

The Effective Use of Technology and Cognitive Task Analysis in a Health Lesson

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ABSTRACT

The use of technology in K-12 lessons has become a trend nowadays. In the Nearpod lesson, students learned foundational knowledge about epidemic diseases, which is of concern and heatedly-discussed during the recent period. Students were provided with several online resources and encouraged to explore the topic with their group members. After this lesson, students were expected to understand different categories of epidemic diseases and their causes and effects as well as the self-protecting measures. The main role of the teacher in the lesson was to guide and give instructions and to make sure that all the students were on the right track. This was qualitative research proposing a lesson plan to examine the effects of technology and cognitive tasks in the lesson. Students were provided with certain materials and activities which would help them to learn about the cause and effect of epidemic diseases. After that their learning outcomes are shared in the Collaborate Board for the whole class to review and comment on. During the whole class, both formative and summative assessments are used to assess students' learning and achievements, which would provide further inspiration for the education field.

Keywords: *Nearpod lesson, Technology, Epidemic diseases, Assessment, Concept Map, Collaborate Board, Feedback.*

1. INTRODUCTION

With the increasing employment of technological-based tasks into K-12 classes, Nearpod lesson plays a significant role in the teaching process. Both teaching and learning have become more inquiry-oriented and interactive. This paper aims to analyze a Nearpod lesson designed for Grade 8 students in Social Studies (Health Education), which mainly teaches students how people are affected by epidemic diseases and how to prevent themselves from being affected. In this lesson, different technological-based activities are designed to help students better understand the knowledge as well as facilitate peer collaboration, thus completing high cognitive demand tasks more effectively and efficiently. In addition, the author aims to provide more supporting evidence of how the designed tasks and activities function in a lesson and help other users to create an inquiry-based lesson in Nearpod.

2. METHODOLOGY

This paper intends to explore the effectiveness of Nearpod lesson on students' learning as well as the extent

to which Nearpod influence students' engagement and motivation. Therefore, this research designed six sections to measure students' performance, namely introduction, motivation, inquiry, formative assessment, applications, summative assessment, and summary.

Firstly, the learning objectives were presented to help both the teacher and the students evaluate whether the whole class was tracked. The learning objectives were 1) students will understand how certain diseases affect people's health; 2) students will know how to protect themselves from being affected; 3) students will be able to teach others how to prevent diseases. At the same time, the lesson agenda with time allocated to each activity was shown to the students to let them have a clear idea of what they were going to do in this class.

Next, to motivate students' interest in the topic of the lesson, the teacher asked them to post their answers in the Collaborate Board to answer, "What things do you usually do to keep yourself healthy?" Students should also comment on each other's posts to have a pre-lesson discussion. Also, this initial assessment could help the teacher to pre-assess and review students' pre-requisite knowledge on Health.

In the introduction section of the lesson, the teacher explained the definition of epidemic, communicable and non-communicable diseases to the students and check their general understandings of these concepts with Matching Pairs to encourage them to put each disease into the correct category. After some general introduction, students was instructed to research further the cause and factors contributing to each category of epidemic disease. Cognitive demanding tasks with pedagogical qualities were assigned to the students to focus their attention and facilitate their understanding of the desired concepts as well. Students should watch two videos about communicable and non-communicable diseases respectively, taking notes and answering several open-ended questions. This activity was both inquiry- and technological-based. While researching and discovering in the video, students should investigate about the epidemic diseases in a methodical manner together with some information processing techniques, followed by an analysis of their findings and a reflection on what was learned. When all the students submitted their answers, the teacher reviewed and provided feedback according to students' learning results and made a pertinent adjustment to the lesson plan.

Concerning the learning objectives, students were expected study how to prevent communicable and non-communicable diseases with the help of interactive technological tools. They were asked to watch another two videos which illustrated preventing measures, then completed the Time to Climb task. Before they did the task, students would have three minutes to share and discuss with their classmates what they had noted down. After this cognitively demanding task came the teacher's illustration time. The teacher would illustrate more on the conceptual knowledge according to previous task outcomes. In the meantime, students are free to ask and answer questions as well as sharing anything they consider interesting and valuable.

The most important part of the lesson is the group research section. Students are divided into separate groups and each group would be assigned a topic to research on. Students are provided with links to various online resources and they could also access other resources they consider important. Their research results should be presented in a concept map on Coggle (an online mapping tool), including the relationships between the concepts and facts, causes and preventions, specific examples, and so on. In the end, students were asked to post their concept map on Collaborate Board in Nearpod for other group members to review. Each group was supposed to take the responsibility to explain and answer questions to the post they were in charge of.

In terms of the summative assessment, the teacher posted a survey to check how the students felt about what they learnt during the lesson. Then, they were required to write an article within 120 words to inform others about

how to keep a healthy status during the epidemic, which allowed the teacher to check to what extent the input knowledge was transferred into output.

At the end of the class, the teacher summarized the whole class with students that they were instructed to post and comment on each other's summary of the lesson on Collaborate Board.

3. RESULTS AND DISCUSSION

3.1. Subject Content

In this part, the subject content of this lesson and how the content is represented by certain technology will be discussed. For this lesson in Health Education, students learnt and researched about communicable and non-communicable epidemic diseases and studied more with their group members with the aid of technological-based activities on certain assigned diseases. After this lesson, students had a clear idea of how certain epidemic diseases affect people's health and what people can do to protect themselves from affection. In addition, each group completed a concept map of their assigned disease after group research and discussions. Topics selected for this activity included both communicable and non-communicable diseases such as COVID-19, Norovirus, and Parkinson's.

Different forms of cognitive demand tasks were applied in the lesson under the learning objectives designed. Each of them had its function and significance in the class. First of all, in the pre-assessment part, the teacher asked the students to post a sentence on "Collaborate Board" in Nearpod to check their previously acquired knowledge on health issues. According to this sentence, students were expected to write down the habit and how it could help with body health. By doing this activity, students became able to relate to their experience and simultaneously boost their interests in the topic, so that students could understand and comprehend new knowledge more comprehensively [1]. Subsequently, after introduction to communicable and non-communicable diseases, a matching game, which helped to check their understanding and allowed the teacher to know the extent to which new knowledge was acquired, because when they were trying to complete the task, they were constantly reviewing the conceptual knowledge, and as a result enhance requisite knowledge. Moreover, by matching and checking their answers, students could know whether they had mastered how to categorize different epidemic diseases and made self-enhancement accordingly.

After the first formative assessment, students were required to watch some videos and websites to learn more about how people get affected. By providing students with visual and audio media, they were able to complete tasks more effectively with the help of cognitive tools [2].

At the same time, online resources enabled students to have a more comprehensive understanding of how the epidemic disease affects human health and had an initial assumption and impression of how to stay safe and healthy [3]. After that, students should collaborate to separate groups to discuss some open-ended questions as well as posting individual answers in Nearpod. In this way, the learning of new knowledge was enhanced. Moreover, students in respective groups were assigned a certain disease for group research and discussions. They needed to come up with a concept map about the assigned topic and post the complete map onto the Collaborate Board for others to review. The complete map should comprise at least the infection source, prevention, and features of the disease and is self-consistent for others to read. This is a high-cognitive demand task that required students' collaboration, comprehension, and analysis of new knowledge. At the same time, students could mutually learn from others' achievements and convey this health knowledge to other people which was in accord with the learning objectives of the lesson.

3.2. Technology

In terms of this section, I will analyze more on the technological-based activities with a focus on the technological essentialities. As this lesson was designed on Nearpod, it could make great use of multiple resources on this platform, especially technological-based activities. According to Spronken-Smith and Walker, inquiry-based learning, especially when it is co-used with technology, enables students to participate in classes more engagingly and actively and it also boosts higher-order thinking and learning skills [4]. By utilizing these activities with Nearpod, students were allowed active participation in the lesson and could discover and research more with their peers. Meanwhile, with the help of various technological-based activities, students became more willing to explore and expressed their opinions concerning certain fields of knowledge.

For this lesson, the researcher designed a set of formative assessments to check students' progressive learning results. For example, "Matching Game" was employed to evaluate students' understanding and check the progress of learning [5]. The teacher received timely feedback from the exercises and adjusted the teaching plan accordingly. "Time to Climb" activity had similar functions, but when students were completing this task, they had a sense of competition that they wanted to climb higher and, as a result, became more motivated to finish the exercises [6]. Other technological activities such as "Collaborate Board" and "Open-ended Questions" allowed students to share their ideas and learning outcomes as well as practice basic language skills in an authentic way. While students were completing these tasks, they discussed and interacted actively with their group members, so that they were likely to improve

communication and cooperative skills as well as learning from others' feedback [7]. Additionally, with the help of Coggle maps, students could complete a concept map using newly acquired knowledge which enhanced students' learning and logical thinking.

In research and discussion sections, students were assigned certain topics with relative online resources. In this activity, they were expected to either self-learn or collaborate with group members to analyze the information provided, then internalize what had been accessed. Both technology and the task itself required students to communicate and think more, which as a result, enhanced speaking, critical thinking and research abilities.

3.3. Pedagogy

Various pedagogical strategies of this Nearpod lesson are to be analyzed in this part. Teachers are continuously attempting to employ digital technologies, together with various instructional strategies into their teachings [8].

Firstly, when students were completing individual tasks, an independent learning instructional strategy was employed. Students were independent learners that behaved like active instructors in their learning [9]. At this stage, teachers should not only focus on giving instructions but also on how to integrate technology to support students' learning, so that they could be able to bring learning effectiveness to the maximum [10]. Therefore, if teachers can integrate proper technologies and maintain high cognitive demand [10], students will learn effectively. Moreover, group learning and discussions enabled students to learn collaboratively as well as receiving peer feedback at the same time. Students were supposed to research assigned diseases together. While researching and discussing, they shared opinions and provided feedback to each other which could lead them to a higher level of thinking. Also, working with peers made students feel more relaxed in creating a low affective filter that they could confidently participate in the research, and the entire efficiency increased [11].

In addition, both peer feedback and teacher feedback, were of vital importance in students' learning. The application of technology and online platforms which allowed more communication between students qualitatively and profoundly reshaped how students interacted and promoted learning outcomes by collaborating and learning from peers [2]. At the same time, through the process of technological-aided learning, traditional ways of learning were reorganized [12]. To be more specific, feedback is traditionally applied to reflect objectively on students' performance [2]. However, as a technological-based pedagogical activity, it enabled students to input and output simultaneously, and as a result, learn concretely [2].

Additionally, differentiation and case study strategies were also utilized in this lesson. In the group research activity, students were allowed to choose different topics to work on and for certain topics, they were offered the opportunity to choose differentiated materials [13]. Students could design their concept maps according to multiple materials provided and chose to present the map in any form they want. In this way, students became the centre of classrooms and educational barriers were broken down [14]. In the meantime, the overall learning environment of the class turned out to be student-centred which is more engaging and active that facilitates student-empowered learning thus enhancing critical thinking and self-reflection skills [15]. In this case, “discussions often involve a chunk of reality” were employed in this discussion-based lesson [16]. More importantly, a case study allowed students to study a certain sub-class and new knowledge to build upon existing one [17]. While conducting case studies, students needed to critically work on details and to outline pros and cons for each standpoint thus improving students’ learning such as critical thinking ability [18]. According to Barkley et al., discussions and outlining which give students practice in case study “bridge the gap between theory and practice and between the academy and the workplace” [19]. In this way, students experienced meaningful engagement in critical thinking as well as in profound learning [17].

Last but not the least, throughout the whole process, formative and summative assessments were of essential and initial importance. Concept-checking questions and quizzes (e.g., “Matching pairs” and “Time to Climb”) allowed students to identify the most significant ideas they just learned from teachers and research discussions. These assessments also helped the teacher to determine whether the students were identifying what was important and essential [20]. Formative feedback not only helped the teacher to adjust instructional strategies but also enabled students to make adjustments to their learning strategies during the class and know which part of the knowledge needed further enhancement. What’s more, summative assessment reflected on students’ learning outcomes and provided evidence to students’ achievements of the lesson [21]. By the end of the class, students were asked to post their concept map on “Collaborate Board” which reflected their progress and there was a quiz for them to evaluate whether learning objectives were met.

4. CONCLUSION

The effective application of technology in K-12 lessons benefit both teachers and students from various aspects. When teaching a new lesson, technology serves as a good helper for the teacher to facilitate teaching as there are a large number of online resources and technological-based activities. Timely formative

feedback is also available to the teachers to assess students learning outcomes and adjust lesson plans in advance. More importantly, with the help of Nearpod, students, and peers, can discover and explore new knowledge by engaging themselves in multiple activities. In this way, the class will become more student-centered and inquiry-oriented. Activities such as Collaborate Board and Concept Map can help the students to understand new knowledge more systematically and clearly, and learn from peers at the same time. To sum up, Nearpod provides an effective platform for technological-based teaching and guarantees a higher teaching quality.

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