

Table 2. regression model testing the effect of different variable on the dependent variable: Academic Performance.

The model was significant (adjusted R-squared= .31). F (7,205) =14.76, p<.001. According to the beta coefficients in Table 2, we conclude that H1(After coming back to on-campus learning during the aftermath of COVID, test competence positively affects academic performance) is supported, H2 (After coming back to on-campus learning during the aftermath of COVID, class engagement positively affects academic performance) is supported, H3 (After coming back to on-campus learning during the aftermath of COVID, attention span positively affects academic performance) is rejected.

Discussion

Academic performance was severely impacted during the COVID pandemic with education institutions reporting decreased grades in STEP courses (Hoofman and Secord 2021). Test competence is an important indicator of academic performance; however, its presence is lacking in the literature. In this study, we found that test competence has an effect on academic performance during the aftermath of the COVID pandemic. The result is in line with a prior study result (Griffin et al. 2012). The finding is also significant because it supports and adds to the literature about test competence which is lacking and bridges the gap in literature. Since this factor showed a significant effect on academic performance, it is recommended to give it enough attention when designing courses either online or offline. It is expected that the pandemic is ending, however, with the increase in the number of positive cases during mid 2022 (Clarke 2022), it is possible to witness another outbreak that could lead to the return to blended learning or purely online learning settings. Universities and educators using platforms such as Blackboard should consider improving students' test competence by providing test tutorials, mock exams, and exam skills workshops that would lead to students' improvement in their academic performance. These suggestions could be incorporated in educational platforms or conducted in class. Educational platforms could provide this material for educators to seamlessly upload in their online classes. For example, Blackboard may provide tested materials that educators can require their students to take prior to any course testing. This recommendation needs further research to measure the effectiveness of such training specifically if it were to be administered without the supervision of the professor.

Class engagement was found to have a significant effect on academic performance. Engagement with class material and the instructor was previously found to have a profound effect on students' success and eventually their performance (Docherty et al. 2018; Dyment et al. 2020). Engagement while physically in the classroom differs a lot compared to engagement online. Engagement in online learning was found to be lower than engagement in physical classrooms (Fisher 2010). It was also found that engagement in online settings is reduced not only because of the nature of distant learning, but also due to the type of activities conducted in the classroom. For example, less active instruction methods and reduced support lead to reduced engagement (Fisher 2010; Meyer 2014). Since engagement showed a significant effect on academic performance during the transitioning period from distance learning to blended or fully on campus learning, it is important to improve students' engagement both in the classroom and online. Professors should consider one on one instruction for all students at least once during the semester to provide tailored support to students and improve their engagement. Online educational platforms could also send prompts or notifications to students to remind them to participate in activities, especially during synchronized online sessions. Such subtle nudges to students would help them stay focused and might improve their motivation to take part in the classroom. These nudges could be coordinated and sent to students on varying times so not all students would get a notification at the same time. The system is also recommended to have the professor initiate the notifications when the instructor believes the classroom requires more engagement from the students' parts. Although this idea has not been tested, notifications are used widely in applications to prompt users to act upon something or to remind users about the use of the application (Lee et al. 2009; Fabito et al. 2016).

Attention span did not show any significant effect on academic performance. Prior research found that students' attention span is volatile during online learning due to different reasons such as student feelings of boredom (Rosegard and Wilson 2013). We initially assumed that students' attention will show a positive effect on students' performance, however, this hypothesis was not supported. A possible reason for this is that attention span, as discussed earlier, differs between online and physical learning. The scale used in this study does not control for online vs offline

learning. Therefore, we could not detect an effect on performance. Another possible reason is that data used in this study is self-reported which may jeopardize the reliability of the data. Future research is recommended to further look into the effect of students' attention span on academic performance.

Limitations

The study includes a number of limitations. First, the data in this research is self-reported which may jeopardize the reliability of the data. Participants might report less accurate information due to many reasons including negligence or lapses of memory. The sample in this research is predominantly female participants, therefore, this would limit the generalizability of the result to the male population. The sample is also mostly from Saudi Arabia, which would limit the generalizability of the results to mostly Saudi college students. Future research is recommended to test for the applicability of the recommendations in this study as these were based on the theoretical found results in this study. Future testing and prototyping of the recommendations is recommended prior to implementation in educational platforms.

Conclusion

The COVID pandemic negatively affected the education process. Several research articles looked at the effect of the pandemic on students' performance. In this research, we focus on a recent time which is the return to on campus learning and how that disruption affect the education process. In particular, this research looks at the effect of three factors on students' academic performance during the aftermath of the COVID pandemic. The three factors we looked at are: test competence, engagement, and attention span. We found that test competence and engagement have a positive effect on academic performance. We discuss several implications and suggestions to be tested in the classroom and also to be piloted in online educational platforms. Limitations of the study are also discussed.

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الأداء الأكاديمي لطلاب الجامعات: من التعلم عبر الإنترنت إلى التعلم في الحرم الجامعي في مرحلة ما بعد الوباء

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المستخلص:

يعتبر قطاع التعليم من القطاعات المهمة التي تأثرت بشكل كبير وسلبي بسبب جائحة COVID-19. بدءًا من إيقاف التعليم إلى الانتقال إلى التعلم عبر الإنترنت بالكامل، تأثر التعليم بشدة مما أدى إلى انخفاض الأداء الأكاديمي. درست العديد من الأوراق البحثية تأثير هذا التغيير على التعليم، ولكن في هذا البحث نركز على ما بعد الجائحة منذ أن أعلنت العديد من الدول نهاية COVID كجائحة عالمية. في هذا البحث، أجرينا استبيانًا عبر الإنترنت لـ214 طالبًا جامعيًا، أغلبهم من السعودية، لتقييم كيف تؤثر عدة عوامل على الأداء الأكاديمي خلال فترة الانتقال من التعلم عبر الإنترنت بالكامل إلى التعلم المختلط أو التعلم بالحضور الكامل في الحرم

الجامعي. ركزنا على ثلاثة عوامل وهي: الكفاءة في الاختبارات، التفاعل، ومدى الانتباه. وجدنا أن الكفاءة في الاختبارات والتفاعل في الفصول الدراسية يؤثران بشكل إيجابي وكبير على الأداء الأكاديمي للطلاب. تم اقتراح ومناقشة دلالات تكتيكية وتقنية لتحسين منصات التعليم عبر الإنترنت والتعلم في الحرم الجامعي مما سيساعد على تحسين الأداء الأكاديمي.

الكلمات المفتاحية: التعليم، المنصات التعليمية، التعلم عبر الإنترنت، الأداء الأكاديمي، جائحة كوفيد