

# Embracing OneNote as an Online Pedagogy

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## Abstract

The COVID-19 pandemic has forced institutions worldwide shifting to fully online learning along with the campus shut down to avoid the spread of virus in year 2021. Considering the necessity of distance education during the pandemic, the Internet of Thing (IoT) and technology play an important role in keeping all connected. In this study, the usability and adoption of Microsoft OneNote class notebook via MS Teams are presented. In view of mathematics classes require a lot of annotation and demonstration of calculation solutions, OneNote class notebook via MS Teams is adopted due to its built-in content library space and collaboration space which act as the digital whiteboard for teachers and students. Besides, OneNote class notebook is able to provide a real-time synchronized space for all the mathematical works. The convenience, usefulness and real-time features of OneNote class notebook via MS Teams make it a powerful tool and as a substitute for the traditional classroom. The chat history and work done in the collaboration space during the break-out room sessions via MS Teams offer the students space to recall and retrieve what has been learned in the class. The COVID-19 crisis provides us an opportunity to blend in the component of IoT in education such as live and collaborative platforms in OneNote class notebook to complement both face-to-face and online education.

**Keywords:** onenote, ms teams, online pedagogy, educational technology

## 1. Introduction

In this century, we are all connected to the internet almost in every aspect of our life (Siddiqui et al., 2019; Dong et al., 2017). It becomes an even more important part of human life when it comes to the COVID-19 pandemic situation in which social distancing is compulsory to prevent the spreading of the virus. Due to the pandemic situation, technology has changed everyday life and the new normal continues to evolve. During this critical period, the Internet of Thing (IoT) is a boon in human life which can reduce the physical contact between human. IoT is able to connect all smart devices with no human interactions needed within a network (Ali et al., 2015; Yu et al., 2016). In short, an IoT device can be a simple object that can be connected to the internet for further monitoring or transferring data (HaddadPajouh et al., 2019). The existence of IoT allows the world to change the old passive interaction to a more active and engaging online interaction. Artificial Intelligence (AI) is one of the features of IoT which is a smart system that can be operated automatically in making decision and thus to improve our life quality. Nowadays there are many protocols, technologies and services available to be part of the IoT concepts, such as Bluetooth, Wi-Fi, Zigbee, NFC, Z-Wave LoRaWAN and Cellular (Savjani, 2019; Triantafyllou et al., 2018). With these supporting protocols, the devices can be connected efficiently in the IoT environment.

During the COVID-19 pandemic, most educational institutions are facing challenges in sustaining the educational process. The sudden arisen pandemic has speeded up the digital transformation of the contemporary education. Thus, the usage of IoT in education is now a focus in facilitating the development of the online learning and distance learning to ensure a smooth and effective teaching and learning process despite the challenges faced during the pandemic situations. Mahmud et al. (2021) performed a systematic review showing the breadth and complexity of research on emerging learning environment and technologies, showing how we mitigate the effects of the COVID-19 crisis on teaching and learning. Online teaching-learning mode is the only option during the pandemic in order to keep everyone safe. All teaching and learning modes have to be fully

converted to online lessons including the blended learning mode which has been a popular trend in the twenty-first century. It combines the traditional classroom education and e-learning (Al-Rimawi, 2014). The rapid expansion of IoT technologies does not solely act as a support to e-learning, in fact, it has transformed the previous model of e-learning into a more engaging and efficient approach (Fadda et al., 2018).

IoT technologies support and apply in industries including education, healthcare, transportation, manufacturing and others (Alhasan et al., 2020). There are many benefits of having IoT as the support of the educational approaches (Amasha et al., 2020). With the use of IoT technologies, lecturers are able to rethink the techniques of e-learning and to create a more efficient virtual learning environment that align with the learner's need and expectation (Ilieva & Yankova, 2020). It is definitely a challenge for lecturers to conduct an engaging and efficient distance learning especially for quantitative subjects which require the demonstration of many calculation steps during the teaching and learning process. With the limited interaction between lecturer and students during online class, it makes the course delivery more difficult to both parties and information is not able to be conveyed optimally. To cater this problem, a virtual environment which promotes class interactions, student participation, and real-time feedback of the students' work is good to be considered for the teaching of quantitative subjects with calculation process such as statistics, mathematics, finance and accounting. The employment of OneNote class notebook can be a good solution so both lecturer and students can have a more interactive experience in the classroom (Patchigalla, 2019).

On the other hand, based on the Technology Acceptance Model (TAM) explained by Venkatesh & Davis (2000), one's attitude towards technology and the behavioural intention to use IT are determined by the perceived usefulness and ease of use of that specific technology. Microsoft OneNote is one of the platforms which includes the important features of IoT technologies such as cloud space storage and real-time synchronization. Its mobile app supports the key features for teaching mathematics including handwriting, drawing, importing content from the web and others. Besides, OneNote is very convenient and accessible at anytime and anywhere on any device, which is not offered in a conventional classroom setting. Salman (2014) mentioned that OneNote is one of the most powerful tools for teaching and learning, which has gained better popularity than the traditional method. It allows lecturers to use it as a teaching whiteboard, thus, students can collaboratively work online, and feedback can be proffered in students' work in real-time. With stylus pen used, we can write texts and draw images digitally on OneNote class notebook. Students can pay more attention because it is just like the traditional chalk and board system. The calculation steps can be demonstrated clearly. The key notes and points can be written and highlighted easily using different colour, different size, bolded or underlined. A review study by Amarin and Al-Saleh (2020) showed that the color use in designing instructional aids has a significant impact on the student's mood, attention, productivity, accuracy, communication and academic achievement. Moreover, utilizing OneNote class notebook as the digital whiteboard allows us to do something beyond the traditional classroom, included inserting images, files, pictures, tables and many more just in few clicks. It makes the information sharing happens spontaneously. Turner (2011) claimed that Microsoft OneNote is easier to be accessed than other similar platforms since it is one of the applications in Microsoft Office package. With the COVID-19 disruption to the traditional face-to-face approach and to overcome the challenges to teach mathematics subject online, the purpose of this study is to examine the usability and adoption of Microsoft OneNote via MS Teams in the teaching of Mathematics for year one students in a degree programme.

## 2. Methodology

### *OneNote Class Notebook Set Up Via MS Teams*

During the COVID-19 pandemic periods, in order to keep lecturers and students safe, all the courses at the university are conducted virtually via Microsoft Teams (MS Teams) as online classes. In this study, Microsoft OneNote is used as the main support of the teaching before, during and after the online class. Team Classes are created in MS Teams by the lecturer (see Figure 1, points 1 and 2) followed by the set up of the OneNote class notebook via MS Teams (See Figure 1, points 3 and 4). Students as the member of the Teams class can join the Teams class either manually added by the lecturer or by using Team code shared by the lecturer. The OneNote class notebook via MS Teams is used as a digital whiteboard, material sharing and assignment submission platform for teaching, real-time communication and interactive classroom collaboration.

In this study, OneNote class notebook was employed in three courses, MAT201 Business Mathematics and QBM153 Mathematics 1 in August 2021 and another course DIP1MAT02 Diploma in Basic Mathematics 1 in October 2021 (see Figure 2). QBM153 and MAT201 are three-credit courses for first year and second year undergraduate students major in Economics, Accounting, Business and Psychology. For DIP1MAT02, it is for students who study Diploma in Business Management.

Once the OneNote class notebook is set up, we can choose to open OneNote class notebook in browser or in desktop app. There are 4 sections ready for the use of the class in the notebook including the “Collaboration Space” (see Figure 3, point 1), “Content Library” (see Figure 3, point 2), the space for “Teacher Only” (see Figure 3, point 3) and student individual workspace (see Figure 3, point 4). Besides, each Teams class comes with General channel (see Figure 3, point 5). The General channel is the main place where conversations, discussion, meeting and announcements happen. Private channels and shared channels can be added later for group discussion. Private channels are meant for discussion within a particular group of members and not open to all team members. Shared channels are for collaboration with people inside and outside of the team.

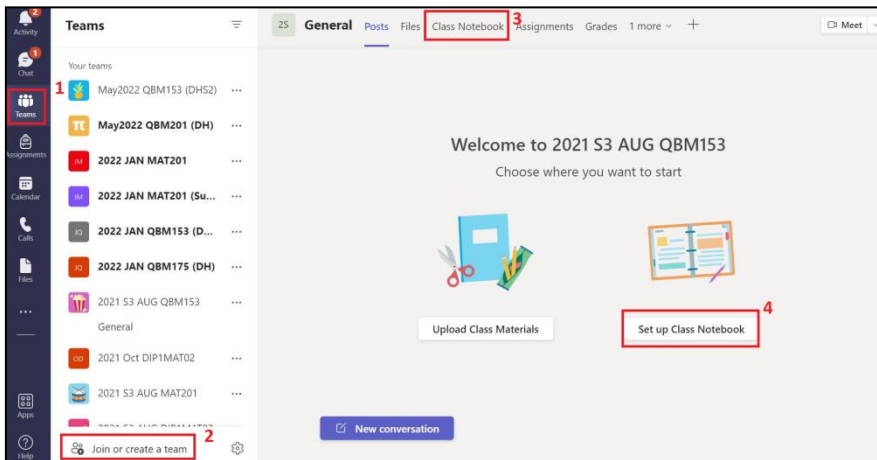


Figure 1. OneNote Class Notebook Set Up in MS Teams

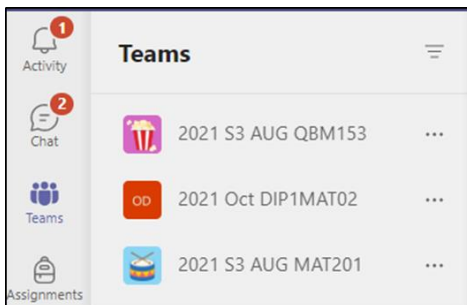


Figure 2. Class Notebooks Created in MS Teams

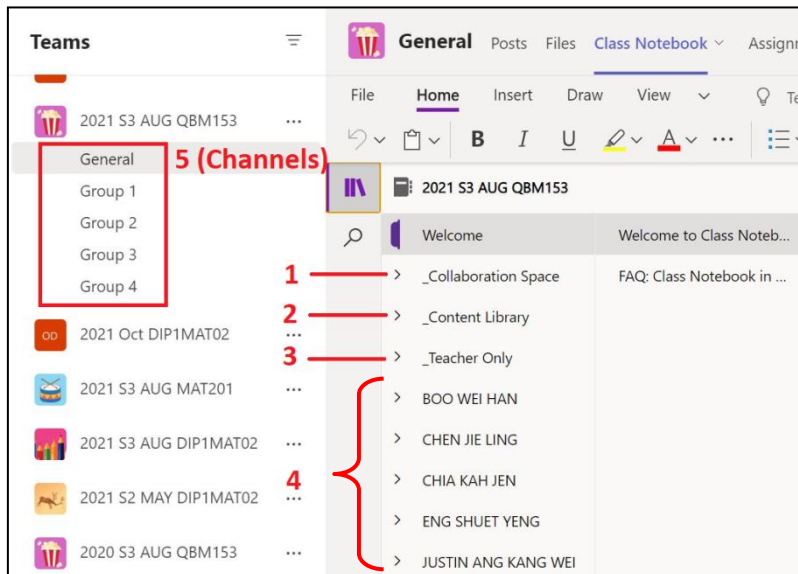


Figure 3. Four Sections Ready in the Class Notebook

“Collaboration Space” is the section for lessons and creative activities to facilitate student group work. Every member in the class can be given separate permission to view and edit the section in the collaboration space. If there is group activity, the lecturer can edit and restrict the content access permission within the section in the collaboration space to students in each group. This collaboration space will be used for students and lecturer to work together to share their learnings.

Teacher only section is a private space for instructors to store material. The lecturer can add content that only educators in the class can see and edit. It is not visible to students.

For student individual workspace, it is a space shared between the lecturer and each individual student. The lecturer can access every student notebook while students can only see their own. Students can actively take notes in this section during class which can help them focus and better understand the lesson learned in the class. They also can add work to homework or assignment section to demonstrate their learning.

Lecture notes, tutorials and other materials included the answers for tutorials are shared and uploaded to the content library section for students’ view. Students are able to download any file inserted by the lecturer in the content library. This section is only editable by the teacher and it is not editable by the members or the students in the class. It acts as a teaching digital whiteboard during the online class via Teams meeting. The lecturer would write text, draw, make notations on images, add mathematics equations and more here in the content library during the class time. All information is synchronized real-time and auto saved in the class notebook. It keeps a record of all the written or typed notes and students may conveniently access and refer to the teaching materials after the class at anytime and anywhere (see Figure 4).

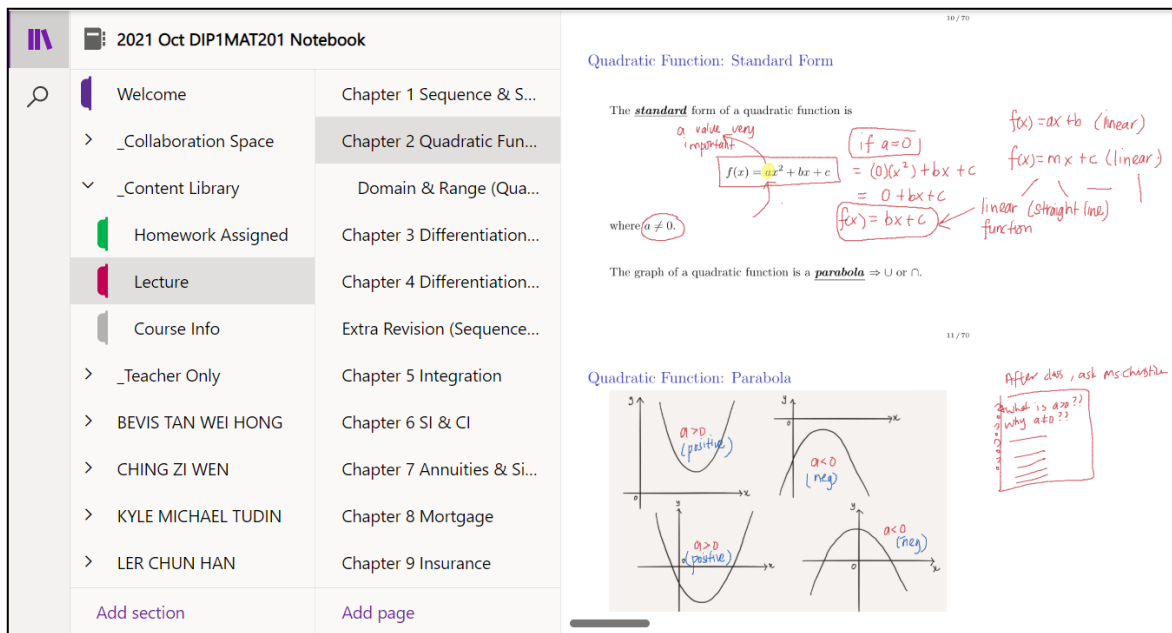


Figure 4. Content Library Acts as the Digital Whiteboard

To start the class, lecturer and students will join the Teams meeting through the General channel in the Teams class by clicking the “Meet now” button. The lecturer will share screen and start teaching by using the content library section as the digital whiteboard. Considering the inclusion of class interactions during online class, the collaboration space in the class notebook together with the channel in the Teams are employed for tutorial discussions. Students are divided into a few break-out rooms of 4 or 5 students for tutorial discussion. Students in each group will be added to one section in the collaboration space and given permission to view and edit that section. The section under the collaboration space in the class notebook is used as the discussion board for students’ collaboration. At the same time, the same group of students will be added to a channel acts as a break-out room in the Teams. Students can have discussion within their group through chat conversation in the channel. Other than messages sharing, students also can share files and tools in the channel. To enrich the conversation, the members in the channel can hop into a call or live screen sharing by initiating an immediate meeting using “Meet now” in the channel. Students will then write text, type, paste images or upload files for their discussion outcomes and knowledge sharing in the collaboration space.

Lecturer may mark the group work in the collaboration space as soon as the work is completed by the students

since the class notebook is synchronized real-time. A thumbs-up gesture inserted next to each question is an indication of marked work (see Figure 5).

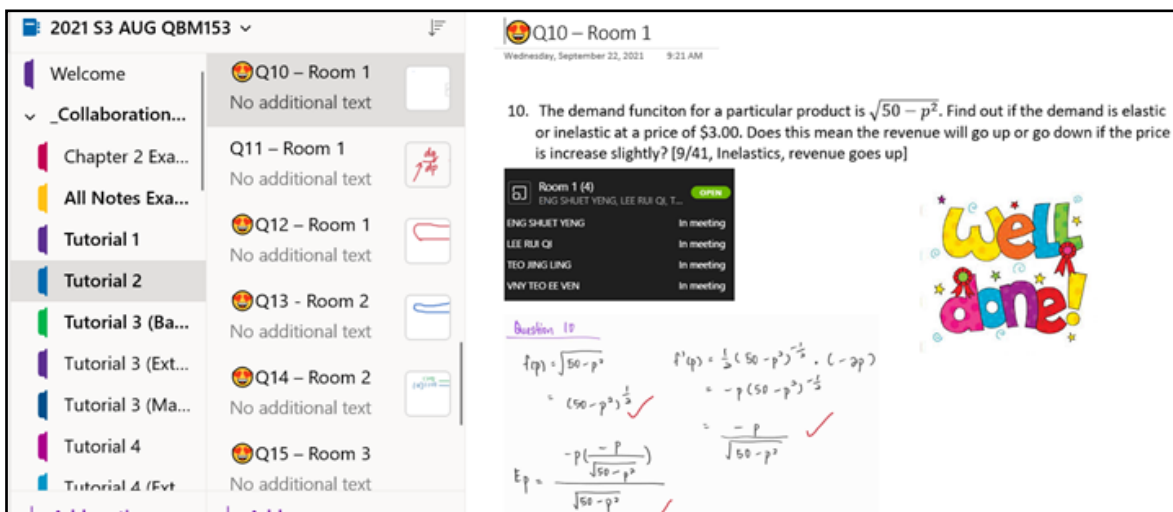


Figure 5. Marking and Feedback Given to the Students

After the marking is done, all the students are then going back to the main Teams meeting online class in the General channel to continue the lesson. Further feedback and clarification are provided by the lecturer during the online class as a tool for continued learning. Students could review the marking record even after the class because everything is auto synchronized in the class notebook and it helps enhancing students’ understanding.

For the collaboration after the live class, every student is assigned to a few questions and instructed to complete them and then post the handwritten working solutions by either inserting the image or annotating directly in the individual workspace in OneNote class notebook. They can complete the assignment individually or by having separate discussions online using “Meet now” or “Schedule a meet” feature in the Teams class channel. Once they have completed the assignment, lecturer would mark and provide feedback on the same page and give a thumbs-up gesture next to the question number as an indication of marked work.

### 3. Discussion

This paper shows how Microsoft OneNote via MS Teams is used and adopted as a collaborative platform to teach mathematics. One great point about using OneNote as a teaching tool in the class is that it is cloud-based storage which is available anywhere, on any device. It is automatically stored on OneDrive. You can access to it at anytime works for you. Furthermore, OneNote works even when a user is offline. The changes made will be synchronised the next time when the user is connected to the Internet again. OneNote is indeed one of the most useful tools for instructors replacing the traditional approach of teaching and learning (Salman, 2014). It is not only used as a digital whiteboard for writing and drawing using pen-like stylus in the online classes, but also is designed to be user friendly, easy to navigate and easy notes organization. From the study, it can be asserted that OneNote fulfils the two factors, including the perceived usefulness of the technology and the perceived ease of use, that influence the attitude of an individual towards technology and the behavioural intention to use IT (Venkatesh & Davis, 2000), which make it a top-notch tool to complement the traditional whiteboard (Salman, 2014). Besides that, OneNote class notebook in MS Teams can also be used to facilitate students’ collaboration activities, during or after the class promoting interactive learning in the classroom (Acharya & Czajkiewicz, 2008; Patchigalla, 2019). Both lecturers and students can use powerful drawing tools to do a lot of things from writing, drawing, highlighting and annotating slides, sketching diagrams, inserting file and web content, including audio and video recordings to create rich interactive lessons for students. The real-time synchronization feature of the OneNote class notebook has the merit of allowing students to edit and share their work remotely together in the collaboration space as a private group, or as a whole class at the same time. With this advantage, students will benefit from the better information speeding up their knowledge and material sharing both synchronously and asynchronously. In addition, lecturer and students are also able to provide their feedback virtually within a space accessible by everyone. The conversation and announcement are made in the General channel in the Teams class; the material and information about the course are posted in the content library section of OneNote class notebook for everyone’s viewings, leading to a more transparent and clear communication for both students and lecturer. Lastly, MS Team break-out room chat feature (see Figure 6)

supports the online discussions while collaboration ensues within the space via OneNote class notebook, utilised as the common board to work on the assigned activities both synchronously and asynchronously. The channels in the Teams class used as the break-out room in MS Teams was found to be effective in improving engagement and interactions for both synchronous and asynchronous lesson (Mahmud & Wong, 2021).

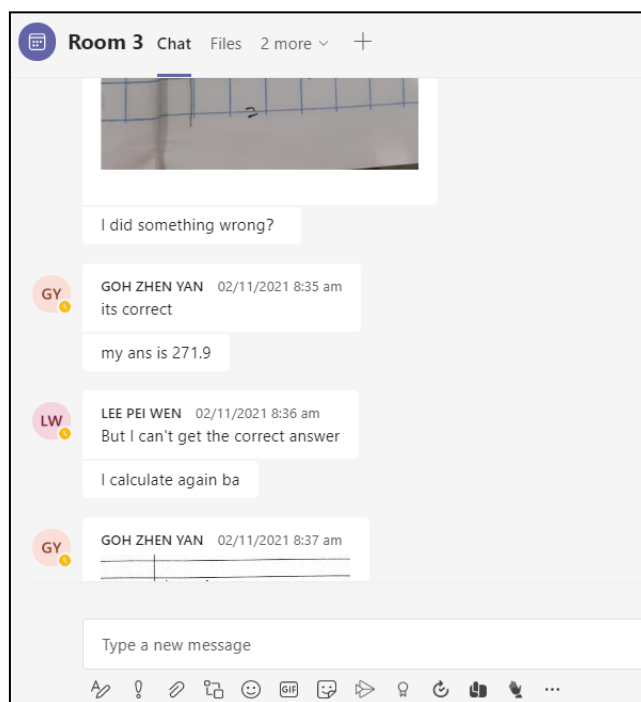


Figure 6. Break-out Room Chat Feature

Despite the many advantages that OneNote offers, it still has its drawbacks. First of all, every student is having different levels of access to technology, including internet and devices that support learning (Sahlberg, 2020). Only if all the students are having the access to technology, then OneNote class notebook can be utilized to maximize its impact. Besides, those who are new to OneNote may find it complicated to access and tricky to navigate at first. Thus, on the first day of class, students should be guided the way to use OneNote step by step. Next, the search tool is not always perfect and the ability to search through OneNote class notebook is limited. One needs to explore from top to bottom, from left to right section by section, page by page in order to look for one point. The styling and formatting options of the notes are limited in OneNote. It could have more Word formatting options available to make the content to be rich text formatting. OneNote is also lack of dynamic elements that could be included in the notes which deemed to be important in student-centered learning. According to International Society for Technology in Education (2017), student-centered learning transforms students from passive learner to a dynamic element in their learning. It requires methods such as hands-on learning and problem-based learning. As a resolution to overcome this problem, the lecturers can always integrate other technology or strategies together with OneNote class notebook in the class to make the lesson more diverse and dynamic.

#### 4. Conclusion

COVID-19 has transformed the education paradigm with challenges. Many educators are having difficulty in student engagement since one-to-one engagement with teachers is reducing and they find it difficult to monitor individual student progress (Sahlberg, 2020). On the other hand, our students are also getting more vulnerable to social isolation and interruption to learning support especially those with additional needs (Sahlberg, 2020). Considering the necessity of keeping everyone connected, there is a need to offer an interactive space for lecturer and students in teaching and learning. In this study, it is presented that OneNote class notebook is feasible to be used for teaching and learning as a substitute to the traditional whiteboard due to its flexibility, real-time engagement and collaboration values. The live real-time sync collaboration and students' participation during and after the live class through OneNote class notebook via MS Teams make the online classes more interactive and enrich students' learning experience. Nonetheless, there are some limitations in this study wherein there is no learning data analytics which could be leveraged as supportive evidence on the advantages of using OneNote class notebook, and how it affects student-teacher, student-student and student-content engagement. Therefore, it

is suggested that further studies could be done by collecting primary dataset from surveys and learning analytics component can be included in the study to deduce further the feasibility and usability of OneNote class notebook as a great component for teaching and learning.

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### References

- Acharya, S., & Czajkiewicz, Z. J. (2008). Enhancing engineering education using new technologies. In *The 1st International Multi-Conference on Engineering and Technological Innovation IMETI* (Vol. 2008, pp. 200-205). Retrieved from <https://www.iiis.org/cds2008/cd2008sci/IMETI2008/PapersPdf/F022GZ.pdf>
- Al-Rimawi, F. T. (2014). The Effect of Using Blended Learning in Teaching English Language on the Direct and Delayed Achievement among the Sixth Graders. *Unpublished Master Thesis, Faculty of Educational Sciences, Middle East University, Jordan*.
- Alhasan, A., Audah, L., Ibrahim, I., Al-Sharaa, A., Al-Ogaili, A. S., & Mohammed, J. M. (2020). A case-study to examine doctors' intentions to use IoT healthcare devices in Iraq during COVID-19 pandemic. *International Journal of Pervasive Computing and Communications*. <https://doi.org/10.1108/IJPC-10-2020-0175>
- Ali, Z. H., Ali, H. A., & Badawy, M. M. (2015). Internet of Things (IoT): definitions, challenges and recent research directions. *International Journal of Computer Applications*, 128(1), 37-47. <https://doi.org/10.5120/ijca2015906430>
- Amarin, N., & Al-Saleh, A. A. S. (2020). The effect of color use in designing instructional aids on learners' academic performance. *Journal of e-Learning and Knowledge Society*, 16(2), 42-50. <https://doi.org/10.20368/1971-8829/1135246>
- Amasha, M. A., Areed, M. F., Alkhalaf, S., Abougalala, R. A., Elatawy, S. M., & Khairy, D. (2020, February). The future of using Internet of things (IoTs) and context-aware technology in E-learning. In *Proceedings of the 2020 9th International Conference on Educational and Information Technology* (pp. 114-123). <https://doi.org/10.1145/3383923.3383970>
- Dong, X., Chang, Y., Wang, Y., & Yan, J. (2017). Understanding usage of Internet of Things (IOT) systems in China. *Information Technology & People*, 30(1), 117-138. <https://doi.org/10.1108/itp-11-2015-0272>
- Fadda, E., Perboli, G., & Tadei, R. (2018). Customized multi-period stochastic assignment problem for social engagement and opportunistic IoT. *Computers & Operations Research*, 93, 41-50. <https://doi.org/10.1016/j.cor.2018.01.010>
- HaddadPajouh, H., Dehghantanha, A., Parizi, R. M., Aledhari, M., & Karimipour, H. (2019). A survey on internet of things security: Requirements, challenges, and solutions. *Internet of Things*, 3, 100-129. <https://doi.org/10.1016/j.iot.2019.100129>
- Ilieva, G., & Yankova, T. (2020). IoT in distance learning during the COVID-19 pandemic. *TEM J*, 9(4), 1669-1674. <https://doi.org/10.18421/TEM94-45>
- International Society for Technology in Education (2017). *Essential conditions: Studentcentered learning*. Retrieved from <http://www.iste.org/>
- Mahmud, M. M., & Wong, S. F. (2021). Fusing the Jigsaw Method and Microsoft Teams: A Promising Online Pedagogy. *International Journal of Learning, Teaching and Educational Research*, 20(11). <https://doi.org/10.26803/ijlter.20.11.15>
- Mahmud, M. M., Wong, S. F., & Ismail, O. (2021, November). Emerging Learning Environments and Technologies Post Covid-19 Pandemic: What's Next?. In *The International Conference on Information, Communication & Cybersecurity* (pp. 308-319). Springer, Cham. [https://doi.org/10.1007/978-3-030-91738-8\\_29](https://doi.org/10.1007/978-3-030-91738-8_29)
- Patchigalla, R. P. (2019). *A Critical Evaluation of The Implementation of Microsoft OneNote Class Notebook at One New Zealand Secondary School* (Doctoral dissertation, Auckland University of Technology). Retrieved from <https://orapp.aut.ac.nz/bitstream/handle/10292/12616/PatchigallaRP.pdf?sequence=3>
- Sahlberg, P. (2020). Will the pandemic change schools?. *Journal of Professional Capital and Community*. <https://doi.org/10.1108/JPC-05-2020-0026>

- Salman, I. S. (2014). OneNote in education: An Effective Way to Enhance Approaches of Teaching and Learning in Classroom. Retrieved from [https://www.researchgate.net/profile/Ihsan-Al-Rukaibawi/publication/280599409\\_OneNote\\_in\\_Education\\_An\\_Effective\\_Way\\_to\\_Enhance\\_Approaches\\_of\\_Teaching\\_and\\_Learning\\_in\\_Classroom/links/55bcf95808aec0e5f4445584/OneNote-in-Education-An-Effective-Way-to-Enhance-Approaches-of-Teaching-and-Learning-in-Classroom.pdf](https://www.researchgate.net/profile/Ihsan-Al-Rukaibawi/publication/280599409_OneNote_in_Education_An_Effective_Way_to_Enhance_Approaches_of_Teaching_and_Learning_in_Classroom/links/55bcf95808aec0e5f4445584/OneNote-in-Education-An-Effective-Way-to-Enhance-Approaches-of-Teaching-and-Learning-in-Classroom.pdf)
- Savjani, R. (2019). *5 Factors to Consider Before Choosing an IoT Platform Vendor*. Retrieved December 30, 2019, from <https://www.softwebsolutions.com/resources/IoT-platform-company.html>
- Siddiqui, F., Beley, J., Zeadally, S., & Braught, G. (2019). Secure and lightweight communication in heterogeneous IoT environments. *Internet of Things*, 100093. <https://doi.org/10.1016/j.iot.2019.100093>
- Triantafyllou, A., Sarigiannidis, P., & Lagkas, D. T. (2018). Network Protocols, Schemes, and Mechanisms for Internet of Things (IoT): Features, Open Challenges, and Trends. *Wireless Communications and Mobile Computing*, 1-24. <https://doi.org/10.1155/2018/5349894>
- Turner, J. (2011) *Using Microsoft OneNote for Collaborative Vocabulary Notebooks in the Academic English Classroom*. Retrieved from <https://pdfs.semanticscholar.org/beff/ed7a470eb669967ea8590976b7fb5099aebd.pdf>
- Venkatesh, V., & Davis, F. D. (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. *Management Science*, 46(2), 186-204. <https://doi.org/10.1287/mnsc.46.2.186.11926>
- Yu, J., Kim, M., Bang, H. C., Bae, S. H., & Kim, S. J. (2016). IoT as a applications: Cloud-based building management systems for the Internet of things. *Multimedia Tools and Applications*, 75(22), 14583-14596. <https://doi.org/10.1007/s11042-015-2785-0>

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