

Online Teaching and Learning Challenges facing the Construction Management Students in KwaZulu-Natal, South Africa

Phindile Sohuma¹, Modupe Cecilia Mewomo², Chikezirim Okorafor³

¹ Department of Construction Management and Quantity Surveying, SA
Durban University of Technology
PhindileS1@dut.ac.za

Abstract

The emergence of the global pandemic Coronavirus has caused a sudden shift from the traditional approach of teaching to an online mode of teaching and learning (T&L) across the world. The sudden shift has not been without some challenges especially in the African context, particularly, South Africa with stubborn levels of inequalities and unequal access to opportunities. This paper aims to investigate and evaluate challenges associated with online teaching and learning with specific focus on Construction Management and Quantity Surveying (CMQS) students at Durban University of Technology (DUT). The paper adopted a quantitative research approach with 77 students from both undergraduate and postgraduate (Honours) participating from a higher institution of learning in South Africa. The key findings from quantitative results indicated that the class attendance, internet connections, lack of technical skills and lack of infrastructure support are key challenges facing the delivery of online learning and the academic performance of the students. Furthermore, these challenges were regrouped and classified into four groups namely technical, psychological, social and infrastructure challenges. This study revealed these challenges negatively impacts on the academic performance of students and the successful implementation of online learning. The study recommends that higher education institutions should develop strategic plans coupled with digital literacy and resources to equip both students and lecturers to address these challenges.

Keywords

Online learning, higher education, digital transformation, students, South Africa.

1. Introduction

Traditionally before the advent of COVID-19 pandemic, construction education has been content-based, hands-on, design-oriented, and concentrated on the development of critical thinking or problem-solving abilities (Bourne et al., 2005). Various methodologies, including active constructivism, project and problem-based learning, flipped classrooms, and project and problem-based learning, have improved higher education in the built environment (Bishop & Verleger, 2013; Lima et al., 2017). Over the last decade, online education has established itself as a significant tool for higher education institutions. Despite the benefits of online education, it is often faced with skepticism and opposition from both educators and students (Vivolo, 2016). According to (Asgari et al., 2021) states that converting a traditional learning to an online format takes time and needs substantial work from the university stakeholders, as well as expertise with the resources available. The COVID-19 pandemic has drastically altered the methods in which higher education (HE) institutions presently provide education. Students and lecturers from all study disciplines and levels were required to immediately convert to online learning teaching methods and evaluation in accordance with national lockdown regulations (Lockee, 2021). According to (Benson, 2002; Carliner, 2004; Conrad, 2002) online learning is described as access to learning experiences via the utilization of some technological tools and advancements such as the internet, wireless networks, mobile phones, and other means of communication (Ratheeswari, 2018). The abrupt change from the traditional approach of teaching and learning to online learning posed a significant challenge, disruption, and disturbance to work-life balance and wellbeing, with many students and staff in the built environment education sector as they were feeling particularly isolated and detached from their peers and colleagues with whom they worked and socialized on a daily basis prior to the pandemic (Abbasnejad et al., 2023; Gülbahar & Adnan, 2020). This paper identified and addresses the key setbacks or challenges of online learning in construction education. To achieve this, the quantitative study was conducted to answer the following objective:

1. What are setbacks of online teaching and learning towards Construction Education that affect student academic performance?
2. What are the recommendations for addressing the top setbacks of online teaching and learning in construction education?

Through this study, the authors aim to fill the research gap by collecting data on setbacks of online teaching and learning, identifying and classifying the most significant setbacks using a quantitative approach, and providing recommendations to address them.

2. Methodology

The study used quantitative method approach to assess online teaching and learning challenges facing the construction management students in KwaZulu Natal. To achieve this objective, a well-structured questionnaire survey was prepared and administered to elicit relevant information from the respondents. The respondents were students registered in construction management department (second years, third years and fourth years) at Durban University of Technology, South Africa. The choice of quantitative research approach utilizing questionnaire survey was deemed to be appropriate for this study because, according to (Rea & Parker, 2014), states that the questionnaire covers large audience in a lesser time, and it quite easy to use. The questionnaire was prepared using a five-point Likert scale. The quantitative data was analyzed using Statistical Package for the Social Science (SPSS), adopting both descriptive and inferential statistics using factor analysis (FA) to analyse the retrieved and collected data. This approach has been used and found appropriate in the previous research (Aluko et al, 2021; Mewomo et. Al, 2022). The study achieved a Cronbach alpha value of 0.930 thereby giving credence to the reliability of the data collected.

3. Findings and Discussions

Table 1 shows the background information of the students in the department of CMQS at DUT. The respondents' information includes gender and qualification level in the department. From the results it shows that out of 77 participants from survey 57, 1% participants were male while 42, 9% were female. The results also revealed that 40, 3% were second year students, 36, 4% were third year students and 23, 4% were fourth year students.

Table.1 Respondents' demography

Gender	Frequency	Percent	Valid Percent
Male	44	57.1	57.1
Female	33	42.9	42.9
Total	77	100.0	100.0
Study level	Frequency	Percent	Valid Percent
Second year	31	40,3	40,3
Third year	28	36,4	36,4
Fourth year	18	23,4	23,4
Total	77	100,0	100,0

4.1 Descriptive Analysis

A total of twenty-one (21) setbacks in online learning with a code called (SIOLs) were identified and extracted for use in this study. Table 2 presents the descriptive analysis of the data retrieved from the questionnaire survey. Variables with very significant values were represented by "VS" and Significant by "S". From this table, it could be summarized that out of all challenges that were identified only five were perceived to be very significant. Those are SIOL9: Technical problems associated with internet connectivity was unanimously ranked number one among others, followed by SIOL21: Less participation from and amongst the student ranked as second one, SIOL5: Lack of physical consultation with lecturers being third, SIOL10: Loss of interest due to online T&L ranked as fourth and SIOL18: Difficulty in assimilating lessons online ranked as the fifth.

Table 2 Descriptive results for challenges of online learning

Code	Setbacks	Mean	Std. Dev.	Significance Level	Rank
SIOL9	Technical problem associated with	3.92	1.295	VS	1 st

Code	Setbacks	Mean	Std. Dev.	Significance Level	Rank
	internet connectivity				
SIOL21	Less participation from and amongst the student	3.79	1.239	VS	2 nd
SIOL5	Lack of physical consultation with lecturers	3.58	1.408	VS	3 rd
SIOL10	Loss of interest due to online T&L	3.56	1.391	VS	4 th
SIOL18	Difficulty in assimilating lessons online	3.56	1.094	VS	5 th
SIOL15	Absence of physical workspaces	3.53	1.294	S	6 th
SIOL17	Difficulties in adapting to new changes	3.49	1.334	S	7 th
SIOL6	Difficulty to adopt & adjust to new T&L	3.48	1.242	S	8 th
SIOL14	Absence of contact group discussion class	3.47	1.294	S	9 th
SIOL3	Trial & error in the online assessment procedure	3.44	1.057	S	10 th
SIOL11	Excessive workload	3.35	1.189	S	11 th
SIOL16	inaccessibility & unaffordability of ICT gadgets	3.30	1.136	S	12 th
SIOL7	Problem of technology adaptability	3.30	1.298	S	13 th
SIOL20	Low productivity	3.27	1.221	S	14 th
SIOL1	Anxiety from transitioning from face to face to online T&L	3.26	1.312	S	15 th
SIOL2	Zero-self exploratory learning	3.16	1.077	S	16 th
SIOL13	Lack of transparency in the method of assessment	3.10	1.021	S	17 th
SIOL8	Difficulties in receiving detailed feedback on assessments	3.05	1.287	S	18 th
SIOL12	Un-realistic deadline from the lecturers	3.03	1.235	S	19 th
SIOL4	Inadequate measures to check plagiarism	2.94	1.228	S	20 th
SIOL19	Late schedule of classes	2.87	1.218	S	21 st

4.2 Factor Analysis: setbacks of online learning

Further to descriptive analysis carried out on the retrieved data, factor analysis was done. Table 3 shows the results of the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's Test of Sphericity. The KMO value of 0.870 indicates that the sample size is adequate for factor analysis. Bartlett's Test of Sphericity has a chi-square value of 900.508 with 210 degrees of freedom and a p-value of 0.000, indicating that the correlation matrix is significantly from an identity matrix, therefore factor analysis can be used to extract meaningful factors from the data.

Table 3 KMO and Bartlett's test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.870
Bartlett's Test of Sphericity	Approx. Chi-Square	900.508
	df	210
	Sig.	<.001

Five components were extracted to represent the underlying factors: 8.908, 1.811, 1.428 and 1.223, with 42.418%, 8.622%, 6.800%, 5.825% and 4.921% of their variance, respectively. This means that the first group had a 42.418% contribution, the second group had an 8.622% contribution, the third group had a 6.800 % contribution, the fourth group had a 5.825% contribution and the fifth group had 4.921. The five groups have a total cumulative variance of 68.584%. (Shrestha 2021) stated that 50% and above is sufficient for variance variability in order to conduct PCA analysis. This study computed 68.584% this means factor analysis can be used to conduct this study. The varimax rotation was employed to interpret the five groups as displayed in Table 4 and Table 5

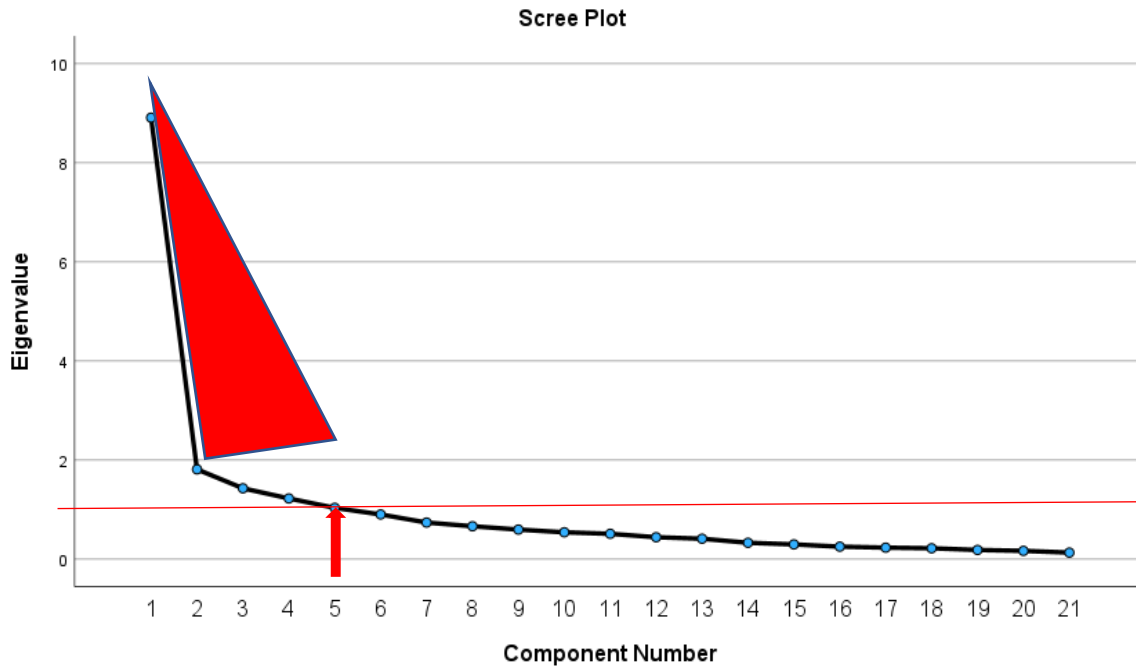


Table 4 Rotated Component Matrix

	1	2	3	4	5
Low productivity	0.683				
Late schedule of classes	0.680				
Lack of transparency in the method of assessment	0.652				
Difficulties in adapting to new changes	0.601				
Difficulty in assimilating lessons online	0.546				
Excessive workload		0.749			
Technical problem associated with internet connectivity		0.680			
Loss of interest due to online T&L		0.636			
Un-realistic deadline from the lecturers		0.607			
Trial & error in the online assessment procedure		0.535			
Absence of contact group discussion class			0.815		
Absence of physical workspaces			0.706		
Less participation from and amongst the student			0.580		
Lack of physical consultation with lecturers			0.522		

Anxiety from transitioning from face to face to online T&L			0.840
Problem of technology adaptability			0.686
Difficulty to adopt & adjust to new T&L			0.652
Zero-self exploratory learning			0.573
Inaccessibility& unaffordability of ICT gadgets			0.747
Inadequate measures to check plagiarism			0.712
Difficulties in receiving detailed feedback on assessments			0.575

The factors loaded in components 1 to 5 showed in Table 4 were re-grouped into 5 components to allocate unique names, as shown in Table 5

Table 5 Setbacks of online learning

Components	Setbacks of online learning
Component 1: Pedagogical Skills factors	Low productivity
	Late schedule of classes
	Lack of transparency in the method of assessment
	Difficulties in adapting to new changes
	Difficulty in assimilating lessons online
Component 2: Technical factors	Excessive workload
	Technical problem associated with internet connectivity
	Loss of interest due to online T&L
	Un-realistic deadline from the lecturers
	Trial & error in the online assessment procedure
Component 3: Social factors	Absence of contact group discussion class
	Absence of physical workspaces
	Less participation from and amongst the student
	Lack of physical consultation with lecturers
Component 4: Psychological factors	Anxiety from transitioning from face to face to online T&L
	Problem of technology adaptability
	Difficulty to adopt & adjust to new T&L
	Zero-self exploratory learning
Component 5: Infrastructure support factors	inaccessibility unaffordability of ICT gadgets
	Inadequate measures to check plagiarism
	Difficulties in receiving detailed feedback on assessments

4. Discussion

The factor analysis revealed that the critical challenges facing online T&L in construction education are in five categories namely: pedagogical skills challenges, technical challenges, social challenges, psychological challenges, and Infrastructure support challenges. From the analysis, five factors were grouped as pedagogical skills-related challenges. The technical-related challenges identified were five factors, the social-related challenges were described by 4 factors, the psychological-related challenges were described by 4 factors and infrastructure support-related challenges comprises of 3 factors. (Please kindly refer to the above Table 5).

Component 1: Pedagogical Skills

The researcher delved deeper into the findings and interpretations to ascertain the impact of pedagogical skills in online learning during the pandemic. The findings from the questionnaire revealed that lack of training skills could

lead to low productivity, late schedule of classes, lack of transparency in the method of assessment, difficulties in adapting to new changes and difficulty in assimilating lessons online. These findings coincide with the findings of (Al Mulhim, 2014; Kundu & Bej, 2021). According to (Kibuku et al., 2020) the absence of technical abilities in online learning and the inability of online classes or tutors to create effective content are significant obstacles to the successful implementation of online education in universities. In addition, (Ebekozi et al., 2023) noted that even when online classes or e-tutors receive training, the emphasis is primarily on mastering the technical aspects of the system rather than on the more difficult task of receiving proper pedagogical training for online learning. The above findings align with the results of this study that the pedagogical skills should be given attention in this era of online learning.

Among the items in this group, difficulties in adapting to new changes is also a challenge facing online learning in CMQS department. This agrees with the findings of (Blankenship & Jones, 2021) that the abrupt transition to remote education in response to the global outbreak of COVID-19 presented notable difficulties and disturbances for both students and educators. In addition, these findings are also in line with, the study of (Mpungose, 2020), the author asserts that South African universities found it to be a challenge to move from face-to-face to online learning (e-learning) because of the (COVID-19). This maybe a result of high cost of the information systems or lack of technical aspect of using the online platforms, or awareness of its full benefits. However, pedagogical skills require efficient and real-time practice and collaboration among students and lecturers to be fully equipped.

Component 2: Technical factors

The technical factors are one of the key issues to online learning. The five- underlying components to technical challenges in this study they include excessive workload, technical problem associated with internet connectivity, loss of interest due to online T&L, un-realistic deadline from the lecturers and trial & error in the online assessment procedure. these findings are in line with study conducted by (Abbasnejad et al., 2023; Aboagye et al., 2021) stating that the lack of fast, affordable, and reliable internet connections hinders online education, particularly for individuals residing in rural areas and underprivileged communities. It can be deduced that there is no full support from the managerial personnel within the university and the government towards the essential needs required for effective online learning implementation. This agrees with the findings of (Basar et al., 2021) the lack of fast, affordable, and reliable internet connections hinders online education, particularly for individuals residing in rural areas and underprivileged communities. Students who are unable to access online content through smartphones are unable to benefit from online learning because a significant amount of the content is not accessible.

Component 3: Social factors

This component has four factors and it is named social factors. They include absence of contact group discussion class with .82 loading, absence of physical workspaces with 0.71, less participation from and amongst the student with 0.58, lack of physical consultation with lecturers with 0.52 loading. The quantitative were in line with the findings of (Peacock & Cowan, 2019), the research have it that studying and having a good balance between school work and personal life makes people feel like they belong and helps them connect with others in a positive way. The author further stated that the COVID-19 crisis has caused problems for students in terms of balancing work and personal life and having difficulty socializing. This has led to issues with academic honesty and students feeling sad about not being able to learn in an interactive environment (Joshi et al., 2022). These findings also agreed with the study of (Cao et al., 2020), stating that the pandemic has disrupted students' social connections with their families and friends, inevitably affecting their academic performance

Component 4: Psychological factors

According (Garris & Fleck, 2022) to the lack of emotional support and social interactions which are contrarily related to the mental health of the students will have the dreadful consequences on the academic performance of students. The mental well-being of students during the COVID-19 crisis has a high impact on their academic performance, often resulting in the expression of traumatic distress. The extensive spread of COVID-19 has led to worries among students about the effectiveness of the online education platform. In terms of this study the quantitative analysis revealed that psychological factors had significance on online construction education during the pandemic. In the findings of quantitative analysis component four had factors which include anxiety from transitioning from face to face to online T&L, problem of technology adaptability, difficulty to adopt & adjust to new T&L and zero-self exploratory learning. These findings were in line with the findings of (George & Thomas, 2021), highlighting that the increasing importance of self-directed learning, leading to concerns about both physical and mental well-being, which ultimately impact students' future careers and achievements. In addition, the author stated that the student workload has increased due to the emotional difficulties they are facing, such as anxiety, depression, and stress.

Component 5: Infrastructure support factors

Infrastructure support is one of the components to online learning. According to the findings of this study infrastructure support included, inaccessibility & unaffordability of ICT gadgets, Inadequate measures to check plagiarism and difficulties in receiving detailed feedback on assessments. Furthermore, findings from qualitative analysis complemented these findings from quantitative analysis. These findings supported the study conducted by (Azorín, 2020), stating that one of the challenges faced by students in online education is the limited availability of fast internet connections and necessary electronic devices. Insufficient infrastructure or resources at home may pose challenges for students in their ability to learn online. Furthermore, a study conducted by (Sahu, 2020), was of the same view that consequently, parents now face increased responsibility of acquiring laptops and IT devices for their children to enable remote studying. In remote regions without access to electricity, students might face challenges in staying connected as they lack the necessary power to charge their online learning devices, like laptops.

5. Conclusions

This study examines the online teaching and learning challenges facing construction management students in KZN, South Africa. The study through the preliminary literature review highlighted the challenges facing the students in online learning. Through the empirical survey, the most critical challenges facing the students in online learning in KwaZulu Natal, South Africa were identified. The results of this current study have highlighted important practical implications because they show that most of the students have low pedagogical skills in online learning, there is lack of technical support to execute online learning, there is lack of social support, students are facing psychological issues and lastly lack of infrastructure support are what majorly discourage the students towards online learning.

The following recommendations could be suggested to enhance future adoption of online learning in construction management departments in South Africa and other under developing and developing countries who also faces similar challenges

- Students and Lecturers should be well equipped for online learning concepts through training programs such as workshop seminars, television and radios to encourage them since the world is changing or moving towards 4th industrial revolution.
- The blended T&L approach can offer advantages of two different methods of teaching. Meaning online learning can offer flexibility to learn wherever you are, while traditional learning remains attending classes physically. Therefore, the introduction of blended learning could be a solution during these difficult times.
- Online learning should be promoted by the government and university policy makers this will help to enhance the practice among students and lecturers also working towards the shift of 4th industrial revolution.

References

- Abbasnejad, B., Soltani, S., & Wong, P. (2023). A systematic review of online learning and teaching strategies during the COVID-19 pandemic: Implications for the construction management sector. *Smart and Sustainable Built Environment*.
- Aboagye, E., Yawson, J. A., & Appiah, K. N. (2021). COVID-19 and E-learning: The challenges of students in tertiary institutions. *Social Education Research*, 1-8.
- Al Mulhim, E. (2014). The Barriers to the Use of ICT in Teaching in Saudi Arabia: A Review of Literature. *Universal Journal of Educational Research*, 2(6), 487-493.
- Asgari, S., Trajkovic, J., Rahmani, M., Zhang, W., Lo, R. C., & Sciortino, A. (2021). An observational study of engineering online education during the COVID-19 pandemic. *Plos one*, 16(4), e0250041.
- Azorín, C. (2020). Beyond COVID-19 supernova. Is another education coming? *Journal of professional capital and community*, 5(3/4), 381-390.
- Basar, Z. M., Mansor, A. N., Jamaludin, K. A., & Alias, B. S. (2021). The effectiveness and challenges of online learning for secondary school students—A case study. *Asian Journal of University Education*, 17(3), 119-129.
- Benson, A. D. (2002). Using online learning to meet workforce demand: A case study of stakeholder influence. *Quarterly review of distance education*, 3(4), 443-452.
- Bishop, J., & Verleger, M. A. (2013). The flipped classroom: A survey of the research. 2013 ASEE Annual Conference & Exposition,
- Blankenship, D., & Jones, I. S. (2021). COVID-19 student mental health check. *Research in Higher Education Journal*.

- Bourne, J., Harris, D., & Mayadas, F. (2005). Online engineering education: Learning anywhere, anytime. *Journal of Engineering Education*, 94(1), 131-146.
- Cao, W., Fang, Z., Hou, G., Han, M., Xu, X., Dong, J., & Zheng, J. (2020). The psychological impact of the COVID-19 epidemic on college students in China. *Psychiatry research*, 287, 112934.
- Carliner, S. (2004). An overview of online learning.
- Conrad, D. (2002). Deep in the hearts of learners: Insights into the nature of online community. *Journal of distance education*, 17(1), 1-19.
- Ebekozien, A., Aigbavboa, C., & Aliu, J. (2023). Built environment academics for 21st-century world of teaching: stakeholders' perspective. *International Journal of Building Pathology and Adaptation*, 41(6), 119-138.
- Garris, C. P., & Fleck, B. (2022). Student evaluations of transitioned-online courses during the COVID-19 pandemic. *Scholarship of Teaching and Learning in Psychology*, 8(2), 119.
- George, G., & Thomas, M. R. (2021). Quarantined effects and strategies of college students–COVID-19. *Asian Education and Development Studies*, 10(4), 565-573.
- Gülbahar, Y., & Adnan, M. (2020). Faculty professional development in creating significant teaching and learning experiences online. In *Handbook of research on creating meaningful experiences in online courses* (pp. 37-58). IGI Global.
- Joshi, O., Chapagain, B., Kharel, G., Poudyal, N. C., Murray, B. D., & Mehmood, S. R. (2022). Benefits and challenges of online instruction in agriculture and natural resource education. *Interactive Learning Environments*, 30(8), 1402-1413.
- Kibuku, R. N., Ochieng, D. O., & Wausi, A. N. (2020). e-Learning Challenges Faced by Universities in Kenya: A Literature Review. *Electronic Journal of e-Learning*, 18(2), pp150-161-pp150-161.
- Kundu, A., & Bej, T. (2021). Ingestion and integration of ICTs for pedagogy in Indian private high schools. *E-learning and Digital Media*, 18(2), 163-184.
- Lockee, B. B. (2021). Online education in the post-COVID era. *Nature Electronics*, 4(1), 5-6.
- Mpungose, C. B. (2020). Emergent transition from face-to-face to online learning in a South African University in the context of the Coronavirus pandemic. *Humanities and social sciences communications*, 7(1), 1-9.
- Peacock, S., & Cowan, J. (2019). Promoting sense of belonging in online learning communities of inquiry in accredited courses. *Online Learning*, 23(2), 67-81.
- Ratheeswari, K. (2018). Information communication technology in education. *Journal of Applied and Advanced research*, 3(1), 45-47.
- Rea, L. M., & Parker, R. A. (2014). *Designing and conducting survey research: A comprehensive guide*. John Wiley & Sons.
- Toyin JO, Mewomo MC. An investigation of barriers to the application of building information modelling in Nigeria. *Journal of Engineering, Design and Technology*. 2023 Mar 24;21(2):442-68.
- Sahu, P. (2020). Closure of universities due to coronavirus disease 2019 (COVID-19): impact on education and mental health of students and academic staff. *Cureus*, 12(4).
- Vivolo, J. (2016). Understanding and combating resistance to online learning. *Science progress*, 99(4), 399-412.