

Learner-Centric Technologies to Support Active Learning Activity Design in New Education Normal: Exploring the Disadvantageous Educational Contexts

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Abstract—Active learning is a learner-centric instructional method that uses discussion, role play, collaborative problem-solving based approaches to engage students with the course materials. However, due to the pandemic, active learning activities take place over multiple learner-centric technologies, as classroom-centered activity design is no longer possible. This study explored the success stories of active learning in disadvantageous educational contexts, particularly in Arab regions. After examining the theory, models, and various learner-centric technologies of pre-pandemic active learning designs, this study proposes 25 emerging technologies to support 19 active learning strategies regarding learning activity design in new education normal. The three-fold findings are related to designing active learning activities in new education normal, enhancing less practiced active learning strategies, and bridging the gaps in pre- and post-pandemic active learning activity design using learner-centric technologies.

Keywords—Active learning, interaction design, learner-centric technology, new education normal, pedagogy

1 Introduction

1.1 New education normal

The term new normal is used to describe the havoc everywhere and poses new challenges in the education system. The new normal in education has been raised due to the disruption that the covid-19 pandemic has brought. Since the covid crisis struck and campus institutions were forced to close, students continued their education using interactive digital platforms like GoogleMeet, Cisco WebEx, Zoom, and skype [1]. A

report published by Commonwealth shows that, after the covid crisis struck, which forced campuses to close with implications for millions of students, 31 open universities listed in the Commonwealth have enrolled over 5 million students [2]. The new normal in education has shown greater attention to distance learning using various pedagogical methods. Commonwealth reported "no significant difference in outcomes between distance and traditional classroom instruction, yet there is a lingering perception, especially in the developing world, that distance education is not as effective as class-based education" [2]. Besides, it has been extremely challenging for educators to assess how active students are in the classroom while attending classes remotely.

1.2 Active learning as an instructional method in higher education

In general, active learning refers to a broad range of behaviors and activities, including reading, writing, discussion, question-posing, and problem-solving, that help in transmitting knowledge. The advantages of active learning in higher education classes include increasing students' engagement, developing collaborative skills, enhancing critical thinking, sparks creative thinking, and fostering real problem-solving skills. Moreover, the cone of learning (refer to Fig. 1) clearly distinguished between a passive learner and an active learner [3]. It is found that active learning achieves 70% to 90% of what he/she intends to learn while a passive learner achieves 50% [3]. It can be said that most mobile, distance and seamless learning technologies used by teachers and learners to support active learning classrooms are developed to achieve 50% to 70% of the knowledge. In order to achieve the purpose, to date, many strategies have been used. Determining the appropriate strategy could be challenging for the teacher as it depends on many associated factors such as curriculum, course contents, technologies, and the pupils. Many instructors prefer to have a combination of multiple strategies for increasing the learning outcome and interaction.

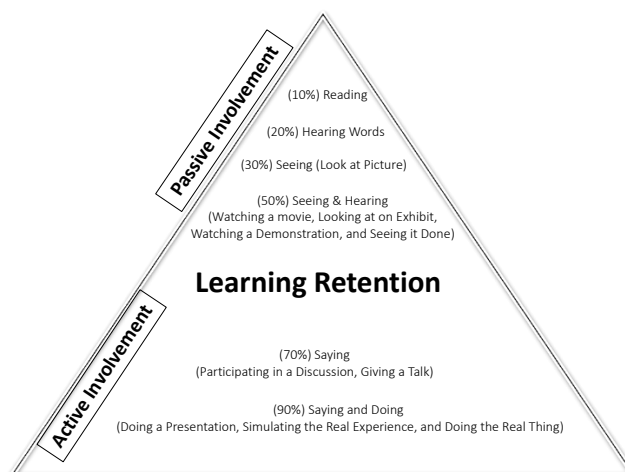


Fig. 1. The cone of learning [3]

1.3 Research questions and contributions

This study investigates the active learning pedagogies, practices, and learning-ing outcomes across the disadvantaged educational contexts, emphasizing the Arab regions. This paper addresses three research questions [4].

- RQ1: How active learning pedagogies in higher educational settings have been affected by the pandemic?
- RQ2: How active learning strategies have been implemented using learner-centric technologies in disadvantageous educational contexts.
- RQ3: How to bridge the gaps in pre-pandemic and new education normal active learning activity design by connecting learner-centric technologies with strategies?

Moreover, in this paper, we connected distance educational tools and technologies that could impact post-pandemic higher education in terms of classroom design, re-thinking, and learning measurement. Furthermore, we studied various applications and systems such as Kahoot, Socrative, LFO panel, Inter-Note, Brainwriting, WeChat, Youtube, Zoom breakout room, Edmodo, Plickers, and DojoIBL could be useful in enhancing active learning. This study could help higher institutions in Asia lead students to perform better while taking online classes and engaging teacher-given activities in distance education.

2 Literature Review on the Active Learning Practices in Disadvantageous Educational Contexts

Active learning methods have not just been tested in advantageous educational contexts (such as US, EU, and the UK), it has also been used in disadvantageous contexts such as the Arab regions. In this section, a survey is reported on active learning practices across Asia-pacific and Arab-regions. The survey uncovers information on the learning technologies and methods used to support active learning in the classroom.

In Jordan, applying active learning strategies using the learning management system (Moodle) and interactive whiteboard can improve students' achievement in a computerized kids program [5]. Moreover, a study is conducted about Syrian refugees residing in Jordan that adopted blended learning as the instructional method [6]. Edmodo is a tool that has been used across many higher educational institutions in Arab regions. For instance, in Saudi Arabia, using Edmodo through mobile devices positively impacts students' learning and access to information. In addition to activating all Edmodo features to increase its impact on the educational process [7]. In Egypt, using active learning through Edmodo effectively teaches English for specific purposes in general and, in particular, in oral communication skills such as accurate pronunciation, fluency, and elocution [8]. Edmodo also has been used to apply e-project and role-playing strategies through the SOPC (Small Private Online Course) model. In Saudi Arabia, it is found that, first, using e-project using Edmodo leads post-graduate students to improve their research skills through digital resources; second, using role-

playing through Edmodo could improve the practical skills among group learning and support interactivity among the learning group [9]. In Saudi Arabia, augmented reality technology is suggested to be an effective technology for enhancing active learning. Because one study found that AR benefits in using multimedia and it can create a relation between the digital devices' camera and presenting the knowledge and skills unfortunately still, there is a need to improve teachers' competencies in practicing augmented reality application through active learning activities in the various learning contexts [10]. Furthermore, using motion graphics is a good chance of practicing active learning [11] (Abdel-Hameed, 2019). Active learning through an e-learning environment based on instructional models improves female students' digital story skills. It is because active learning through an e-learning environment enables students to practice the learning activities, share their own opinion, discuss their ideas, collaborate with other students, practice the practical learning activities, improve their responsibilities toward their self-learning, and encourage the students to search for the new experiences that they have to learn [12].

3 Mapping Impactful Learning Technologies with Strategies to Design Active Learning Activities

This section aims to map some of the promising and impactful learning technologies that can be used to support active learning design under pandemic and post-pandemic education (i.e., new education normal). First, we discuss some impactful learning technologies and their usage in active learning activity design in new education. After that, we map twenty-five learner-centric technologies with active learning strategies.

- **ARIS:** The gaming software ARIS developed by UW Madison is a promising tool that could help students in responsive active learning. The gamified environment of the ARIS system (refer to Fig.2) provides fun opportunities for learners to develop, practice, and improve coping skills for potentially stressful, unfamiliar, complex, or controversial situations.

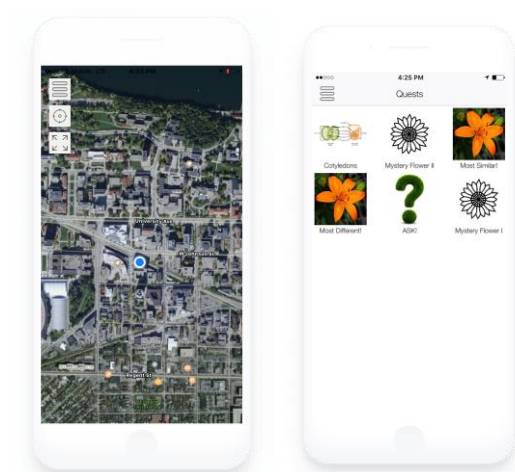


Fig. 2. Learning environment ARIS system

- **Edmodo:** Edmodo is a computer-mediated environment that can be used to support active learning in a traditional classroom. The Edmodo platform uses social network sites such as Facebook and Twitter to connect and interact with one another, share ideas and opinions, and fluidly gather feedback.
- **Socrative:** This tool is advised to support several activities in a classroom where students have their smartphones. Because this platform uses smartphones to visualize students' understanding, provides instant feedback, and creates personalized interaction activities to engage students in the classroom.
- **Kahoot:** The Kahoot platform could be used by the teachers who aim to use various digital games (that is, game-based learning activities) for their classroom. Kahoot platform contributes to students' learning, including creating and integrating appropriate content inside Kahoot and providing students with timely feedback and game-play strategies [13].
- **Plickers:** Plickers is widely used as an active learning tool for formative assessment in K-12 and Physical Education Teaching Environment (PETE) professionals. Hence it is suggested for the teachers who aim to use formative assessment in the classroom.
- **Zoom:** Zoom has shown great promises to the teachers and students regarding content delivery, active participation in discussions, video chat, and screen sharing. The analytics of Zoom is capable of ranking top-participants by meeting minutes. This tool is suggested to those who aim to use brainstorming in their classrooms. Also, this is effective for the instructors who aim in live-monitoring the class.
- **Tokiwa Tool:** One of the research tools is Tokiwa tool[14], developed to assist active learning activities. This tool can be used as a plugin of Sakai is to enhance students' motivation while students are learning in the absence of a lecturer [14].
- **BLOSSOMS Interactive Video Platform:** Interactive videos could be used as an active learning technique to increase students' performance and motivation. For instance, one study [15] suggested that BLOSSOMS (Blended Learning Open Source

Science or Math Studies) developed by MIT (Massachusetts Institute of Technology) could be used along with active learning strategies to assist the teaching and learning of thermodynamics. On the contrary, this platform could be used without an active learning strategy to teach the thermodynamics energy conversion course, yet, students' performance could be enhanced [16].

- **MALL Tools:** For foreign language learning programs, MALL (Mobile Assisted Language Learning) tools, including messaging services, could be used. Messaging apps such as WeChat in the EFL (English as Foreign Language) context could enhance students' English proficiency and motivation [17].
- **LFO Panel:** In addition to the existing tools, we developed the LFO (Learn From Others) Panel, a tool for experiential learning, known to be a rather complex form of active [18], [19]. This tool is mainly used for language learning classrooms where teachers intend to teach foreign vocabulary. This tool uses learning analytics to identify authentic logs and suggest one learner's authentic learning logs to other learners. Figure 3 shows the interface on the LFO Panel.

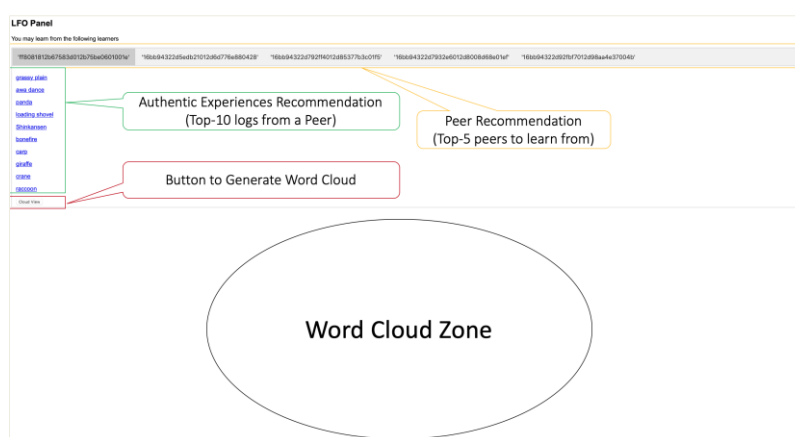


Fig. 3. The LFO Panel

Although several tools are developed, no one tool fits in all situations. Each of the tools has limitations for supporting multiple strategies. Therefore, further research and developments need to be conducted. In this study, we used the spectrum of some active learning activities arranged by complexity and classroom time commitment prepared by Chris O'Neal and Terisha Pinder Grover of Centre for Research on Learning and Teaching, the University of Michigan for mapping the popular strategies with emerging technologies.

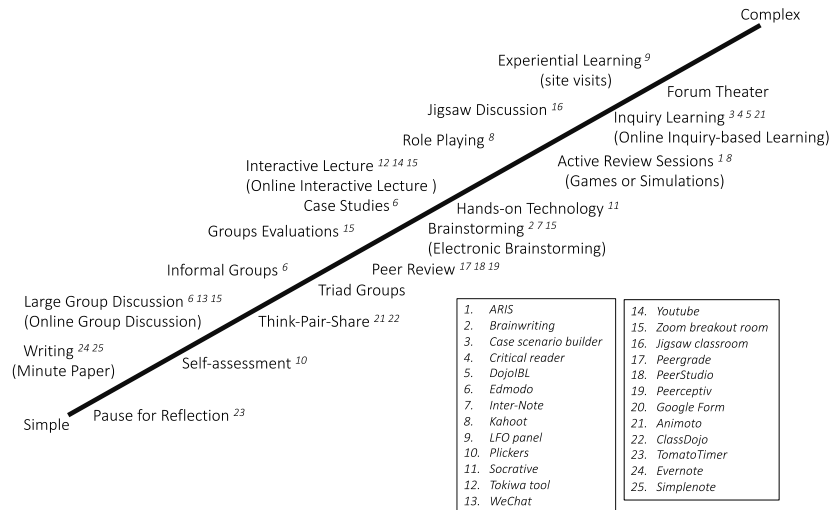


Fig. 4. Mapping impactful learning technologies with active learning strategies

4 Findings

In this paper, we explored three critical aspects of higher education, namely, how active learning pedagogies have been affected by new education normal, the success stories of technology-supported active learning practices in the disadvantageous educational contexts, particularly in Arab regions, and a way to connect impactful technologies with active learning strategies, even under- and post-pandemic education. The findings of this study indicate that,

- Concerning RQ1: In disadvantageous educational contexts, active learning strategies have shown significant successes in bringing better learning outcomes. However, only a few institutions have stepped forward to use this instructional method.
- Concerning RQ2: In during and post-pandemic education, active learning will help to a certain extent with the acquisition of learning outcomes related to skills belonging to university undergraduate academic abilities [4]. In new education normal, teachers find it challenging to remotely measure students' emotions, motivations, and learning outcomes.
- Concerning RQ3: To bridge the gaps in activity design between pre-pandemic and new education normal, learner-centric applications such as Kahoot, Socrative, LFO panel, Zoom's breakout room, Edmodo, and Plickers are recommended. In this regard, it is suggested that more research need to be conducted to develop a suitable technological framework for enhancing less practiced active learning strategies such as pause for reflection and role-playing [4].

In new education normal, students and teachers may have to face several challenges. These challenges include overwhelming technologies, working with a group using

technologies, before-and-after class activity design. Unfamiliar technologies could remain a challenge for both teachers and students. For students, distractions related to multiple activities (i.e., whiteboard activities, video screen sharing, chat window, consult with teaching assistant) could be a key factor. For teachers, the evaluation of active learning activities could be challenging.

5 Discussion

In higher education, active learning is used as a learner-centric instructional method that primarily aims to engage students fully in their education by exploring, thinking, creating, discussing, sharing, and reflecting on what they have learned. This instructional method could lead to deeper engagement and understanding than the students who sit passively in the class and listen to the instructor's lecture. In both advantageous (i.e., US, UK) and disadvantageous (i.e., Arab countries), active learning techniques have been adopted to boost achievement. However, as engaging students in hands-on activities, collaborative works, and discussion are the key, it is hard to do when universities are closed due to pandemic. Therefore, these activities need to be done over learner-centric technologies in new education normal.

In this paper, we connected twenty-five learner-centric technologies with nineteen active learning strategies. The nineteen strategies are- pause for reflection, writing minutes paper, self-assessment, group discussion, think pair share, informal groups, triad groups, peer review, groups evaluations, brainstorming, case studies, hands-on technology, interactive lecture, role play, active review sessions, jigsaw discussion, inquiry learning, forum theatre, and experiential learning. These nineteen strategies are chosen from work by Chris O'Neal and Tershia Pinder Grover of Centre for Research on Learning and Teaching, University of Michigan. None of the twenty-five learner-centric technologies were primarily designed for triad group and forum theatre activity design based on our analysis. Therefore, we discuss more on these two strategies.

Triad groups is an active learning strategy that promotes higher-order thinking through generating ideas, answering exams, or solving problems. The teacher in this strategy has to prepare the learning material, ask learners to form groups of three learners and assigns one role (either reader, recorder, or checker) for each learner in the group. The reader's role is to read carefully and to learn about the tasks and materials. The recorder's role is to write down all the group members' good ideas and write the final answer that the full group members agreed upon. The checker's role is to ensure that all group members contribute to the discussion and share in the final answer. Although using the triad group helps teachers ensure that all learners understand the learning, it enables teachers to stop spreading the misunderstanding that may happen in some groups with the rest of the learners. Still, using a triad group is a challenge in a class that enrolls large numbers of learners. Managing many triad groups through web learning communities requires highly qualified teachers, specific time for giving the class, a long-time of management before and after the class, stable and

high-speed connection to the internet resources, and not easy and not available all the time.

Forum Theatre is an active learning strategy that can be applied through web learning communities. The teacher in the Forum Theatre modifies the learning situation, learning objective, or the learning problem to be a dramatic sketch that acts out possible solutions, understanding the learning context, or achieving the learning objectives. The steps of applying Forum Theatre as a teaching technique: (1) Develop a Script: Learners have to develop a script based on their prior experience, and the primary goal of this activity is to train learners to develop scripts that include the learning materials. (2) Anti-model Play: After revising the script, learners acted in the script. Learners, while acting the scripts, focus on achieving the learning objectives. (3) The Forum: in this stage, teachers have to open a discussion with the learners. The discussion should include possible solutions proposed while acting the script. The teachers also asked the learners to present the main ideas of what they have seen. (4) Intervention Play: The learners, after finished acting the learning materials, discuss the main ideas and related details of the learning objectives. Each student should present the central role of one of the characters the act in the learning theatre. Besides, some learners joined the scene as a new character [20]. Forum Theatre, as an active learning strategy, also has some disadvantages. Although the forum theatre strategy is a suitable strategy for teaching moral issues and many various topics, it is challenging to use it to improve engineering majors. Also, preparing a script for forum theatre is another challenge for teachers who will use this strategy to overcome it.

6 Conclusion

The pandemic forces worldwide to shift from conventional teaching and learning methods to digital learning. Although preparing students to master the 21st-century skills needed to use a more active learning strategy, using active learning strategies within the digital learning communities is challenging. International Research and Training Centre for Rural Education (INRULED), UNESCO, contributes to the current educational system with a scientific report that discussed active learning guidance in new education normal. Because learning is a complex human activity, only providing guidance sometimes does not work. Designing an active learning course is required for students to obtain higher quality in their academic performance.

Designing a suitable learning activity following student-centred activity design principles' guidelines remains a challenge that teachers face. Using virtual labs for improving learners' abilities to conduct a scientific experiment in Science major can help students understand the scientific experiment, but still, learners need to deal with exponential tools in the science labs. Teaching arts, dealing with musical instruments, or drawing tools are also the big challenges in new education normal. Therefore, our study has connected various educational tools and technologies that could impact post-pandemic higher education in classroom design, re-thinking, and learning measurement. Although active learning enables students to practice the learning activities, share their own opinions, discuss their ideas, and collaborate with other students,

designing an active learning model that could balance real space, virtual space, and hybridized learning interaction is necessary.

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9 Appendix

In this section, we provide the list of web technologies that have been explored within the scope of this article.

<https://www.jigsaw.org/>
<https://www.peergrade.io/>
<https://www.peerstudio.org/>
<https://www.peerceptiv.com/how-it-works/>
<https://www.futurelearn.com/info/courses/teaching-for-home-learning-secondary-science/0/steps/75741>
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