

Open Access Article



<https://doi.org/10.55463/issn.1674-2974.49.12.17>

Effectiveness of Using EDPuzzle – A Study in Velammal College of Engineering & Technology

B. Janaki, K. R. Surendran

Department of English, Velammal College of Engineering & Technology, India

Received: August 25, 2022 / Revised: October 21, 2022 / Accepted: November 26, 2022 / Published: December 30, 2022

Abstract: Education is evolving every second, and so are the instructional materials. However, the video materials continue to be one of the most interesting and effective teaching tools in higher education. They not only help students learn by seeing it visually in their own convenient pace but also remain flexible enough to watch recurrently to grasp and retain information. These video materials are made even more engaging by applying the tool named EDPuzzle, which helps the instructors embed the questions intermittently throughout the video lectures to check their understanding of the concepts. If the question is answered, the video resumes; else it demands the keen attention and response from the students. This helps the instructors determine the students' understanding level in terms of the details of the content and the time taken to accomplish. The objective of this study was to examine the effectiveness of EDPuzzle in the learning process. To facilitate this evaluation, a survey was conducted on a class of 59 using a questionnaire designed with a five-point Likert scale based closed ended questions. A descriptive statistical method was used for data analysis. The results showed that EDPuzzle, which has proved to be user-friendly, commands better interaction and student engagement resulting in active learning. The findings acknowledge the need to train instructors and students to use EDPuzzle for a better learning experience. Further, there is scope to investigate the contribution of EDPuzzle to content learning, which will contribute to better academic performance.

Keywords: EDPuzzle, interactive tool, videos, learning, teaching.

使用益智游戏的有效性-工程技术学院的一项研究

摘要：教育每秒都在不断发展，教学材料也是如此。但是，视频材料仍然是高等教育中最有趣，最有效的教学工具之一。他们不仅可以通过以自己的方便速度来视觉看待学生来帮助学生学习，而且还足够灵活，可以经常观看以掌握和保留信息。通过应用名为益智游戏的工具，这些视频材料更具吸引力，该工具可帮助讲师间歇性地嵌入整个视频讲座中的问题，以检查他们对概念的理解。如果回答问题，则视频会恢复；否则，它需要学生的敏锐关注和反应。这可以帮助讲师根据内容的细节和完成的时间来确定学生的理解水平。这项研究的目的是检查益智游戏在学习过程中的有效性。为了促进这项评估，使用针对五点李克特量表的封闭式问题设计的问卷对 59 级进行了调查。描述性统计方法用于数据分析。结果表明，事实证明，益智游戏可以更好地互动和学生参与度，从而实现了积极的学习。这些发现承认有



必要培训讲师和学生使用益智游戏，以获得更好的学习体验。此外，还有一些范围来研究益智游戏对内容学习的贡献，这将有助于更好的学习成绩。

关键词：编辑拼图、互动工具、视频、学习、教学。

1. Introduction

Video materials are the tools that entertain and inform the students because these teaching aids are animated, colorful, and visually delighting. These video materials are often used by the instructors to effectively communicate and transfer the knowledge to the students. However, a question remains how much the video has commanded student engagement in terms of learning or comprehending. EDPuzzle, an interactive tool, is used to embed the questions then and there on the videos so that the students can on the spot answer them and instantaneously verify their level of understanding. This helps the instructor keep track of the progress of the students and devise an action plan for further development accordingly. Keeping this in mind, this study intends to evaluate the effectiveness of the EDPuzzle among a class of students at Velammal College of Engineering & Technology, Madurai. This tool was chosen because it is available free of cost and identified to be useful in enhancing the concentration level of the students. Therefore, it becomes essential to analyze its effectiveness in terms of enriching the learning experience.

2. Literature Review

The world witnessed an upheaval [36], [43] when coronavirus (COVID-19) was identified in China in December 2019 [30]. The World Health Organization abbreviated it as (COVID-19) on February 11, 2020 and [11] clarified it to be the widest plague of atypical pneumonia. Owing to this, the normal routine was disrupted as there was indefinite closure of educational institutes [13], [46]. It obviously became a challenge to manage academics in a lock down situation [44]. During this phase, the online education came into the picture [15], [26] in various forms and so are the instructional materials [25].

With hardly any training and motivation, the instructors and students who are considered to “digital natives” by [34] had to switch over to online education using Google Meet, MS Teams, or Zoom worldwide [10]. Gradually they put efforts to cope with the pandemic situation and manage to gain fruitful experiences [3]. Many studies like [9], [40], [46] have examined the challenges of online education, especially with reference to instructional materials [1]-[2]. However, not so much study has been carried out on video materials, especially in the southern part of India. Hence, this study evaluates the effectiveness of an

interactive tool embedded in videos.

The instructors found it easy to infuse more of audio-visual materials to make their pedagogies interesting and engaging and this resulted in improved student engagement [20], [22]. The instructors felt that the video materials were really welcomed much by the students as confirmed by [31], thus, “several studies on the use of technology in the classroom have shown a positive impact on the motivation of learners”. However, the effectiveness of the understanding of the content remained a million-dollar question to be answered. To manage this, EDPuzzle was introduced, which lets teachers embed questions intermittently in the video for the students to answer; the video resumes if only the students respond to the questions. This helps the instructors track the performance of the students and their levels of understanding too.

2.1. Features of EDPuzzle

The EDPuzzle allows the instructors to edit the video, adding multiple choice questions, and true or false tasks, match the following or open-ended questions as per the suitability of the content. The instructors can easily add an audio or text to intensify the learning experience for the better academic performance. Even cropping the video, assessing the questions and giving the feedback are made easy and instantly possible with the help of EDPuzzle. Additionally, it lays the platform to access many inspiring shows like TED Talks, Khan Academy etc. that are informative, motivating and engaging. The study conducted by [29] spells out that the students perform better in assessments because the EDPuzzle provides the students a platform to learn autonomously at their own pace and this is acknowledged by [4] as well. Moreover, the students get the results instantly [32]. It is for these reasons, both instructors and students prefer the EDPuzzle as put forth by [21].

As affirmed in [41], EDPuzzle can facilitate varied types of learning. According to [8], EDPuzzle is noteworthy for being free and hassle-free. It provides user-friendly access and the instructors can keep track of how many times a student has attempted to watch a portion or entire of the video. This helps the instructors analyze the comprehending capabilities of the students and the problem areas of the videos. EDPuzzle enriches the probability of inserting questions in learning platforms like Moodle or assigning a task to a specific student or a student group [27]. The instructors can monitor the performance of each student in the group

activities. If a student attempts to watch something on a new tab while performing the task, the task enabled video will automatically stop. However, this is impossible when a student attempts to watch something else in a new window [28]. Also, the instructors can opt to use or edit changes in someone’s EDPuzzle videos if they consider it right [7].

3. Methodology

A survey was conducted using a questionnaire consisting of 10 closed ended questions with a five-point Likert scale. Descriptive statistical analysis was carried out using IBM SPSS. In this study, 59 undergraduate students of III year of Electrical and Electronics Engineering of Velammal College of Engineering and Technology, Madurai, in the state of Tamil Nadu, India, participated, including 27 male students and 32 female students. These students were exposed to the use of EDPuzzle during online classes administered using the Google classroom platform during the pandemic period. The following is the flowchart from the research:

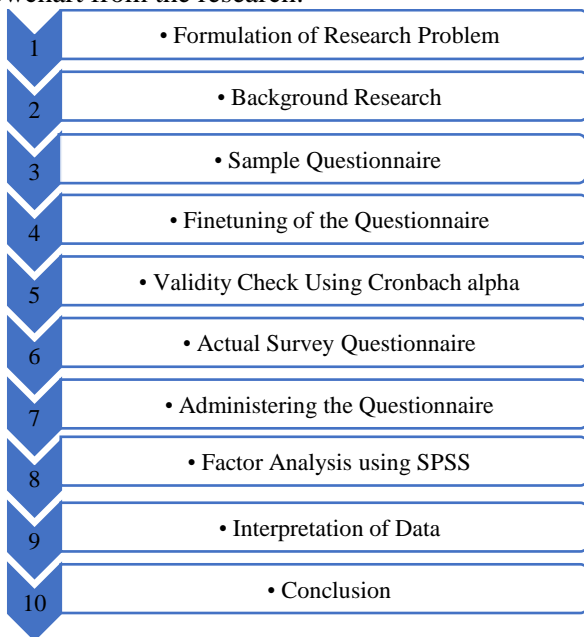


Fig. 1 The research stages

4. Results

Figure 2 shows that the gender-wise participation of students though the study does not discriminate the users by gender.

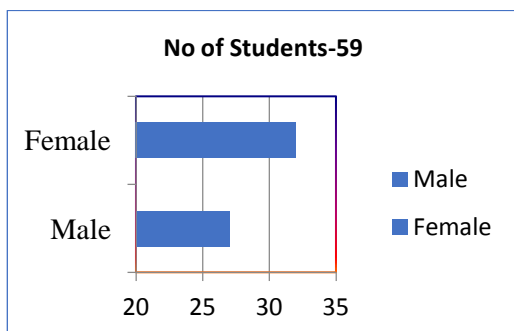


Fig. 2 Gender-wise participation (Developed by the authors)

Figure 3 shows the means of question items generated with the help of IBM SPSS. It has been observed that user friendliness has got the highest means followed by interaction, engagement, joyfulness and dynamism, motivation, recommendation and participation. All the parameters got the means of more than 3.00 except the mean of the item, “Focus” that is 2.81. This clearly suggests that the application needs enhancement in terms of achieving nominal focus.

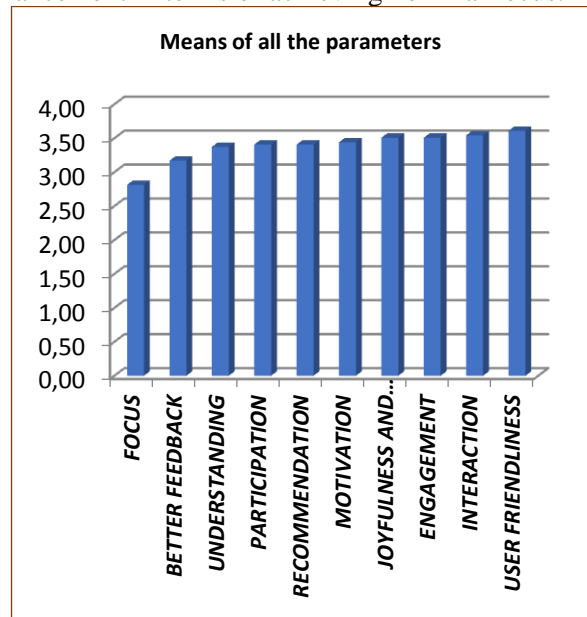


Fig. 3 Means of all parameters (Developed by the authors)

Table 1 shows the descriptive statistical data collected for all parameters. It was observed that there are some participants who strongly disagreed with the parameters of focus, better feedback and understanding. Parameters like focus, motivation, participation and joyfulness and dynamism have not been strongly agreed with by any student.

Table 1 Descriptive analysis of statistics of the parameters (Developed by the authors)

| No. | Item | Min | Max | Mean | Std. Dev. | Statistic |
|-----|-------------------------|-----------|-----------|-----------|-----------|-----------|
| | | Statistic | Statistic | Statistic | Err. | |
| 1 | Focus | 1 | 4 | 2.81 | 0.09 | 0.73 |
| 2 | Better Feedback | 1 | 5 | 3.17 | 0.12 | 0.95 |
| 3 | Understanding | 1 | 5 | 3.37 | 0.11 | 0.86 |
| 4 | Participation | 2 | 4 | 3.41 | 0.07 | 0.59 |
| 5 | Recommendation | 2 | 5 | 3.41 | 0.09 | 0.72 |
| 6 | Motivation | 2 | 4 | 3.44 | 0.08 | 0.65 |
| 7 | Joyfulness and Dynamism | 2 | 4 | 3.51 | 0.08 | 0.65 |
| 8 | Engagement | 2 | 5 | 3.51 | 0.08 | 0.67 |
| 9 | Interaction | 2 | 5 | 3.54 | 0.08 | 0.65 |
| 10 | User Friendliness | 2 | 5 | 3.61 | 0.10 | 0.83 |

5. Discussion

5.1 Content

The authors selected 50.57-minute YouTube video content on the Interpretation of Graphs, Charts and Diagrams produced by Doordarshan, Odisha, in

collaboration with ISRO EDUSAT. With the integration of the EDPuzzle it was communicated to the students through Google Classroom. The video was given to 59 students of Electrical and Electronics Engineering as an assignment in January 2020. Eight multiple choice questions and two open-ended questions with a time gap of 5 to 8 min were added to the video with the setting of ‘prevent skipping’ to ensure that the students watched the content for all 50.57 minutes and answered all the questions. Closed ended responses were auto-corrected and open-ended questions were graded by the instructor. The first multiple choice question with four options got 75% right answer and the other three wrong options got the percentage of 8, 6, and 13, respectively. In the second multiple choice question with three options, 96% got the right answer and the other two wrong options were 0% and 4% respectively. This brings into light the student progression with respect to understanding of the content.

5.2. Time

A total time of 3907 min was put in by 59 students with an average of 128 min, 120 min being the maximum and 51 being the minimum minutes spent by the participants in the EDPuzzle video lesson. 17 participants completed the assignment on time. 11 took 5 min more than the actual time; 22 participants took 60-minute time i.e., 8 min extra and 10 participants took more than 60 min to complete the task.

Table 2 Time spent by students (Developed by the authors)

| S. No. | Duration | No of participants |
|--------|----------|--------------------|
| 1 | 53 | 1 |
| 2 | 52 | 1 |
| 3 | 51 | 17 |
| 4 | 56 | 11 |
| 5 | 60 | 22 |
| 6 | 60+ | 10 |

This helps keep track of the progress of the students’ understanding of the content, grasping of the ideas, and comprehending the concepts.

5.3. Comparison with Other Studies

The outcome that the instructors and students found EDPuzzle to be more effective in teaching and learning agrees with the research pursuits of [6], [23], [24], [27], [33], [37], & [39]. EDPuzzle facilitates improved interaction even in asynchronous settings and this is confirmed by [5], [12], [16], & [42] and the audio-visual representations do a demonstrative teaching, enhancing the chances of understanding the content, which is acknowledged by [35], as well.

Further, EDPuzzle keeps the students motivated as proposed by [19], enhances their theoretical understanding according to [14], & [18], [38], and these are reflected in the results of this study too. Significantly, EdPuzzle is considered more effective

than other interactive tools, which is in sync with the findings of (as cited in [17]).

5.4. Findings

The interactive tool, EDPuzzle, is proven to be user-friendly and commands more student engagement as they actively learn using any of their smart devices at their own pace by answering the questions then and there. Hence, the infusion of EDPuzzle in the video-based lecturing is proved effective and it contributes to better academic performance. Additionally, EDPuzzle helps the instructors keep track of the students’ pace of study, which, in turn, supports in identifying the challenging area/areas of the videos for a better understanding. Instant feedback from the instructors is an added advantage to make EDPuzzle all the more likable, which is yet to be achieved according to the study. Developing the feedback parameter could enhance the understanding of the content. If properly devised and used, EDPuzzle can intensify the student participation, the quality and quantity of focus, which could be commendable.

5.5. Implication and Explanation of Findings

The study highlights the changing role of an instructor these days. The instructor does not have to teach conventionally or complete the syllabus. He or she should be tech-savvy, ready to exploit the available online tools to generate creative instructional materials to make the classes interesting and engaging. He or she should be aware of the varied skillsets of the students and design pedagogies that are inclusive of students with different levels of understanding. Hence, infusing digital interactive tools becomes indispensable. Educationists must understand the changing parameters of an able instructor and invest and promote upgrading the technologies behind such interactive tools like EDPuzzle as these help the instructors conduct classes in a more effective manner.

6. Conclusion

6.1. Strengths

- EDPuzzle helps in making video materials more interesting to the students.
- It pauses when a new tab is opened and this helps in identifying the students who are distracted.
- It also provides auto correction of MCQ questions.
- It helps instructors customize the video and types of questions.

6.2. Recommendations

After observing the data carefully, it can be said that the first three parameters have not scored high means as some students find them not very attractive. It is recommended to further probe into these parameters to redesign or upgrade EDPuzzle. It is recommended that

the EDPuzzle application should be recreated to generate more focused learning, giving instant feedback so that participation and motivation can be sustained high throughout the video. The integration of EDPuzzle into the instructional materials should be encouraged. Designing the pedagogy, keeping the use of EDPuzzle in mind, could be initiated. Assessment of the knowledge of study skills and cognition of the students against their background will make the picture very clear as to what kind of questions should be embedded in the content of the EDPuzzle.

6.3. Limitations

- The students who participated in the study were from different socio-economic backgrounds that raise questions on their level of understanding with respect to digital skills and interactive tools.
- Regarding the sample size, it is not so large enough to be conclusive.
- Students' awareness of the content well before the study was also a matter of concern. Though, most of them expressed their liking of the exposure to EDPuzzle. The effectiveness of the EDPuzzle is not evaluated against the cognition or the pre-knowledge of the content.
- Learning Management System (LMS) platforms like Moodle do not accommodate EDPuzzle. This limited the preferences among the instructors.
- Intermittent Internet remains a perennial problem while accessing such interactive tools hampers the teaching learning process.

6.4. Future Research

EDPuzzle can be compared with other such noteworthy interactive tools to identify the drawbacks in EDPuzzle for further betterment. Qualitative research with a focus on content could be initiated. Further research can be done to enhance the video-based learning app to retain interest among the users. The effectiveness of the feedback rendered on EDPuzzle should also be evaluated. The effectiveness of group work with EDPuzzle and assessment of the same need further investigation.

Appendix 1

| S. No. | Item | SCALE OF 1-5 (Strongly Disagree- Strongly Agree) | | | | |
|--------|---|--|---|---|---|---|
| 1 | Do you find more focus when you are using EDPuzzle when compared to watching videos without this application? | 1 | 2 | 3 | 4 | 5 |
| 2 | Do you understand better while using the application? | 1 | 2 | 3 | 4 | 5 |
| 3 | Do you feel joyful and dynamic while using this application? | 1 | 2 | 3 | 4 | 5 |
| 4 | Do you feel more engaged during your participation? | 1 | 2 | 3 | 4 | 5 |
| 5 | Do you get better feedback of your understanding after using this application? | 1 | 2 | 3 | 4 | 5 |

Continuation of Appendix 1

| | | | | | | |
|----|---|---|---|---|---|---|
| 6 | Do you get motivated to use this application? | 1 | 2 | 3 | 4 | 5 |
| 7 | Do you think the application is user friendly? | 1 | 2 | 3 | 4 | 5 |
| 8 | Do you interact with content better while using this application? | 1 | 2 | 3 | 4 | 5 |
| 9 | Do you participate more while using this application? | 1 | 2 | 3 | 4 | 5 |
| 10 | Do you recommend this application to others? | 1 | 2 | 3 | 4 | 5 |

References

- [1] ABULOUM A, FARAH A, KASKALOGLU E, & YAAKUB A. College students' usage of and preferences for print and electronic textbooks. *International Journal of Emerging Technologies in Learning*, 2019, 14(7): 80-97.
- [2] ADEYINKA T, DARE O, ADEBISI O, & LAWAL A. Perception and usage pattern of e-books among library and information science students in selected universities in Nigeria. *Journal of Library and Information Technology*, 2018, 38(2): 132-140. <http://dx.doi.org/10.14429/djlit.38.2.11111>
- [3] ALFIRAS M, BOJIAH J, & YASSIN A. COVID-19 Pandemic and the Changing Paradigms of Higher Education: A Gulf University Perspective. *Asian EFL Journal*, 2020, 27(5.1): 339-347.
- [4] ALVARADO N C, COELHO D, & DOUGHERTY E. Mobile apps for ELLs: Supporting language learning with engaging digital tools. *Argentinean Journal of Applied Linguistics*, 2016, 43: 43-58.
- [5] ALVAREZ-ALVAREZ C, SANCHEZ-RUIZ L, RUTHVEN A, & MONTOYA J. Innovating in University Teaching Through Classroom Interaction. *Journal of Education, Innovation, and Communication*, 2019, 1(1): 8-18. https://doi.org/10.34097/jeicom_1_1_1
- [6] AWIDI I T, & PAYNTER M. The impact of a flipped classroom approach on student learning experience. *Computers and Education*, 2019, 128: 269-283. <https://doi.org/10.1016/j.compedu.2018.09.013>
- [7] AYDIN B, & DEMIRER V. Flipping the drawbacks of the flipped classroom: effective tools and recommendations. *Journal of Educational and Instructional Studies in the World*, 2016, 6(1): 33-40.
- [8] BAKER A. *Active Learning with Interactive Videos: Creating Student-Guided Learning Materials*, 2016
- [9] BAO W. COVID - 19 and online teaching in higher education: A case study of Peking University. *Human Behavior and Emerging Technologies*, 2020, 2(2): 113-115. <https://doi.org/10.1002/hbe2.191>
- [10] BARTEIT S, GUZEK D, JAHN A, et al. Evaluation of e-learning for medical education in low-and middle-income countries: A systematic review. *Computers & Education*, 2020, 145: 103726. <https://doi.org/10.1016/j.compedu.2019.103726>
- [11] BHAT R. et al. Chest imaging in patients hospitalized with COVID-19 infection - A case series. *Current Problems in Diagnostic Radiology*, Elsevier, 2020
- [12] BURNS A, HOLFORD P, & ANDRONICOS N. Enhancing understanding of foundation concepts in first year university STEM: evaluation of an asynchronous online interactive lesson. *Interactive Learning Environments*, 2020, 0(0): 1-13. <https://doi.org/10.1080/10494820.2020.1712426>
- [13] CDC. Public Health Recommendations after

- Travel-Associated COVID-19 Exposure. Centers for Disease Control and Prevention. Corona virus Disease 2019 (COVID-19).
- [14] GIITA SILVERAJAH V S, & GOVINDARAJ A. The use of EDPuzzle to support low-achiever's development of self-regulated learning and their learning of chemistry. In *Proceedings of the 10th International Conference on Education Technology and Computers*, 2018 (pp. 259-263).
- [15] GOH P S. & SANDARS J. A vision of the use of technology in medical education after the COVID-19 pandemic [version 1]. *MedEdPublish*, 2020, 9: 49. <https://doi.org/10.15694/mep.2020.000049.1>
- [16] HERNÁNDEZ G, & ÁLVAREZ-ÁLVAREZ C. Improving interaction in the classroom through collaborative action research. Bordon, *Revista de Pedagogia*, 2018, 70(4): 73-87. <https://doi.org/10.13042/Bordon.2018.60079>
- [17] HIDAYAT L E, & DZULFIQAR PRASENSO M. Improving students' writing participation and achievement in an EDPuzzle-assisted flipped classroom. *Education of English as Foreign Language*, 2021, 4(1): 1-8.
- [18] HURSEN C. The effect of problem-based learning method supported by Web 2.0 tools on academic achievement and critical thinking skills in teacher education. *Technology, Knowledge and Learning*, 2020, 26(3): 515-533.
- [19] JULINAR J, & YUSUF F N. The flipped learning model: An alternative way to enhance students' speaking skills. *Jurnal Penelitian Pendidikan*, 2019, 19(3): 366-373.
- [20] KARABATZAKI Z, STATHOPOULOU A, KOKKALIA G, et al. Mobile application tools for students in secondary education: An evaluation study. *International Journal of Interactive Mobile Technologies*, 2018, 12(2): 142-161. <https://doi.org/10.3991/ijim.v12i2.8158>.
- [21] KOKINA J, & JURAS P E. Using Socrative to Enhance Instruction in an Accounting Classroom. *Journal of Emerging Technologies in Accounting*, 2017, 14(1): 85-97. <https://doi.org/10.2308/jeta-51700>
- [22] KÖNIG J. et al. Adapting to online teaching during COVID-19 school closure: teacher education and teacher competence effects among early career teachers in Germany. *European Journal of Teacher Education*, 2020, 43(4): 608-622, <https://doi.org/10.1080/02619768.2020.1809650>
- [23] KORKMAZ Ö, VERGILI M, ÇAKIR R, & ERDOĞMUŞ F. U. Plickers Web 2.0 ölçme ve değerlendirme uygulamasının öğrencilerin sınav kaygıları ve başarıları üzerine etkisi [The impact of Plickers Web 2.0 assessment and evaluation tool on exam anxiety and academic success of students]. *Gazi Eğitim Bilimleri Dergisi*, 2019, 5(2): 15-37.
- [24] LÅG T, & SÆLE R. G. Does the Flipped Classroom Improve Student Learning and Satisfaction? A Systematic Review and Meta-Analysis. *AERA Open*, 2019, 5(3): 233285841987048. <https://doi.org/10.1177/2332858419870489>
- [25] LEONARD A, & SNYMAN M. E-books: yes or no? A case study of undergraduate students at the University of Namibia. *Collection and Curation*, 2019, 38(3): 78-88.
- [26] MCKIMM J, GIBBS T, BISHOP J. and JONES P. 'Health Professions' Educators' Adaptation to Rapidly Changing Circumstances: The Ottawa 2020 Conference Experience'. *MedEdPublish*, 2020, 9: 47. <https://doi.org/10.15694/mep.2020.000047.1>
- [27] MISCHEL L J. Watch and Learn? Using EDPuzzle to Enhance the Use of Online Videos. *Management of Teaching Review*, 2018, 4(3), 283-289. <https://doi.org/10.1177/2379298118773418>
- [28] MU H, & PAPARAS D. Ready for the flipped classroom? Preliminary experiences of the new approach in teaching economics to non-major students. *Applied Economics and Finance*, 2016, 3(2): 45-53. <https://doi.org/10.11114/aef.v3i2.1288>
- [29] MVKAVANAGH. The Role of Technology in the Assessment of RE, 2017.
- [30] NISHIURA H. The extent of transmission of novel Corona virus in Wuhan, China, 2020. *Journal of Clinical Medicine*, 2020, 9: 330.
- [31] OXKERT D. Using a tablet computer for EFL positive self-review: Increase in self-determination theory-based learning motives. *Calido Journal*, 2018, 35(2): 1-18.
- [32] PEREIRA A, MARTINS P, MORGADO L, et al. A Technological Proposal Using Virtual Worlds to Support Entrepreneurship Education for Primary School Children. *Proceedings of the 20th International Conference on Interactive Collaborative Learning (ICL2017)/Springer*, 27-29 September, 2017, Hungary, Budapest, pp. 1283-1290, Springer. https://doi.org/10.1007/978-3-319-73210-7_9
- [33] PULUKURI S, & ABRAMS B. Step back, translate, extend: Addressing misconceptions relating to energy and free energy in cellular reactions via active-learning videos. *Biochemistry and Molecular Biology Education*, 2020, August: 1-3. <https://doi.org/10.1002/bmb.21461>
- [34] REICH, S. M, YAU, J.C, XU, Y, et al. Digital or Print? A comparison of preschoolers' comprehension, vocabulary, and engagement from a print book and an e-book, *AERA Open*, 2019, 5(3), 1-16. <https://doi.org/10.1177/2332858419878389>
- [35] ROBERTS D. Higher education lectures: From passive to active learning via imagery? *Active Learning in Higher Education*, 2019, 20(1): 63-77. <https://doi.org/10.1177/1469787417731198>
- [36] SANSA N A. Analysis for the impact of the COVID-19 to the petrol price in China (March 2, 2020). Accessed 08/04/2020, available from <https://ssrn.com/abstract=3547413>
- [37] SANTOS D R, CORDON C R, & PALOMO-DUARTE M. Extending H5P Branching Scenario with 360° scenes and xAPI capabilities: A case study in a local networks course. *Proceedings of the 2019 International Symposium on Computers in Education*, SIIE 2019. <https://doi.org/10.1109/SIIE48397.2019.8970117>
- [38] SHELBY S J, & FRALISH Z D. Using EDpuzzle to improve student experience and performance in the biochemistry laboratory. *Biochemistry and Molecular Biology Education*, 2021, 49(4): 529-534.
- [39] SILVERAJAH V S G, & GOVINDARAJ A. The use of EDPuzzle to support low-achiever's development of self-regulated learning and their learning of chemistry. *ACM International Conference Proceeding Series*, 2018: 259-263. <https://doi.org/10.1145/3290511.3290582>
- [40] SINTEMA E J. Effect of COVID-19 on the Performance of Grade 12 Students: Implications for STEM Education. *Eurasia Journal of Mathematics, Science and Technology Education*, 2020, 16(7): em1851. <https://doi.org/10.29333/ejmste/7893>
- [41] UMASS. Online tools for teaching and learning, 2019 [online] <https://blogs.umass.edu/onlinetools/assessment-centered-tools/edpuzzle>

- [42] VERCELLOTTI M L. Do interactive learning spaces increase student achievement? A comparison of classroom context. *Active Learning in Higher Education*, 2018, 19(3): 197-210. <https://doi.org/10.1177/1469787417735606>
- [43] WANG G. *et al.* Mitigate the effects of home confinement on children during the COVID-19 outbreak. *The Lancet*, 2020, 395(10228): 945-947. [http://doi.org/10.1016/S0140-6736\(20\)30547-X](http://doi.org/10.1016/S0140-6736(20)30547-X)
- [44] WORLD BANK. Guidance Note on Remote Learning and COVID-19 (English). Washington, D. C.: World Bank Group. 2020. Accessed 08/04/2020, available from <http://documents.worldbank.org/curated/en/>
- [45] WU Z. & MCGOOGAN J M. Characteristics of and important lessons from the Corona virus disease 2019 (COVID-19) outbreak in China: Summary of a report of 72314 cases from the Chinese center for disease control and prevention. *JAMA*, 2020, 323(13): 1239-1242. <https://doi.org/10.1001/jama.2020.2648>
- [46] YAN Z. Unprecedented pandemic, unprecedented shift, and unprecedented opportunity. *Human Behavior & Emerging Technologies*, 2020, 2(2): 110-112. <https://doi.org/10.1002/hbe2.192>
- 参考文献:**
- [1] ABULOUM A、FARAH A、KASKALOGLU E 和 YAAKUB A. 大学生对印刷和电子教科书的使用和偏好。国际新兴技术学习杂志, 2019, 14(7): 80-97.
- [2] ADEYINKA T、DARE O、ADEBISI O 和 LAWAL A. 尼日利亚选定大学的图书馆和信息科学专业学生对电子书的感知和使用模式。图书情报学报, 2018, 38(2): 132-140. <http://dx.doi.org/10.14429/djlit.38.2.11111>
- [3] ALFIRAS M、BOJIAH J 和 YASSIN A. 新冠肺炎大流行和高等教育范式的变化: 海湾大学的视角。亚洲英语杂志, 2020, 27 (5.1) : 339-347.
- [4] ALVARADO N C、COELHO D 和 DOUGHERTY E. 英语学习班的移动应用程序: 通过引人入胜的数字工具支持语言学习。阿根廷应用语言学杂志, 2016 年, 43: 43-58.
- [5] ALVAREZ-ALVAREZ C、SANCHEZ-RUIZ L、RUTHVEN A 和 MONTROYA J. 通过课堂互动创新大学教学。教育、创新与传播杂志, 2019, 1(1): 8-18. https://doi.org/10.34097/jeicom_1_1_1
- [6] AWIDI I T, 和 PAYNTER M. 翻转课堂方法对学生学习体验的影响。计算机与教育, 2019, 128: 269-283. <https://doi.org/10.1016/j.compedu.2018.09.013>
- [7] AYDIN B, 和 DEMIRER V. 翻转翻转课堂的弊端: 有效的工具和建议。世界教育与教学研究杂志, 2016 年, 6(1): 33-40.
- [8] BAKER A. 通过交互式视频进行主动学习: 创建学生指导的学习材料, 2016
- [9] BAO W. 新冠肺炎与高等教育在线教学: 以北京大学为例。人类行为与新兴技术, 2020, 2(2): 113-115. <https://doi.org/10.1002/hbe2.191>
- [10] BARTEIT S、GUZEK D、JAHNA 等. 低收入和中等收入国家医学教育电子学习评估: 系统评价。计算机与教育, 2020, 145 : 103726 。 <https://doi.org/10.1016/j.compedu.2019.103726>
- [11] BHAT R. 等. 新冠肺炎感染住院患者的胸部影像学检查 - 病例系列。诊断放射学的当前问题, 爱思唯尔, 2020.
- [12] BURNS A、HOLFORD P 和 ANDRONICOS N. 加强对大学一年级干基础概念的理解: 异步在线互动课程的评估。交互式学习环境, 2020, 0(0): 1-13. <https://doi.org/10.1080/10494820.2020.1712426>
- [13] 疾控中心. 旅行相关新冠肺炎暴露后的公共卫生建议。疾病预防控制中心. 2019 年冠状病毒病 (新冠肺炎)
- [14] GIITA SILVERAJAH V S, 和 GOVINDARAJ A. 使用电子数据处理益智支持低成就者发展自我调节学习和化学学习。在第 10 届教育技术与计算机国际会议论文集, 2018, (第 259-263 页)。
- [15] GOH P S. 和 SANDARS J. 新冠肺炎大流行后在医学教育中使用技术的愿景 [第 1 版]。医学出版, 2020, 9: 49. <https://doi.org/10.15694/mep.2020.000049.1>
- [16] HERNÁNDEZ G, 和 ÁLVAREZ-ÁLVAREZ C. 通过协作行动研究改善课堂互动。博登, 教育学杂志, 2018, 70(4): 73-87. <https://doi.org/10.13042/Bordon.2018.60079>
- [17] HIDAYAT L E, 和 DZULFIQAR PRASENO M. 在电子数据处理益智辅助翻转课堂中提高学生的写作参与度和成绩。英语作为外语的教育, 2021, 4(1): 1-8.
- [18] HURSEN C. 网络 2.0 工具支持的基于问题的学习方法对教师教育中中学业成绩和批判性思维技能的影响。技术、知识和学习, 2020, 26(3): 515-533.
- [19] JULINAR J, 和 YUSUF F N. 翻转学习模式: 提高学生口语技能的另一种方法。佩内利提学堂杂志, 2019, 19(3): 366-373.
- [20] KARABATZAKI Z、STATHOPOULOU A、KOKKALIA G 等. 中等教育学生的移动应用工具: 一项评估研究。国际交互式移动技术杂志, 2018, 12(2): 142-161. <https://doi.org/10.3991/ijim.v12i2.8158>.
- [21] KOKINA J, 和 JURAS P E. 使用苏格拉底的加强会计课堂教学。会计新兴技术杂志, 2017, 14(1): 85-97. <https://doi.org/10.2308/jeta-51700>
- [22] KÖNIG J. 等人. 适应新冠肺炎学校关闭期间的在线教学: 德国早期职业教师的教师教育和教师能力影响。欧洲教师教育杂志, 2020 年, 43(4): 608-622, <https://doi.org/10.1080/02619768.2020.1809650>
- [23] KORKMAZ Ö, VERGILI M, ÇAKIR R, 和 ERDOĞMUŞ F. U. 钳子网络 2.0 评估和学业评估工具对学生焦虑的影响。嘎子教育科学杂志, 2019, 5(2): 15-37.
- [24] LÄG T, 和 SÈLE R. G. 翻转课堂是否提高了学生的学习和满意度? 系统评价和荟萃分析。艾拉公开赛, 2019, 5(3) : 233285841987048 。 <https://doi.org/10.1177/2332858419870489>
- [25] LEONARD A, 和 SNYMAN M. 电子书: 是还是不是? 纳比亚大学本科案例研究。收藏与策展, 2019, 38(3): 78-88.
- [26] MCKIMM J、GIBBS T、BISHOP J. 和 JONES P.“卫生专业教育者适应快速变化的环境: 渥太华 2020 年会议经验”。医学出版, 2020, 9: 47. <https://doi.org/10.15694/mep.2020.000047.1>
- [27] MISCHER L J. 观察和学习? 使用电子数据处理益智增强在线视频的使用。教学评审管理, 2018, 4(3), 283-289. <https://doi.org/10.1177/2379298118773418>
- [28] MU H, 和 PAPARAS D. 准备好翻转课堂了吗? 非专业经济学教学新模式的初步体会 应用经济与金融, 2016, 3(2): 45-53. <https://doi.org/10.11114/aef.v3i2.1288>

- [29] MV 卡瓦纳格。技术在回覆评估中的作用, 2017 年。
- [30] NISHIURA H. 新型冠状病毒在中国武汉的传播范围, 2020。临床医学杂志, 2020, 9: 330.
- [31] OXKERT D. 使用平板电脑进行英语积极自我审查: 增加基于自决理论的学习动机。卡利多杂志, 2018, 35(2): 1-18。
- [32] PEREIRA A, MARTINS P, MORGADO L 等。一项使用虚拟世界支持小学生创业教育的技术提案。第 20 届交互式协作学习国际会议(集成电路 2017)/ 施普林格会议记录, 2017 年 9 月 27 日至 29 日, 匈牙利, 布达佩斯, 第 1283-1290 页, 施普林格。
https://doi.org/10.1007/978-3-319-73210-7_9
- [33] PULUKURI S, 和 ABRAMS B. 后退、翻译、扩展: 通过主动学习视频解决与细胞反应中能量和自由能相关的误解。生物化学与分子生物学教育, 2020, 8 月: 1-3。
<https://doi.org/10.1002/bmb.21461>
- [34] REICH, S. M, YAU, J.C, XU, Y, 等。数码还是印刷? 纸质书和电子书对学龄前儿童理解力、词汇量和参与度的比较, 艾拉公开赛, 2019, 5(3), 1-16。
<https://doi.org/10.1177/2332858419878389>
- [35] ROBERTS D. 高等教育讲座: 通过意象从被动学习到主动学习? 高等教育中的主动学习, 2019, 20(1): 63-77。
<https://doi.org/10.1177/1469787417731198>
- [36] SANSA N A. 新冠肺炎对中国汽油价格的影响分析 (2020 年 3 月 2 日)。于 08/04/2020 访问, 可从 <https://ssrn.com/abstract=3547413> 获得
- [37] SANTOS D R, CORDON C R 和 PALOMO-DUARTE M. 使用 360°场景和 xAPI 功能扩展 H5P 分支场景: 本地网络课程中的案例研究。2019 年计算机教育国际研讨会论文集, 上实工业 2019。
<https://doi.org/10.1109/SIIE48397.2019.8970117>
- [38] SHELBY S J, 和 FRALISH Z D. 使用编辑益智提高学生生物化学实验室的体验和表现。生物化学与分子生物学教育, 2021, 49(4): 529-534.
- [39] SILVERAJAH V S G, 和 GOVINDARAJ A. 使用电子数据处理益智支持低成就者的自我调节学习发展和化学学习。美国计算机学会国际会议论文集系列, 2018: 259-263。 <https://doi.org/10.1145/3290511.3290582>
- [40] SINTEMA E J. 新冠肺炎对 12 年级学生表现的影响: 对于教育的影响。欧亚数学科技教育杂志, 2020, 16(7): em1851。 <https://doi.org/10.29333/ejmste/7893>
- [41] 麻省大学。在线教学工具, 2019 [在线] <https://blogs.umass.edu/onlinetools/assessment-centered-tools/edpuzzle>
- [42] VERCELLOTTI M L. 互动学习空间会提高学生成绩吗? 课堂环境的比较。高等教育中的主动学习, 2018, 19(3): 197-210。 <https://doi.org/10.1177/1469787417735606>
- [43] WANG G, 等。减轻新冠肺炎爆发期间居家隔离对儿童的影响。柳叶刀, 2020, 395(10228): 945-947。
[http://doi.org/10.1016/S0140-6736\(20\)30547-X](http://doi.org/10.1016/S0140-6736(20)30547-X)
- [44] 世界银行。关于远程学习和新冠肺炎的指导说明 (英文)。华盛顿特区: 世界银行集团。2020 年。访问时间为 08/04/2020, 可从 <http://documents.worldbank.org/curated/en/> 获取
- [45] WU Z. 和 MCGOOGAN J M. 中国 2019 年冠状病毒病(新冠肺炎)疫情的特征和重要教训: 中国疾病预防控制中心 72314 例病例报告摘要。美国医学会杂志, 2020, 323(13): 1239-1242。 <https://doi.org/10.1001/jama.2020.2648>
- [46] YAN Z. 前所未有的大流行, 前所未有的转变, 前所未有的机遇。人类行为与新兴技术, 2020, 2(2): 110-112。 <https://doi.org/10.1002/hbe2.192>