

Impact of Using Visual Learning as Educational Technology Tools on Elementary School Students' Memory in Kuwait

Ali Buhamad

Associate professor at collage of basic education

Ayda Aleidan

Associate professor at collage of basic education

Rabab Alsaffar

Associate professor at collage of basic education

Budour Almisad

Associate professor at collage of basic education
State of Kuwait

Abstract

Human working memory is limited and can become a challenge when it comes to learning. We are living in time that technology leading our live and providing constant distractions, making it even harder to retain information and stay focused.

In this study, the problem that we examine is the poor memory among younger students in elementary school in different area of Kuwait. This issue has become a growing concern in the education system, as it significantly impacts their learning experience and academic performance this study researchers used qualitative study designs based on naturalistic inquiry to provide a comprehensive understanding of the phenomena under investigation.

The quantitative data collections were conducted via electronic google surveys.

Visual learning plays a crucial role in the cognitive development of elementary students, particularly in terms of memory retention. Research has shown that incorporating visual elements into lessons

Impact of Using Visual Learning as Educational Technology Tools on Elementary School Students' Memory in Kuwait

and educational materials can significantly enhance students' ability to retain and recall information.

Future research needs to shed light on the impact of different visual representations and their role in shaping the cognitive development of students in different age group. Additionally, it will provide valuable insights into how educators can optimize the use of educational technology to enhance students' understanding and interpretation of visual information.

Impact of Using Visual Learning as Educational Technology Tools on Elementary School Students' Memory in Kuwait

Ali Buhamad

Associate professor at collage of basic education

Ayda Aleidan

Associate professor at collage of basic education

Rabab Alsaffar

Associate professor at collage of basic education

Budour Almisad

Associate professor at collage of basic education
State of Kuwait

Human working memory is limited and can make learning challenging. Technology is leading people's lives and providing constant distractions, making it even more difficult to retain information and to focus. This reliance on technology will negatively affect people's cognitive development and critical thinking skills (Fleaca et al., 2022). In addition, technology has led to the loss of students' attention inside classrooms. Students with poor memories may struggle in such environments because they rely heavily on technology to store information. Yet the incorporation of physical activity can potentially enhance working memory, thus improving cognition and academic performance among students facing such challenges (Maddumage et al., 2021). Thus, incorporating strategies such as regular practice tests and cognitive load theory techniques and addressing working memory difficulties could significantly improve students' learning performance in this digital era (Newton et al., 2021).

The purpose of using educational technology is to help students gain knowledge and experience easily and quickly and retain knowledge. The aim of educational technology is to facilitate

Impact of Using Visual Learning as Educational Technology Tools on Elementary School Students' Memory in Kuwait

an efficient, engaging learning experience for students, thereby enhancing memory retention. This is achieved through methods such as interactive visualization and collaborative problem-solving activities, which are proven to be effective in deepening understanding and promoting long-term memory storage. Furthermore, research has shown that the use of technology in education can boost student motivation because it provides an interactive, immersive learning environment. The integration of interactive tools, such as visualization technologies in education, has been found to help deepen student understanding and enhance memory retention, making this approach one of the most effective teaching methods for all ages of students.

To address the issue of poor memory among young students, it is essential to understand the sections of human memory: sensory memory, short-term memory, and long-term memory. Sensory memory is the initial stage, where information from the environment is briefly stored for a short duration. It acts as a filter, allowing only important information to enter the next stage, which is short-term memory. Short-term memory, also known as working memory, has limited capacity and can only hold a small amount of information for a short period, typically around 20 to 30 seconds. In contrast, long-term memory possesses virtually unlimited capacity and can store information for a prolonged period ranging from a few minutes to a lifetime and is further subdivided into episodic memory, semantic memory, and procedural memory. Episodic memory, specifically, stores images of personal experiences that contribute to creating our life narrative and shaping our identities in the long term (Wen, 2015). Episodic memory is a component of long-term memory that stores vivid, autobiographical events and the feelings associated with them, which contribute to an individual's sense of self and their personal history.

Long-term memory stores more data and information when delivered visually than through any other sensory modality. Prompted by mnemonic strategies that use visualization for optimal

information production and retention, it is plausible to assert that visual inputs elicit greater long-term memory responses than other sensory modalities. In addition to visual stimuli, auditory information also plays a crucial role in memory processing. However, studies have indicated that visual stimuli have an upper hand during the early stages of working memory processing, potentially because of a higher spatial resolution compared to auditory stimuli. As a result, individuals may have better memory recall for visual inputs compared to auditory inputs (Wen, 2015).

The problem of this study based on the issue of inadequate memory retention among elementary school students in various regions of Kuwait has emerged as a significant concern within the education system, prompting educators and policymakers to seek effective solutions. This challenge not only adversely affects students' learning experiences but also has profound implications for their overall academic performance. Research indicates that memory plays a crucial role in learning, with effective retention being linked to better academic outcomes (Dunlosky et al., 2013; Roediger & Butler, 2011).

As technological advancements continue to evolve, students are granted unprecedented access to information from a variety of sources. While this accessibility can enhance learning opportunities, it also presents the risk of information overload. Cognitive overload can lead to difficulties in processing and retaining the vast amounts of data encountered, complicating students' ability to effectively recall knowledge when needed (Paas et al., 2019). Many students find themselves overwhelmed, struggling to sift through information to identify what is most relevant.

Moreover, the rapid pace of contemporary life contributes to this dilemma. Students are often bombarded with distractions from various media and social platforms, which can detract from their focus and engagement in educational activities (Kuznekoff & Titsworth, 2013). This constant barrage of stimuli makes it challenging for young learners to concentrate deeply, hindering their ability to consolidate memories and build a solid foundation of

Impact of Using Visual Learning as Educational Technology Tools on Elementary School Students' Memory in Kuwait

knowledge. Research has shown that multitasking and frequent interruptions can significantly impair cognitive performance (Ruthruff et al., 2016).

As a result, the educational community is confronted with the urgent need to address these issues through targeted strategies that foster better memory retention and enhance overall student learning outcomes. Efforts to cultivate an environment conducive to focused learning, alongside the integration of effective memory retention techniques, are essential to mitigate the impact of these modern challenges on students' academic journeys. Strategies may include minimizing distractions, promoting active learning, and utilizing technology in a way that supports rather than hinders cognitive processing (Hattie&Clarke,2018)

In this study, we aim to develop an educational technology tool that addresses poor memory retention among young students by integrating relevant learning theories. A key focus is cognitive load theory, which highlights the importance of managing working memory limitations during learning. By using techniques such as data visualization and multimedia presentations, we simplify complex information, facilitating deeper comprehension and promoting long-term knowledge retrieval. This aligns with constructivist principles that emphasize active engagement with content (Newton et al., 2021).

Additionally, we will incorporate experiential learning, which emphasizes hands-on experiences and reflection, and dual-coding theory, which combines verbal and visual information to enhance understanding and recall. By integrating these theories, our educational tool will provide interactive and multimodal resources that cater to diverse learning styles. Through this comprehensive approach, we aim to improve memory retention and foster a deeper understanding of material, ultimately empowering students to become more effective learners in their academic journeys. Furthermore, research has suggested that mnemonic strategies,

which entail visualizing information to improve its retrieval and reduce forgetting, may potentially augment retention of knowledge up to 90% in long-term memory. Likewise, a review of past studies points toward a notable improvement in vocabulary retention rates among learners when memory strategies, including mnemonic techniques, are employed.

The three questions that direct this study are as follows: Does visual data help elementary school students understand the knowledge? Does visual data support elementary school students' overall thinking? Does visual data help elementary school students recall the needed experience? The question that leads this research is as follows: What is the impact of visual learning on elementary school students' memories?

Methodology

Qualitative Tradition

In this study we used a qualitative design based on naturalistic inquiry to provide a comprehensive understanding of the phenomena under investigation. We employed qualitative methods, such as interviews, focus groups, and analysis of findings in the form of words or actions, to provide an in-depth exploration of participants' experiences and perceptions in their natural state (Ploeg et al., 2018; Valenzuela et al., 2018). This qualitative approach allowed for a deeper understanding and insights into the phenomenon being studied, capturing rich information and broad insights from participants. In the education field, specifically in the context of nursing education and preceptorship, qualitative descriptive design was utilized to gather data through individual interviews with nurse educators and preceptors and focus-group discussions with nursing students, enabling researchers to gain nuanced insights into the competencies taught in pediatric pain management (Uwimana et al., 2020). This design allowed the researchers to obtain direct descriptions of important phenomena in the health care field that may not be fully understood.

We designed this study to determine the real reason for elementary school students to having poor memory while we

Impact of Using Visual Learning as Educational Technology Tools on Elementary School Students' Memory in Kuwait

provide educational material, suggesting that cognitive load theory techniques might be helpful in managing the limited capacity of human working memory, which is often a bottleneck for learning (Newton et al., 2021). When using educational technology tools, elementary school students still have a gap in performance between delivered knowledge and recall knowledge. Through the qualitative tradition, we aimed to investigate the underlying reasons for poor memory retention during academic instruction.

One probable reason is that the instructional methods currently used may not be effectively reducing students' cognitive loads, leading to an inefficient use of their limited working memory and thus affecting their learning outcomes. In contrast, we planned this study to clarify the benefits of visualizing data and information to achieve the purpose of educational technology and facilitate our teaching process for teachers and students. We aimed to explore the benefits and effectiveness of using visual enhancers for educational purposes, specifically in the context of teaching and learning. The information gathered was subjective and related to each participant's experience.

As researchers tried to understand and examine the power of visual learning as part of technology in our daily lives as well as to understand the visual abilities that affect teaching styles that are better than traditional styles by applying technology tools for the retention of information. We chose a random public elementary school in a different area of Kuwait because we have access due to being connected to teachers and administrators. The participants included 75 elementary school students from four different school states in Kuwait. We used homogeneous sampling methods to simplify the data and facilitate group interviewing because all participants are from the same country (Creswell, 2013).

Instrumentation

We used a Likert-type scale to understand teachers' attitudes toward using visual literacy that affects memorization. To notice the memorization of the targeted sample, these memorizations could be

about the degree of agreement or level of occurrence or value (Darity, 2008). A reason we chose method is because it is widely used in the educational field (Darity, 2008). The survey questionnaires were descriptive and inferential in one-dimensional matter. The questionnaire consisted of 10 statements. The answer options included “almost all the time,” “frequently,” “sometimes,” “once in a while,” and “almost never.”

Procedure

We conducted quantitative data collections via electronic Google surveys. The students were motivated to answer all questions because the researchers personally visited them. We conducted qualitative data collections through focus-group discussions. The focus-group discussions consisted of a carefully selected group of students who were encouraged to share their experiences, perspectives, and insights on the topics that were asked.

We implemented various methods to recruit participants for the study to ensure a diverse, representative sample. To avoid bias in selecting our sample, we used my friends and relatives, as well as personal visits, to help send and complete the surveys.

We predict a 90% completion of our sample, which is an acceptable return rate for our study. The participants had sufficient time to fill out the questionnaire, and they used a 10- to 15-minute time frame to answer all 10 questions. We ensured the participants' confidentiality and informed them about the purpose of the study as well as their rights as participants. Participants' names were not required because of anonymous sampling to prevent any fear of accountability by the research subjects. This ensures that the participants' identities are protected and that the research is conducted in an ethically sensitive manner.

Data Analysis

I calculated the same data from the final study to ensure the results are highly reliable to reach to the data reliability (Plessis & Webb, 2012). We compared the sample of the target population in order to test the validity of the testing instruments used. Exploring

Impact of Using Visual Learning as Educational Technology Tools on Elementary School Students' Memory in Kuwait

the level of experience is most likely going to affect the outcome of using a visual approach in the learning environment and to explore how much the outcomes relate to the target population. We processed the data as a descriptive analysis with a percentage of each question of the survey results to describe the impact of visual learning on students' memory. Using this approach helped provide systematic information about the effectiveness of visual learning on students' memory as a phenomenon. After that, we analyzed the data and interpreted it accordingly.

Results

The results of this study were predictably positive, showing significant impact of using educational technology visual tools that improve elementary school students. The findings highlight the importance of applying more visual content for students, which affects their memories and implementing visual literacy effectively in their daily communication. Students were excited about the findings, which may lead to changing teachers' instructional style after generating results.

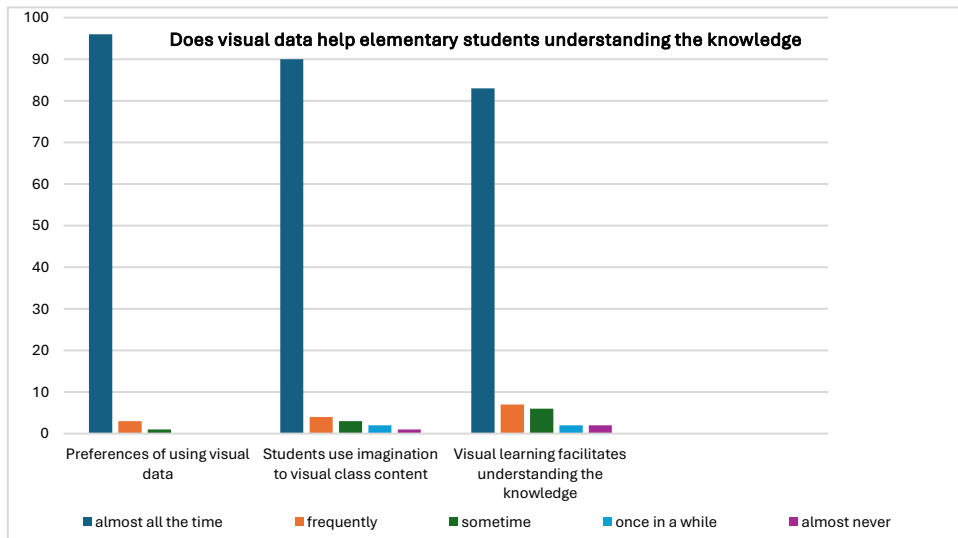
The completion percentage was good enough to represent elementary school students in Kuwait. Seventy-five individuals finished the survey. There are some important contributing factors that resulted in this completion rate. One factor is that some participants are close friends with or relatives of the researchers. Another factor is the nature of the questions. The questions were nonintrusive, conveniently delivered electronically, and mobile friendly. A short amount of time was needed for the completion of the questions. There were only 10 questions that we carefully chose from a pool of 30 well-researched questions that were approved by faculty members in the Department of Education Technology at the College of Basic Education in Kuwait. The process of answering the questions was simple and only required a couple of clicks or taps "depending on the device of the user" to be fully completed.

The process of answering the questions should not have taken more than 10–15 minutes. Gender and age: The ratio of male

participants is 35% and female is 65%. This result clarifies the results we eventually viewed later pertaining to their beliefs in visual memories in general. This particular age group is known to generate elementary school students age in regard to the use of visual media in their daily lives.

To answer the research questions, the survey asked the students several questions to know whether visual data helps elementary student understand the knowledge. The survey asked about students' preferred learning styles: using visual data or writing data. Ninety-six percent stated that they preferred almost all time. Also, 90% stated that they always use their imagination to visualize class content. Last, 83% believed that visual learning facilitates understanding. Research shows the importance of visual aids in facilitating active learning and comprehension in elementary education (Mayer& R. E., 2021).

Figure 1

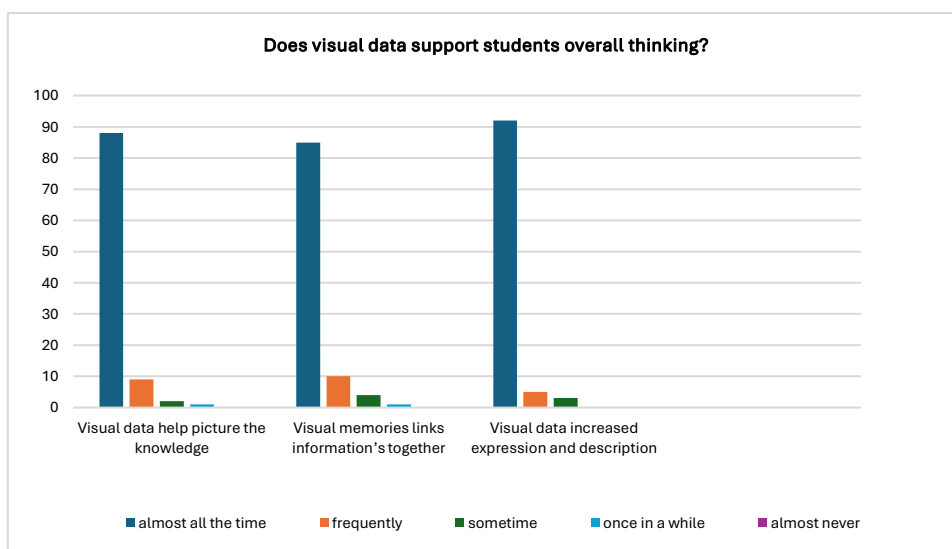


To answer the second question, we selected questions that illustrate whether visual data supports students' overall thinking. The first question was to report students' use of visual data to picture the knowledge. Eighty-eight percent stated that they are. In addition,

Impact of Using Visual Learning as Educational Technology Tools on Elementary School Students' Memory in Kuwait

85% of students use visual memories to link information. Ninety-two percent of students confirmed that it increased expression and description of the knowledge. Zhang, D., et al. (2022). "The Effects of Graphic Organizers on Elementary Students' Learning Outcomes: A Meta-Analysis." In *Educational Research Review*. This study provides evidence that graphic organizers, a form of visual data, significantly improve understanding and retention among elementary students.

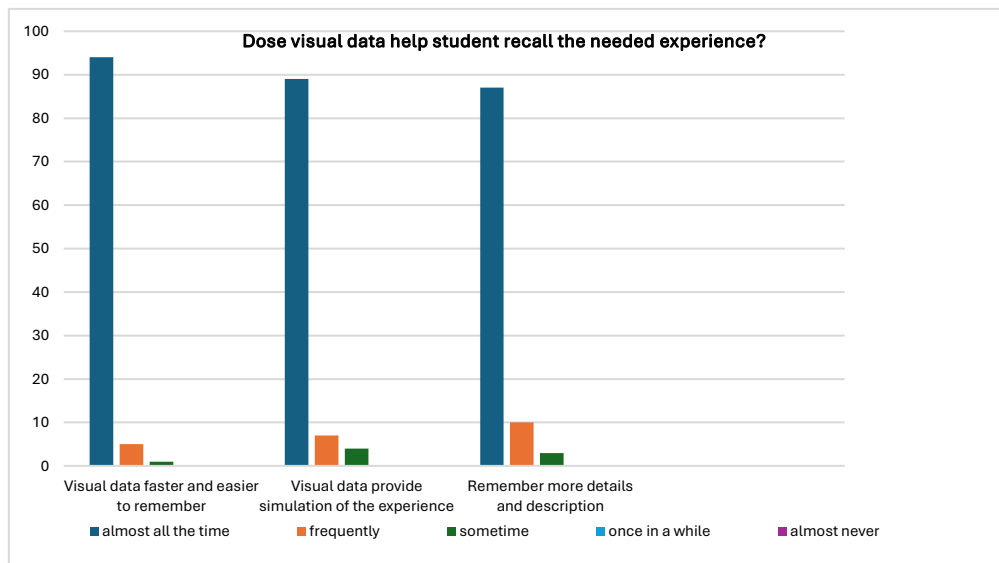
Figure 2



The third question asked students to define how visual data helps them recall the needed experience. Ninety-four percent of participants found the visual data faster and easier to remember because of shape and color. Eighty-nine percent confirmed that visual data provide simulation of the needed experience and increase memorization. In essence, 87% of elementary school participants could remember more details and description based on visual data that they interacted with. Visual data enhances recall in elementary students by promoting dual coding and mental imagery.

Mayer (2021) notes that visuals paired with verbal information improve retention, while Hegarty (2020) emphasizes that visualizations help form strong memory connections. Graphic organizers, as shown by Zhang, Wang, and Xu (2022), facilitate easier access to information. Berk (2021) highlights that multimedia engagement captures attention and supports retention, and Fadel and Lemke (2020) underscore the importance of visuals in memory recall. Together, these studies illustrate the significant impact of visual data on learning outcomes.

Figure 3



Discussion

Visual learning plays a crucial role in the cognitive development of elementary school students, particularly in terms of memory retention. Research has shown that incorporating visual elements into lessons and educational materials can significantly enhance students' ability to retain and recall information. By engaging multiple senses, visual learning helps activate different areas of the brain, leading to better memory encoding and retrieval. Additionally, visual learning allows students to make connections

Impact of Using Visual Learning as Educational Technology Tools on Elementary School Students' Memory in Kuwait

between new information and their prior knowledge, enhancing comprehension and retention.

Visual literacy prevents the imagination of information; it enhances the comprehension and interpretation of information by incorporating visual elements such as pictures, graphics, and symbols (Kaya, 2020). Learners use their visual literacy skills to understand, produce, and utilize important images and visible actions in their learning process and can link their visual memories between concepts and subjects. Visual literacy is a crucial skill for teachers to possess to enhance the comprehension and interpretation of information for learners.

Increasing the use of visual literacy leads to increasing the abilities of learners' memorization; therefore, students can better understand complex concepts and retain information effectively. Moreover, visual literacy provides a means for students to express their ideas and thoughts in a different format, allowing for a more comprehensive understanding of the subject matter. Teachers who are proficient in using technology in classrooms have the ability to enhance student engagement, promote active learning, facilitate personalized instruction, and foster collaboration among students.

It is essential for educators to incorporate visual literacy into their teaching methods, such as using visual aids, infographics, and multimedia presentations. This approach can cater to diverse learning styles and engage students in a dynamic and interactive way. Additionally, by enhancing visual literacy skills, students can develop critical thinking and analytical abilities by interpreting, analyzing, and memorizing visual information.

As technology continues to advance, visual literacy becomes increasingly significant in navigating and comprehending the digital world. Therefore, educators need to continuously adapt and integrate visual literacy into the curriculum to prepare students for the visual-centric landscape they will encounter in their academic and professional endeavors.

The integration of technology is particularly important in the context of educational technology tools, as these resources can present visual information in diverse and engaging ways. The development of visual literacy in elementary school students is significantly influenced by how this visual information is presented. According to cognitive load theory, effective presentation techniques can help manage cognitive demands, allowing students to better process and retain visual information (Sweller, 2010). An essential aspect of visual literacy is the ability to interpret and understand various forms of visual representation, such as drawings, videos, shapes, and instructional photographs. Each of these mediums has distinct characteristics that can impact how students form concepts, develop ideas, and enhance memorization. For instance, dual-coding theory suggests that combining verbal and visual information can improve learning outcomes by leveraging both the verbal and visual channels of memory (Mayer, 2020).

Furthermore, constructivist learning theory emphasizes the importance of active engagement with visual materials, enabling students to construct their own understanding through exploration and interaction (Piaget, 1973; Vygotsky, 1978). By integrating educational technology tools that present visual information in dynamic and accessible ways, we can promote deeper comprehension and foster critical thinking skills. Recent studies have shown that such interactive and multimodal approaches significantly enhance students' engagement and learning outcomes (Kirkpatrick & Kirkpatrick, 2020; Lee & Chen, 2021). Ultimately, this multifaceted approach to visual literacy not only enhances students' ability to interpret visual information but also supports their overall cognitive development and academic success.

Exploring the differences in visual literacy patterns among elementary school students can offer valuable insights into their cognitive development. By understanding how individual students interpret and process visual information, educators can tailor their teaching strategies to better suit different learning styles (Casey & Wolf, 1989). This understanding can lead to more engaging and

Impact of Using Visual Learning as Educational Technology Tools on Elementary School Students' Memory in Kuwait

effective learning experiences, ultimately fostering students' cognitive growth and academic success. Educators can leverage an understanding of visual literacy to support the cognitive development of elementary school students in several ways:

- **Tailored teaching strategies:** By recognizing that students interpret visual information differently, educators can diversify their teaching methods beyond traditional text-based approaches. Incorporating more visual aids such as diagrams, charts, and videos can cater to visual learners and enhance overall comprehension (Visual literacy in education - Wikipedia, 2009).
- **Engaging learning experiences:** Visual literacy can make learning more interactive and engaging. Activities such as creating visual representations of concepts, analyzing images, or using visual storytelling can stimulate students' imaginations and foster deeper understanding (Seglem & Witte, 2009).
- **Critical thinking skills:** Educators can guide students to critically analyze and interpret visual information, helping them develop essential critical thinking skills. This includes recognizing biases, identifying persuasive techniques used in advertising, and evaluating the reliability of visual sources (Seelig, 2007).
- **Communication and creativity:** Visual literacy empowers students to express themselves creatively and communicate ideas effectively through visual mediums. Encouraging activities such as drawing, photography, or digital design can nurture students' creativity and communication skills (Ecoma, 2016).

By integrating visual literacy into their teaching practices, educators can create a rich learning environment that caters to diverse learning styles, promotes engagement, and fosters essential cognitive skills in elementary school students. By investigating the use of these tools and exploring strategies that can enhance memory retention

among young students, we can effectively promote visual literacy in elementary school students.

Future research should address the impact of different visual representations and their roles in shaping the cognitive development of students in different age groups. Additionally, it will provide valuable insights into how educators can optimize the use of technology to enhance students' understanding and interpretation of visual information.

Additionally, investigating the use of educational technology tools can provide valuable insight into enhancing memory retention among older students. Understanding how these tools interact with visual information can further inform educators on effective strategies to promote visual literacy in the classroom. Expanding on this research, it is important to explore teaching methods that engage students in active learning and promote critical thinking skills. By incorporating hands-on activities and interactive visual materials, educators can create stimulating learning environments that foster the development of visual literacy and memorization among learners.

References

- Berk, R. A. (2021). "Multimedia technologies in education: How they enhance learning." *TechTrends*, 65(2), 215-223. <https://doi.org/10.1007/s11528-020-00528-0>.
- Casey, H V E., & Wolf, J S. (1989, December 1). Developing visual literacy among academically able fifth-grade students. Routledge, 12(2), 86-91. <https://doi.org/10.1080/02783198909553242>
- Dunlosky, J., Rawson, K. A., Marsh, E. J., Nathan, M. J., & Willingham, D. T. (2013). Improving Students' Learning with Effective Learning Techniques: Promising Directions from Cognitive and Educational Psychology. *Psychological Science in the Public Interest**, 14(1), 4-58.
- Ecoma, V E. (2016, April 2). The tools, approaches and applications of visual literacy in the Visual Arts Department of Cross River University of Technology, Calabar, Nigeria. Taylor & Francis, 35(2), 114-125. <https://doi.org/10.1080/1051144x.2016.1278088>
- Eddy, Matthew Daniel (2014). **"The Shape of Knowledge: Children and the Visual Culture of Literacy and Numeracy"**. *Science in Context*. 26 (2): 215–245.
- Fadel, C., & Lemke, C. (2020). "Multimedia learning: Research and practice." *Educational Technology Research and Development*, 68(5), 2491-2514. <https://doi.org/10.1007/s11423-020-09743-1>.
- Felten, Peter. **Visual Literacy"**, *Change: The Magazine of Higher Learning*, 40.6 (November/December 2008): 60-64
- Fleaca, B., Fleaca, E., & Maiduc, S. (2022, August 29). Digital Transformation and Current Challenges of Higher Education. <https://scite.ai/reports/10.18421/tem113-32>
- Hattie, J., & Clarke, S. (2018). *Visible Learning: Feedback* (1st ed.). Taylor and Francis. Retrieved from <https://www.perlego.com/book/1597686/visible-learning-feedback-pdf> (Original work published 2018)
- Hegarty, M. (2020). "Learning from visualizations: The role of visual data in education." *Educational Psychologist*, 55(3), 156-169. <https://doi.org/10.1080/00461520.2020.1779491>
- Kaya, M. (2020, May 6). The Impact of Visual Literacy Awareness Education on Verbal and Writing Skills of Middle School Students. <https://doi.org/10.7575/aiac.ijels.v.8n.2p.71>

- Kirkpatrick, D., & Kirkpatrick, J. (2020). *Evaluating Training Programs: The Four Levels*. Berrett-Koehler Publishers.
- Kuznekoff, J. J., & Titsworth, S. (2013). The Impact of Mobile Phone Usage on Student Learning. **Communication Education**, 62(3), 233-252.
- Lee, J., & Chen, C. (2021). Digital tools for visual literacy: Enhancing learning outcomes in elementary education. *Educational Technology Research and Development*, 69(3), 1125-1141.
- Maddumage, S P., Withanage, S M., & Wickramasinghe, P. (2021, June 30). Impact of Physical Activity on Working Memory of 10-11 year old Children from Colombo Educational zone. <https://scite.ai/reports/10.4038/jpgim.8271>
- Mayer, R. E. (2020). *How Can Virtual Reality Help Us Learn?* In *The Cambridge Handbook of Multimedia Learning* (pp. 469-490). Cambridge University Press.
- Mayer, R. E. (2021). Learning by doing and learning from others: The role of visuals in learning. *Educational Psychologist*, 56(2), 83-92. <https://doi.org/10.1080/00461520.2020.1852228>
- Mayer, R. E. (2021). "Cognitive theory of multimedia learning." In *The Cambridge Handbook of Multimedia Learning* (3rd ed., pp. 31-48). Cambridge University Press. This chapter discusses how visual aids enhance cognitive processing, leading to better recall.
- Newton, P M., Najabat-Lattif, H F., Santiago, G., & Salvi, A. (2021, August 11). The Learning Styles Neuromyth Is Still Thriving in Medical Education. <https://scite.ai/reports/10.3389/fnhum.2021.708540>
- Paas, F., Renkl, A., & Sweller, J. (2019). Cognitive Load Theory: A Framework for Enhanced Instructional Design. **Educational Psychologist**, 54(1), 1-16.
- Piaget, J. (1973). *To Understand is to Invent: The Future of Education*. Viking Press.
- Ploeg, J., McAiney, C., Duggleby, W., Chambers, T., Lam, A., Peacock, S., Fisher, K., Forbes, D., Ghosh, S., Markle-Reid, M., Triscott, J., & Williams, A. (2018, April 23). A Web-Based Intervention to Help Caregivers of Older Adults With Dementia and Multiple Chronic Conditions: Qualitative Study. <https://scite.ai/reports/10.2196/aging.8475>

Impact of Using Visual Learning as Educational Technology Tools on Elementary School Students' Memory in Kuwait

- Roediger, H. L., & Butler, A. C. (2011). The Critical Role of Retrieval Practice in Long-Term Retention. **Trends in Cognitive Sciences**, 15(1), 20-27.
- Ruthruff, E., Burch, M., & Johnston, J. C. (2016). The Effects of Task Switching on Encoding and Retrieval in Memory. **Memory & Cognition**, 44(3), 390-402.
- Seelig, M I. (2007, January 1). What Photo Editors/Managers Want Photo Students to Learn. SAGE Publishing, 28(1), 85-98. <https://doi.org/10.1177/073953290702800107>
- Seglem, R., & Witte, S. (2009, November 1). You Gotta See It to Believe It: Teaching Visual Literacy in the English Classroom. *Wiley-Blackwell*, 53(3), 216-226. <https://doi.org/10.1598/jaal.53.3.3>
- Sweller, J. (2010). Cognitive load theory. *Psychology of Learning and Motivation*, 55, 37-76.
- Uwimana, P., Mukamana, D., Adejumo, O., & Babenko-Mould, Y. (2020, August 25). Pediatric pain management competencies taught to nursing students in Rwanda: Perspectives of nurse educators, preceptors and nursing students. <https://scite.ai/reports/10.5430/jnep.v10n12p21>
- Valenzuela, T., Raze, H., Schoene, D., Lord, S R., & Delbaere, K. (2018, November 30). An Interactive Home-Based Cognitive-Motor Step Training Program to Reduce Fall Risk in Older Adults: Qualitative Descriptive Study of Older Adults' Experiences and Requirements. <https://scite.ai/reports/10.2196/11975>
- Vygotsky, L. S. (1978). *Mind in Society: The Development of Higher Psychological Processes*. Harvard University Press.
- Wen, Y. (2015, January 1). Combined Material Recycling Study with Aesthetic of Entropy and Place Making. <https://scite.ai/reports/10.1155/2015/208342>
- Zhang, D., Wang, Y., & Xu, L. (2022). The effects of graphic organizers on elementary students' learning outcomes: A meta-analysis. *Educational Research Review*, 17, 100-115. <https://doi.org/10.1016/j.edurev.2022.100115>