Digital learning experience of engineering students in the pandemic

The perspective of graduate teaching assistants

Di Wang

PhD candidate and Senior GTA, WMG, University of Warwick
Correspondence: Di.Wang.1@warwick.ac.uk

Di Wang is a PhD researcher and belongs to the Energy Application Group of Warwick Manufacturing Group. His main research field is cell instrumentation, which provides technical support for the development and monitoring of a new generation of smart batteries. Di Wang has been working as a postgraduate teaching assistant for the Study, Professional and Analytical Skills (SPA) module since December 2020. He currently provides teaching support in qualitative and quantitative analysis to the SPA team, and provides diverse academic services to more than 1,000 WMG master students, including online and offline seminars or lectures, one-on-one offline tutoring for targeted students, development of synchronous and asynchronous learning materials to fully meet students' learning needs, etc. He also provided technical support for the upgrade and improvement of the SPA's online Moodle platform.

Yiduo Wang

PhD candidate and Senior GTA, WMG, University of Warwick
Correspondence: Yiduo.Wang@warwick.ac.uk

Yiduo Wang is a PhD researcher from the Warwick Manufacturing Group. Her research is to investigate the effect of STEM outreach on secondary students' attitudes towards STEM funded by the Lord Bhattacharyya Family Trust and in collaboration with the Royal Academy of Engineering. Since December 2020, Yiduo has been working as a graduate teaching assistant for the module of Study, professional and analytical skills (SPA) to provide academic support for more than 1,000 WMG master students, including delivering seminars, running one-to-one mentor sessions, designing synchronous and asynchronous learning materials and refining online Moodle platform. Yiduo holds an Associate Fellowship from the Higher Education Academy.

Zhizhuo Su

PhD candidate and Senior GTA, Warwick Manufacturing Group (WMG), University of Warwick
Correspondence: Zhizhuo.Su@warwick.ac.uk

Zhizhuo Su is a second-year PhD student from the Intelligent Vehicle, WMG, University of Warwick, UK. He has received a bachelor's degree in Vehicle Engineering from Jilin University, China, and a master's degree in Vehicle Engineering from Chongqing University, China. As a senior graduate teaching assistant, he hosted academic writing seminars, weekly drop-in mentoring sessions and designed synchronous and asynchronous curriculum (e.g., face-to-face tutorials and recorded video sessions) in the WMG module of Study, professional and analytical skills (SPA) for over 1000 postgraduate students. He is now focusing on the Analytical Stream of SPA and supporting students' analytical skills with quantitative and qualitative methods. He holds an Associate Fellowship from the Advance HE (previous Higher Education Academy).

Abstract

During the unprecedented world crisis of COVID-19, traditional offline courses were forced to be delivered online. Most students struggled with this change of delivery approach due to difficulties in accessing online resources, overwhelming and independent work, communication and concentration, isolation and longlines issues in online learning. Therefore, providing a positive digital learning experience for students was an important concern in UK Higher Education. Graduate teaching assistants (GTAs) are an indispensable part of the teaching community at the University of Warwick to deliver modules and facilitate WMG engineering students' learning. Owing to the dual identity of student and teaching staff, doctoral researchers have a unique perspective in investigating students' digital learning experiences. As students, doctoral researchers empathise with the affective impact and physical constraints of online learning that hinder the student experience and learning. And as tutors, doctoral researchers recognise the pedagogical strategies that the digital tools enable, such as peer learning or reflection. This paper provides a reflective evaluation of how effective digital tools, and their uses are supporting the constructive alignment of learning while benefiting the student experience, such as Vevox, Padlet, and Microsoft Teams. In sharing a reflexive account of experiences with digital tools for learning and teaching, guidance is provided on how students' digital learning experiences can be improved.

Keywords: Digital Learning Experience, COVID-19, Engineering Students' Engagement, Digital Literacy

Introduction

The 2019 coronavirus pandemic has triggered major changes in the global education system (Sepulveda-Escobar & Morrison, 2020). The virus raging across the UK had shut schools and forced teaching programmes to shift from face-to-face classes to a fully virtual model. In response to this crisis, the University of Warwick used Moodle and Microsoft Teams as the main teaching platforms to provide high-quality teaching services for the majority of Warwick students (Online Teaching and Learning, 2021). In this online teaching mode, we, as the Graduate Teaching Assistants (GTAs) of Warwick Manufacturing Group (WMG), are unique, which is mainly reflected in three aspects: the first is the uniqueness of our identity. We are both PhD students and teachers. Compared with other teachers, we have a better understanding of the needs of students and can communicate better with them since we are more like peers to the students (Jordan & Howe, 2017). Students could tell us about issues that may not be discussed with other teachers. The second is the uniqueness of the module on which we teach. The Study, Professional & Analytical Skills module (SPA) is a general education program for all WMG postgraduate students. As teachers on SPA, we are responsible for more than 1200 students from different countries around the world. Most of them are not native English speakers, and many are learning in a foreign country or environment for the first time. The final is the uniqueness of the transition from face-to-face to online teaching. Since the outbreak of the pandemic, we are the first cohort of WMG GTAs to fully implement online teaching. We and the students in the 2020/2021 academic year have experienced a major change in teaching mode.

In this article, we first discuss issues and challenges that arise in the digital teaching process and propose practical measures to address these problems. Finally, using seven elements of digital literacy as a reference (Sinay *et al.*, 2016), a reflective description of digital teaching from a GTA perspective is developed and future work is provided on how to further improve students' digital learning experience.

Challenges

There are four main challenges we have encountered during the digital teaching process. As shown in Figure 1, the first is the inconvenience of students searching for materials on Moodle. Moodle is a learning management system for the students which provides an e-learning platform. To meet the complex academic and professional needs of all students, SPA's Moodle page is divided into three sections to correspond to the students' learning journey, namely study skills, professional skills and analytical skills, which contain a total of 36 sessions (Moodle@Warwick, 2022). Due to the number of sessions and volume of content, based on the students' feedback, we learned that sometimes they cannot find what they are looking for in Moodle quickly and easily. They sometimes waste a lot of time searching for the information they need.

The second is the software aspect of online teaching. As stated in Hermanto *et al.* (2021), the success of online learning depends not only on students, educators and the use of learning resources. High-quality online technical support is also a key factor for the success of online learning, including the selection of online education platforms and the use of interactive software. During the COVID-19 pandemic, Microsoft Teams was adopted as our

online teaching software. Its rich functions can help us develop diverse teaching modes such as lectures, seminars, and group discussions. However, network conditions can greatly affect students' online learning experience. Poor network conditions can result in students being delayed or even disconnected during the online class.

The third challenge concerns the use of interactive software. Vevox or Padlet, a personal response system which enables participants to join engaging sessions through live polling, quizzes, and Q&A (Vevox at Warwick, 2022), relies on its powerful interactive features to be referenced in our classrooms to attract students to better participate in the learning of online courses. But the problem that comes with it is that many students have not used software such as Vevox or Padlet before, and this has caused them to give up when they need to use the above interactive software.

The last aspect is the limitations of different electronic devices. It can be easy to assume that students will use a computer or laptop for online learning. However, due to the flexibility of teaching and learning online, many electronic devices are available for learning. Students may choose mobile phones, iPads or other electronic devices for their online learning. In this case, designing suitable activities in which students are able to have a good learning experience under different screen sizes is also one of the challenges we cannot ignore. The next section will describe our practices in response to the above challenges.

Practice

We have launched targeted measures and practices from four aspects to try to solve the above-mentioned challenges. To address difficulties in navigating Moodle, we conducted a Frequently Asked Questions (FAQ) list raised by students from each drop-in session on the Moodle website. We have tested the A to Z list and received some positive feedback. For example, students can find relevant information on 'literature reviews' by searching for "L". This index, while inferior to a search engine, provides a tool that can help students address some major topics.

Secondly, for the problem of network connection and latency, we conduct pre-tests before each class to ensure the stability and reliability of the teaching platform.

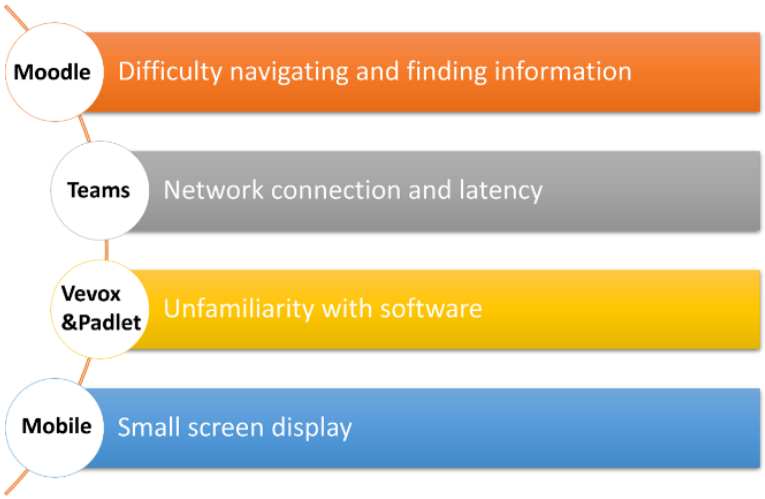

Figure 1: Challenges arising in the digital teaching process

When students encounter problems such as Internet delay, reducing the Internet's workloads such as turning off students' cameras or microphones may be the most effective method at present. Before the class starts, we will provide students with information such as reducing network load to help students reduce network delays.

Also, for interactive software like Vevox and Padlet, although engagement has been significantly increased through such online tools, some students may hide in large study groups and are not motivated to learn how to use software (Hermanto *et al.*, 2021). Therefore, we plan for more time to help them and encourage them to take their first attempts, such as designing icebreaker activities via this software at the beginning of the class to familiarise students with each other and how to use them.

Finally, inclusivity and accessibility are another concern, so all materials posted online are cross-checked via mobile phones, iPads, and other electronic devices in order to communicate key messages and meet the needs of the majority of students by adapting formatting such as fonts and colours.

To conclude, the measures we have already taken have proven effective in some cases. However, in order to achieve a better learning experience, we have reflected on these measures and will address this topic further in the next section.

Reflections

The seven elements of digital literacy are presented in Figure 3. Developed for the higher education sector, this framework can be used to guide our reflection on digital learning practices in teaching and to help us explore how students can successfully survive in a digital world (Sinay *et al.*, 2016). Within our module we have encountered a number of challenges related to ICT literacy, such as the aforementioned challenges of using Microsoft Teams, Vevox or other software. Through our observation, we found that students' ability to obtain and integrate information is insufficient compared to the digital literacy competencies proposed by the University of Warwick, so students' information literacy of information search, interpretation, evaluation, management and sharing also needs to be improved. In particular, the assessment of digital information that students use to demonstrate the quality of information and distinguish between valuable or false information will help them achieve academic success.

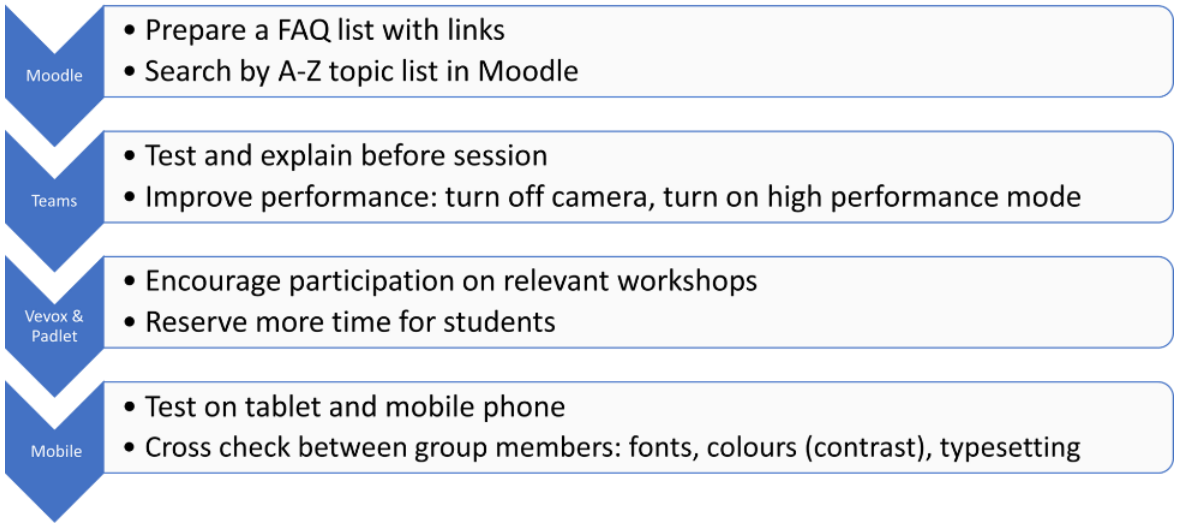

Figure 2: Corresponding practices regarding the challenges during digital teaching

Digital literacy, as one of the core skills of the University of Warwick, refers to students:

- Having "the capabilities that enable living, learning, and working in a digital society."
- Are "comfortable with using digital media to communicate, solve problems, manage information, collaborate, create and share content (Tissington, 2020: Paragraph 1)."

Therefore, online teaching is not only necessary for students to have a good, efficient and successful learning journey, but the cultivation of students' digital literacy triggered by online teaching should be paid more attention to. Whether in the social situation raging during the pandemic or after, the cultivation of students' digital literacy should not be forgotten. Therefore, we will pay more attention to these elements for improvement in our future work.

Future Work

Based on our reflection, we plan to design a series of digital literacy workshops for taught master students in our module. First of all, digital literacy will be emphasised at the beginning of the workshops as it is one of Warwick's core courses, which will help students realise the importance of digital literacy to personal development and stimulate students' subjective initiative to achieve self-improvement. Secondly, students are expected to acquire knowledge and skills in the search, assessment, analysis and implementation of digital information across a range of learning, which is related to information literacy in the digital literacy framework. Finally, focusing on improving ICT literacy, students will be able to gain experience with commonly used professional software such as Padlet, Vevox, Teams and Moodle. What we want to achieve is not only to help students build digital literacies, but also to contribute to their confidence and comfortability in their digital learning experience.

Figure 3: The seven elements of digital literacies (Sinay *et al.*, 2016)

The importance of improving students' digital learning literacy is as relevant after the pandemic as it was during. This will also be the focus of our future work and teaching efforts. We consider these lessons learned would benefit the other GTAs with similar challenges and wish to collaborate with other GTAs to share our experience.

References

Hermanto, Y. and Srimulyani, V. (2021). The Challenges of Online Learning During the Covid-19 Pandemic. *Jurnal Pendidikan dan Pengajaran*, 54(1), p.46.

Jordan, K. and Howe, C. (2017). The perceived benefits and problems associated with teaching activities undertaken by doctoral students. *Teaching in Higher Education*, 23(4), pp.504-521.

Moodle.warwick.ac.uk. (2022). *Moodle@Warwick*. [online] Available at: https://moodle.warwick.ac.uk [Accessed 4 September 2022].

Sepulveda-Escobar, P. and Morrison, A. (2020). Online teaching placement during the COVID-19 pandemic in Chile: challenges and opportunities. *European Journal of Teacher Education*, 43(4), pp.587-607.

Sinay, E., Ryan, T. and Nahornick, A. (2016). *Unpacking the Tdsb's Vision for Learning*.

Tissington, P. (2020). *Warwick Core Skills 2020.* University of Warwick. https://warwick.ac.uk/about/strategy/education/detail/employabilityandskills/wcs/warwick_core_skills_approved_a3_jan_2020.pdf (Accessed 26 August 2022)

Warwick.ac.uk. (2021). *Online Teaching and Learning*. [online] Available at: https://warwick.ac.uk/fac/sci/lifesci/study/pgt/induction/before-you-arrive/online/ [Accessed 4 September 2021].

Warwick.ac.uk. (2022). *Vevox at Warwick*. [online] Available at: https://warwick.ac.uk/services/academictechnology/support/guides/vevox-guides/vvx-11/ [Accessed 26 September 2022].

To cite this article: Di Wang, Yiduo Wang & Zhizhuo Su. 2022. Digital learning experience of engineering students in the pandemic: the perspective of graduate teaching assistants. Journal of PGR Pedagogic Practice, 2, 79-85. Available at: https://doi.org/10.31273/jppp.vol2.2022.1232