INTERNATIONAL JOURNAL OF ACADEMIC RESEARCH IN BUSINESS & SOCIAL SCIENCES

Vol 14, Issue 10, (2024) E-ISSN: 2222-6990

SCORE Model-Based Strategy Assessment for Fraction Learning Modules with Educational Technology

Syed Azman Syed Ismail, Siti Mistima Maat, Fariza Khalid
Faculty of Education, The National University of Malaysia, 43600 Bangi, Selangor, Malaysia
Corresponding Author Email: syedazman86@gmail.com

To Link this Article: http://dx.doi.org/10.6007/IJARBSS/v14-i10/23212 DOI:10.6007/IJARBSS/v14-i10/23212

Published Date: 30 October 2024

Abstract

Understanding fractions has long been a difficult aspect of mathematics education, especially when teaching complex concepts using traditional methods. To overcome these difficulties, educational technology has been integrated into fraction learning modules, providing more interactive and stimulating learning experiences. However, the effectiveness of these modules in the context of fraction learning has not been thoroughly explored compared to other areas of mathematics education. This study uses the SCORE model to evaluate these modules, focusing on five key elements: Strengths (S), Challenges (C), Options (O), Responses (R) and Effectiveness (E). By analyzing literature from reputable databases such as Google Scholar, SCOPUS and Web of Science, the study assesses how educational technology improves students' understanding of fractions by offering personalized learning experiences. The study emphasizes the strengths of these modules, such as real-time feedback and personalized learning opportunities. Nevertheless, challenges, such as the digital literacy gap among educators and the need for language adaptations, have also been identified. The study concludes that the SCORE model offers a comprehensive framework for evaluating and enhancing fraction learning modules, ensuring that educational technology is effectively utilized to support diverse learners. Future research should explore the scalability of these modules and their long-term impact on students' mathematics achievement.

Keywords: Fraction Learning, Score Model, Educational Technology, Mathematics Education, Strategy-Based Assessment.

Introduction

In recent years, educational technology has changed the way teachers and students work in classrooms. One area that has benefited a lot from this is mathematics, especially the teaching of fractions. Fractions are often difficult for both students and teachers because they are abstract and can be hard to understand (Lee et al., 2023; Pramudiani et al., 2022). But with educational technology, these difficulties can be reduced by providing interactive and engaging learning experiences (Reinhold et al., 2020). This new way of teaching requires new assessment models to see if both the content and the technology are effective.

To address these challenges, fraction learning modules using educational technology should be created to help students understand better. These modules are expected to provide students with a dynamic learning environment where abstract concepts, like fractions, should become easier to understand through visual aids, interactive exercises and instant feedback (Tan et al., 2022). Technology also allows personalized learning that adjusts to each student's needs and pace (Abdualiyeva et al., 2022; Wahyuni et al., 2021). However, to ensure that these modules are effective, we need to evaluate them using new methods that go beyond traditional assessments.

One of the methods used for this purpose is the strategy-based assessment. Among these models, the SCORE model has become popular because it focuses on action and improvement (Neal, 2024). Instead, the SCORE model emphasizes strategic development and progress, making it more effective in evaluating learning modules with technology. However, the potential of the SCORE model, which provides a more dynamic and effective alternative compared to other strategic planning tools like SWOT, TOWS, NOISE and SOAR is often overlooked in the context of mathematics education in Malaysia. By leveraging the SCORE model, educators and policymakers can create more precise and impactful educational strategies that enhance both learning outcomes and the integration of technology.

The integration of educational technology with fraction learning modules also opens new possibilities for personalized learning and adaptive instruction, both of which can significantly improve student outcomes (Cao et al., 2022; Hussein, 2023). However, evaluating the success of these modules demands more than just examining test scores or student feedback. A comprehensive strategy-based assessment like the SCORE model allows educators to evaluate how effectively the technology supports the learning process, how students interact with the technology, the challenges they face and the instructional strategies' impact. This type of assessment ensures that technology not only supports learning but also enhances the overall educational experience (Jun-On et al., 2022)

The objective of this paper is to apply the SCORE model as a strategy-based assessment to evaluate fraction learning modules integrated with educational technology. This approach will provide educators and researchers with a clear framework for assessing the strengths and challenges of the learning modules, identifying potential areas for improvement and ensuring that the technology used effectively supports students' understanding of fractions. By focusing on both the content and the technology, this paper aims to offer a comprehensive evaluation model that can be applied in various educational contexts to improve both teaching strategies and learning outcomes.

Methodology

This research employs the SCORE model as a strategic planning tool to assess and enhance organizational strategies. The SCORE model looks at five key areas: strengths, challenges, options, responses and effectiveness. This method goes beyond other tools like SWOT analysis, which mainly looks at current conditions. The model helps educators, organizations or teams assess and improve their performance by analyzing these areas. Strengths refer to what is done well or has the potential to be done well, while Challenges represent areas where more resources or capabilities are needed. Options focus on the opportunities and risks to be addressed, Responses show how stakeholders like students, educators or policymakers react and Effectiveness measures how well the actions achieve their intended goals efficiently and reliably. This structured approach helps educators identify what is working, what needs improvement and how to adapt strategies to enhance learning outcomes. Previous researchers have recently used this model to assess the effectiveness of specific strategies in educational settings, such as special education, coaching competency and the teaching profession (Azeman et al., 2024; Ishak et al., 2024; Othman et al., 2024; Sabtu et al., 2023).

When applied to fraction learning modules integrated with educational technology, the SCORE model helps educators evaluate the strengths of these modules, such as how well they engage students with interactive and personalized learning experiences. At the same time, it helps identify challenges, such as difficulties students might have with the technology or if the modules don't fully meet the learning needs of all students. By finding these challenges, educators can explore options to improve the modules and gather feedback on how well the changes are working. The SCORE model is particularly useful when there's a need for a comprehensive evaluation. It helps educators not only understand how students are interacting with the technology but also how effective it is in improving their understanding of fractions.

Figure 1 refers to the SCORE Model as a strategic assessment tool that goes beyond the SWOT model. It evaluates five key elements: Strengths (S), Challenges (C), Options (O), Responses (R) and Effectiveness (E) (Neal, 2023).

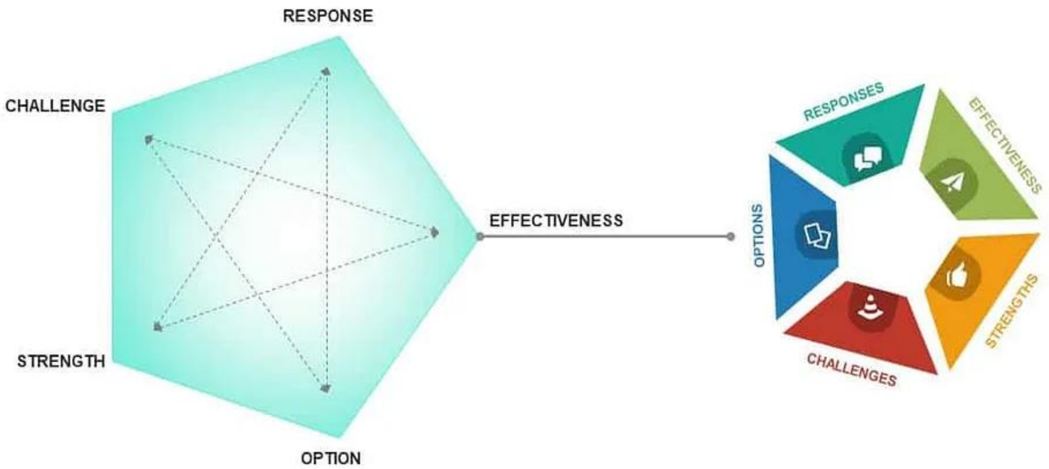

Figure 1 Score Model as Strategy Assessment Beyond SWOT (Neal, 2023)

The study involved analyzing current literature from reputable databases such as Google Scholar, SCOPUS and Web of Science. Keywords like "fraction learning", "educational technology" and "mathematics education" were used to identify relevant studies. This approach allowed the researchers to identify and evaluate existing knowledge, theories and applications of educational technology in the context of teaching fractions within mathematics education. The screening process focused on empirical studies related to the use of educational technology in teaching fractions, limited to English language publications. Conceptual, simulation-based or review studies were excluded. The inclusion and exclusion criteria are detailed in Table 1. After filtering out irrelevant and duplicate articles, the remaining ones were thoroughly analyzed to ensure alignment with the study's objectives. The finalized literature selection underwent detailed examination of the findings, discussions and conclusions of each article, identifying the strengths, challenges, options, responses and effectiveness of the SCORE model in evaluating fraction learning modules integrated with educational technology.

Table 1
Inclusion and exclusion criteria

Criteria	Inclusion Criteria	Rejection Criteria
Types of publication	Empirical studies	Conceptual, simulation-based or review studies
Language	English	Other than English

Findings and Discussion
The findings of this study provide valuable insights into the application of the SCORE model for evaluating and enhancing fraction learning modules integrated with educational technology across diverse educational contexts.

Strengths in Fraction Learning Modules with Educational Technology
One major strength of fraction learning modules that use educational technology is their ability to make difficult concepts easier to understand. Fractions, which are often hard to grasp, can be explained more clearly through interactive technology, such as visual aids, animations and simulations (Amo-Asante & Bonyah, 2023). These features make the abstract concept of fractions more concrete, helping students visualize and interact with the content in ways that traditional methods cannot.

Another strength is personalized learning. The technology adjusts to each student's learning pace, which leads to better understanding and retention of information. Real-time feedback systems in these modules also allow students to correct their mistakes immediately, which improves their learning experience and mastery of fractions (Mavrikis et al., 2022). These modules also offer many services, like adaptive learning platforms and AI-driven assessments that help teachers track student progress and adjust their instruction as needed. Gamified content makes learning more engaging, especially for a subject like fractions, which can be challenging (Hunt et al., 2022). With these advanced features, fraction learning modules are a powerful tool for both teachers and students.

Challenges in Fraction Learning Modules with Educational Technology
Despite their strengths, fraction learning modules with educational technology face several challenges. One of the main challenges is the varying levels of digital literacy among teachers. While some teachers are comfortable with technology, others may struggle to use it effectively (Reich, 2020). This can limit the modules' impact on student learning. Another challenge is the time and resources needed to set up and maintain the technology, which can be difficult for some schools (Stein et al., 2020).

Another issue is the dominance of English in many technology platforms (Gaggi & Petenazzi, 2019). Since English is not the first language for many students and teachers in Malaysia, they might find it hard to navigate these tools. This creates a barrier to fully using the modules. There are also challenges with collaboration between schools, technology providers and government bodies. Misaligned expectations, delays in technical support or lack of infrastructure can make it hard for schools to fully integrate the modules into daily teaching(Emmanuel, 2024; Zhang & Tahir, 2023).

To address these challenges, targeted professional development programs are needed to train teachers in both the technical and instructional use of these modules (Fowler & Leonard, 2021). Schools also need to strengthen their technical support services to ensure that teachers and students can rely on help when needed. Additionally, more localized content should be created to ensure that students and teachers who aren't proficient in English can still benefit from the modules.

Options in Fraction Learning Modules with Educational Technology

The use of educational technology in fraction learning modules presents several key opportunities. One important opportunity is the ability to offer personalized learning paths, allowing students to learn at their own pace (Marciniak & Szczepański, 2020). This makes learning more tailored to individual needs, which can help improve understanding of fractions.

Another opportunity is the use of data to improve teaching. With technology, teachers can collect important information about how students are performing, how engaged they are and how well they understand the material. This data can help teachers make quick changes to their teaching strategies, especially when they notice students struggling, allowing for timely interventions. However, there are some risks. Depending too much on technology could create problems with accessibility, especially for students who don't have reliable access to devices or the internet (Ortiz et al., 2020). Additionally, the use of data in education raises concerns about privacy and security.

Despite these risks, solutions can be found. For example, improving technology access for students in underserved areas can create a fairer learning environment. Also, by focusing on data security, schools can protect student information while still benefiting from the insights that data provides. Several options can be considered to improve fraction learning modules with educational technology. One option is to invest in teacher training programs to help teachers use the modules effectively (Friesen & Kuntze, 2020). By providing teachers with the skills and knowledge they need, schools can ensure that students get the most benefit from these learning tools.

Another option is to partner with educational technology companies. These partnerships can help schools stay up to date with the latest technology and provide better support for teachers and students. Schools and policymakers should work with tech providers to improve digital infrastructure, especially in underserved areas, so all students can have access to the tools they need to succeed (Greaves, 2024). It's important for schools to prioritize these options. First, they should focus on closing the digital access gap, ensuring that every student has access to the necessary technology. After that, investing in teacher training and support should be a priority, as well as addressing data privacy and security concerns to protect student information while using data to improve learning outcomes.

Responses in Fraction Learning Modules with Educational Technology
Different people will likely have varied reactions to the use of fraction learning modules with technology. For students, these tools are expected to increase engagement and interest in learning fractions because of their interactive and personalized nature (Sarifah et al., 2022). However, some students might find it difficult at first, especially if they are not used to using digital tools or don't have access to reliable technology. Teachers who receive proper training and support are likely to respond positively (See et al., 2022). Those familiar with educational technology will appreciate how these modules can enhance teaching and help manage large classes by providing individualized learning. However, teachers who are less comfortable with digital tools might feel overwhelmed, which is why ongoing training is important.

Policymakers are expected to support the use of these modules, especially in countries like Malaysia, where educational technology is seen as a way to improve learning. However, if there are problems like accessibility issues or the content not being suitable for all students, policymakers may give critical feedback and push for changes (Reich, 2020). As these modules become more common, regulations about data privacy and security will also become more important. Schools must follow strict guidelines to protect student information. There may also be rules to ensure that the content of the modules matches national educational standards. If the modules don't align with the curriculum, they might need to be modified or restricted.

In terms of benefits, these fraction learning modules can significantly improve student performance and engagement, particularly in mathematics. For technology providers, the growing use of educational tools offers a chance to expand their products and services. For policymakers, one of the key rewards is the development of students who are better prepared for a digital future.

Effectiveness in Fraction Learning Modules with Educational Technology
The effectiveness of fraction learning modules using educational technology can be measured in several ways. First, efficiency is important. These modules should make the best use of both human and technological resources. For example, adaptive learning systems can personalize lessons, reducing the time teachers spend on repetitive tasks and digital assessments provide instant feedback, reducing the need for manual grading (Bush, 2021). Reliability is also crucial. The technology needs to work consistently without frequent technical problems or errors (Clark-Wilson et al., 2020). A reliable system allows both teachers and students to trust the technology, ensuring a smooth learning experience. The technology must also securely store student data and be regularly updated to maintain its reliability over time.

An elegant system means that the content is presented clearly and simply (Dugdale, 2021). The fraction learning modules should be easy for both students and teachers to navigate. The platform should present abstract concepts, like fractions, in engaging and understandable ways, helping students learn more easily. The system should also be accessible to all students, including those with disabilities or those who need simplified content. The appropriateness of these learning modules depends on how well they match the educational goals and needs of students. They should fit the curriculum and meet the diverse needs of students in different classrooms (Malaysia Ministry of Education, 2021). The technology should support learning

without adding unnecessary complexity and be accessible to all students, including those with limited access to technology.
Finally, integration is key to the effectiveness of these modules. The fraction learning modules should easily work with existing school systems, like Learning Management Systems (LMS), allowing teachers to track student progress across different subjects. This helps teachers see the full picture of a student's performance and adjust their teaching accordingly (Marchisio et al., 2022). The modules should also allow parents to get involved in their children's learning, creating a more connected educational experience.

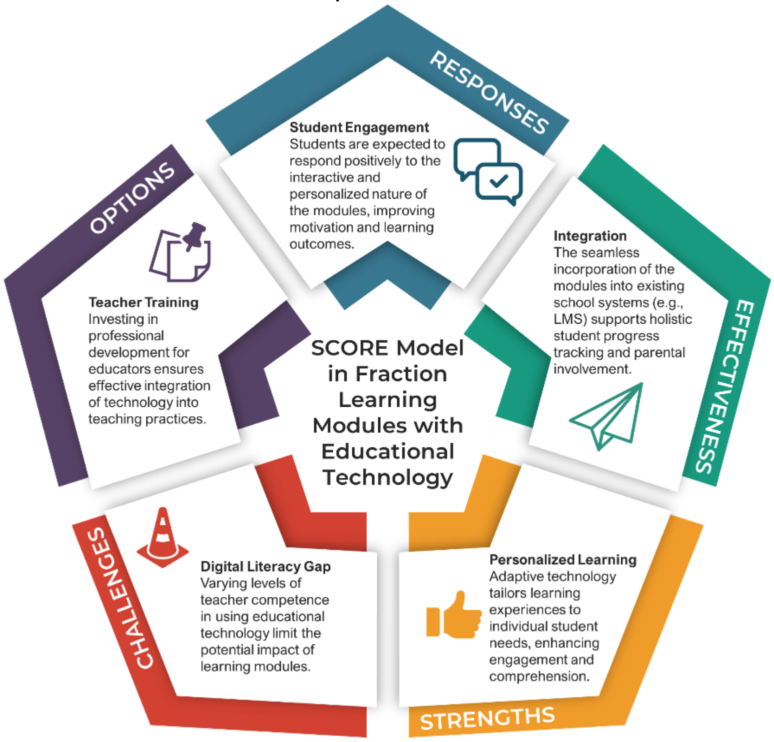

Figure 2 Score Model in fraction learning modules with educational technology

Figure 2 illustrates the SCORE Model as applied to fraction learning modules integrated with educational technology. It highlights the areas where improvements can be made through a comprehensive and action-based approach. This framework helps educators and policymakers focus on key aspects such as student engagement, personalized learning and technology integration that need strengthening. By using this model, schools can continuously monitor and enhance the effectiveness of these modules, ensuring they adapt to the evolving needs of students and the challenges of implementing technology in education.

Conclusion
Overall, the SCORE model offers a useful and structured way to evaluate and improve fraction learning modules that use educational technology. By focusing on strengths, challenges, options, responses and effectiveness, the model gives educators and policymakers valuable insights into how these tools can be optimized for better student outcomes. The ability to personalize learning, provide real-time feedback and use data-driven insights are some of the biggest strengths of these modules.

Although this paper focuses on fraction learning, the findings suggest that the SCORE model can be applied to other areas of education as well. More research is needed to explore how it works with other subjects and types of educational tools. These findings have important implications for the future of educational technology. By understanding the strengths and challenges of technology in education, such as digital literacy and language barriers, teachers and policymakers can take targeted actions to improve the use of technology in schools. Additionally, this study highlights the need for more teacher training programs to help educators integrate technology effectively into their lessons.

Further studies are recommended to explore how the SCORE model can be used in other areas of math and beyond and to examine the long-term effects of using technology-based learning tools, especially in underserved communities. Future research could also look at how international partnerships can improve the quality and accessibility of educational technology, ensuring that all students, regardless of their background, benefit from these advancements.

Theoretically, this study expands the use of the SCORE model in educational research, showcasing its applicability for evaluating technology-integrated learning tools in mathematics. By applying SCORE's structured, action-oriented framework to fraction learning, this research broadens the scope of assessment models in mathematics education, offering a dynamic alternative to traditional assessments. Contextually, the study aligns with Malaysia's Digital Education Policy by demonstrating the practical benefits of technology integration to enhance learning outcomes and digital literacy. These contributions are vital for advancing digital education in Malaysia, providing actionable insights for policymakers and educators to support the national goal of fostering a digitally proficient student population.

Author Contributions: All authors made an equal contribution to the development and planning of the study.

Funding: This research was funded by grant GG-2024-005 from the Faculty of Education, The National University of Malaysia.

Acknowledgments: The authors would like to thank the anonymous reviewers for the valuable comments and suggestions regarding improving the quality, content and presentation of this paper.

Conflicts of Interest: The authors declare no conflict of interest.

References

Abdualiyeva, R., Seitova, S., Tasbolatova, R., & Smagulova, L. (2022). Methodology of application of case technology in the process of teaching mathematics. *Cypriot Journal of Educational Sciences*, *17*(9), 3545–3555. https://doi.org/10.18844/cjes.v17i9.8119

Amo-Asante, K., & Bonyah, E. (2023). Building students' conceptual understanding of operations on fractions using manipulatives: A junior high school perspective. *Mediterranean Journal of Social & Behavioral Research*, *7*(3), 151–159. https://doi.org/10.30935/mjosbr/13381

Azeman, M. T., Mohd Matore, M. E., Ishak, H., Othman, N., Rosli, N. M., Sabtu, S. H., & Mohd Noh, M. F. (2024). Application of the SCORE model in enhancing competency of agile coaches in sports coaching. *International Journal of Academic Research in Progressive Education and Development*, *13*(3), 3979–3987. https://doi.org/10.6007/IJARPED/v13-i3/22743

Bush, J. B. (2021). Software-based intervention with digital manipulatives to support student conceptual understandings of fractions. *British Journal of Educational Technology*, *52*(6), 2299–2318. https://doi.org/10.1111/bjet.13139

Cao, Y., AlKubaisy, Z. M., Stojanović, J., Denić, N., Petković, D., Zlatković, D., & Zakić, A. (2022). Appraisal of information and communications technologies on the teaching process by neuro fuzzy logic. *Computer Applications in Engineering Education*, *30*(3), 779–802. https://doi.org/10.1002/cae.22486

Clark-Wilson, A., Robutti, O., & Thomas, M. (2020). Teaching with digital technology. *ZDM – Mathematics Education*, *52*(7), 1223–1242. https://doi.org/10.1007/s11858-020-01196-0

Dugdale, S. (2021). The design of computer-based mathematics instruction. In J. H. Larkin & R. W. Chabay (Eds.), *Computer Assisted Instruction and Intelligent Tutoring Systems* (pp. 11–45). Routledge.

Emmanuel, S. H. (2024). The integration of technology in educational management among HEIs in Kaduna State, Nigeria: challenges and strategies. *International Journal of Latest Technology in Engineering, Management & Applied Science*, *XIII*(I), 21–34. https://doi.org/10.51583/IJLTEMAS.2024.130104

Fowler, S., & Leonard, S. N. (2021). Using design based research to shift perspectives: a model for sustainable professional development for the innovative use of digital tools. *Professional Development in Education*, *50*(1), 192–204. https://doi.org/10.1080/19415257.2021.1955732

Friesen, M. E., & Kuntze, S. (2020). The role of professional knowledge for teachers' analysing of classroom situations regarding the use of multiple representations. *Research in Mathematics Education*, *22*(2), 117–134. https://doi.org/10.1080/14794802.2019.1710555

Gaggi, O., & Petenazzi, G. (2019). A digital platform for teaching mathematics. *ACM International Conference Proceeding Series*, 37–42. https://doi.org/10.1145/3342428.3342666

Greaves, D. E. (2024). Bridging the digital divide: the role of online education in promoting equity. *International Journal of Contemporary Education*, *7*(2), 1–9. https://doi.org/10.11114/ijce.v7i2.6768

Hunt, J. H., Taub, M., Marino, M., Duarte, A., Bentley, B., & Holman, K. (2022). Demonstrating core components of a game-based fraction supplemental curriculum. *Proceedings of*

International Conference of the Learning Sciences, ICLS , 1958–1959.

Hussein, H. (2023). Global trends in mathematics education research. *International Journal of Research in Educational Sciences*, *6*(2), 309–319. https://doi.org/10.29009/ijres.6.2.9

Ishak, H., Mohd Matore, M. E. @ E., Othman, N., Mohd Rosli, N., Sabtu, S. H., Mohd Nor, M. F., & Azeman, M. T. (2024). Strategy-based assessment using SCORE model in adaptive behavior evaluation. *International Journal of Academic Research in Business and Social Sciences*, *14*(9), 1592–1601. https://doi.org/10.6007/IJARBSS/v14-i9/22745

Jun-On, N., Suparatulatorn, R., Kaewkongpan, D., & Suwanreung, C. (2022). Enhancing pre-service mathematics teachers' technology integrated competency: Cooperative initiation and open lesson observation. *International Journal of Information and Education Technology*, *12*(12), 1363–1373. https://doi.org/10.18178/ijiet.2022.12.12.1760

Kementerian Pendidikan Malaysia. (2021). *Laporan Tahunan 2021: Pelan Pembangunan Pendidikan Malaysia 2013-2025*.

Lee, J., Bryant, D. P., & Bryant, B. R. (2023). The effect of a tier 2 multicomponent fraction intervention for fifth graders struggling with fractions. *Remedial and Special Education*, *44*(1), 28–42. https://doi.org/10.1177/07419325211069878

Marchisio, M., Remogna, S., Roman, F., & Sacchet, M. (2022). Teaching mathematics to non-mathematics majors through problem solving and new technologies. *Education Sciences*, *12*(1), 34. https://doi.org/10.3390/educsci12010034

Marciniak, J., & Szczepański, M. (2020). Individualized learning in a course with a tight schedule. *Procedia Computer Science*, *176*, 2059–2068. https://doi.org/10.1016/j.procs.2020.09.242

Mavrikis, M., Rummel, N., Wiedmann, M., Loibl, K., & Holmes, W. (2022). Combining exploratory learning with structured practice educational technologies to foster both conceptual and procedural fractions knowledge. *Educational Technology Research and Development*, *70*(3), 691–712. https://doi.org/10.1007/s11423-022-10104-0

Neal, M. (2023). *SWOT, NOISE, SOAR, and SCORE, tools for strategy*. https://medium.com/@marcneal/swot-noise-soar-and-score-tools-for-strategy-3b11a30031fd

Neal, M. (2024). *SCORE, an alternative to SWOT*. https://medium.com/@marcneal/score-an-alternative-to-swot-64bcf5fc740a

Ortiz, E. A., Cristia, J., & Cueto, S. (2020). Improving mathematics education through technology. In E. A. Ortiz, J. Cristia, & S. Cueto (Eds.), *Learning Mathematics in the 21st Century: Adding Technology to the Equation* (pp. 1–15). Inter-American Development Bank. https://doi.org/10.18235/0002599

Othman, N., Mohd Matore, M. E. E., Mohd Rosli, N., Sabtu, S. H., Mohd Noh, M. F., Azeman, M. T., & Ishak, H. (2024). Enhancing developmental assessments for children with intellectual disabilities in Malaysia: The application of the SCORE model. *International Journal of Academic Research in Progressive Education and Development*, *13*(3), 5149–5158. https://doi.org/10.6007/IJARPED/v13-i3/22760

Pramudiani, P., Herman, T., Turmudi, Dolk, M., & Doorman, M. (2022). How does a missing part become important for primary school students in understanding fractions? *Journal on Mathematics Education*, *13*(4), 565–586. https://doi.org/10.22342/jme.v13i4.pp565-586

Reich, J. (2020). *Failure to Disrupt: Why Technology Alone Can't Transform Education* (1st ed.).

Harvard University Press.

Reinhold, F., Hoch, S., Werner, B., Richter-Gebert, J., & Reiss, K. (2020). Learning fractions with and without educational technology: What matters for high-achieving and low-achieving students? *Learning and Instruction*, *65*, 1–19. https://doi.org/10.1016/j.learninstruc.2019.101264

Sabtu, S. H., Mohd Matore, M. E., & Maat, S. M. (2023). The Six Sigma approach improves teacher instruction quality through Quadruple Helix Model expectations. *International Journal of Academic Research in Business and Social Sciences*, *13*(4), 781–791. https://doi.org/10.6007/IJARBSS/v13-i4/16679

Sarifah, I., Rohmaniar, A., Marini, A., Sagita, J., Nuraini, S., Safitri, D., Maksum, A., Suntari, Y., & Sudrajat, A. (2022). Development of android based educational games to enhance elementary school student interests in learning mathematics. *International Journal of Interactive Mobile Technologies*, *16*(18), 149–161. https://doi.org/10.3991/ijim.v16i18.32949

See, B. H., Gorard, S., Lu, B., Dong, L., & Siddiqui, N. (2022). Is technology always helpful?: A critical review of the impact on learning outcomes of education technology in supporting formative assessment in schools. *Research Papers in Education*, *37*(6), 1064–1096. https://doi.org/10.1080/02671522.2021.1907778

Stein, H., Gurevich, I., & Gorev, D. (2020). Integration of technology by novice mathematics teachers – what facilitates such integration and what makes it difficult? *Education and Information Technologies*, *25*(1), 141–161. https://doi.org/10.1007/s10639-019-09950-y

Tan, C.-K., Khoo, H.-S., Tan, C.-P., & Cheah, W.-P. (2022). Integration of pedagogical agent in learning. *Proceedings of the International Conference on Computer, Information Technology and Intelligent Computing (CITIC 2022)*, 572–578. https://doi.org/10.2991/978-94-6463-094-7_46

Wahyuni, Y., Jamaris, & Solfema. (2021). Integration of digital technology in mathematics learning. *International Journal of Humanities Education and Social Sciences (IJHESS)*, *1*(3), 144–151.

Zhang, X., & Tahir, S. (2023). Leveraging technology to enhance access to quality legal education in Malaysia. *International Journal of Social Science and Business Management*, *1*(2), 63–73. https://doi.org/10.59021/ijssbm.v1i02.46