Chapter 5: Visualisation as a Teaching Strategy

Cosmas Maphosa[1] (iD)
Sithulisiwe Bhebhe[2] (iD)

AFFILIATIONS
[1 & 2] University of Eswatini, Eswatini
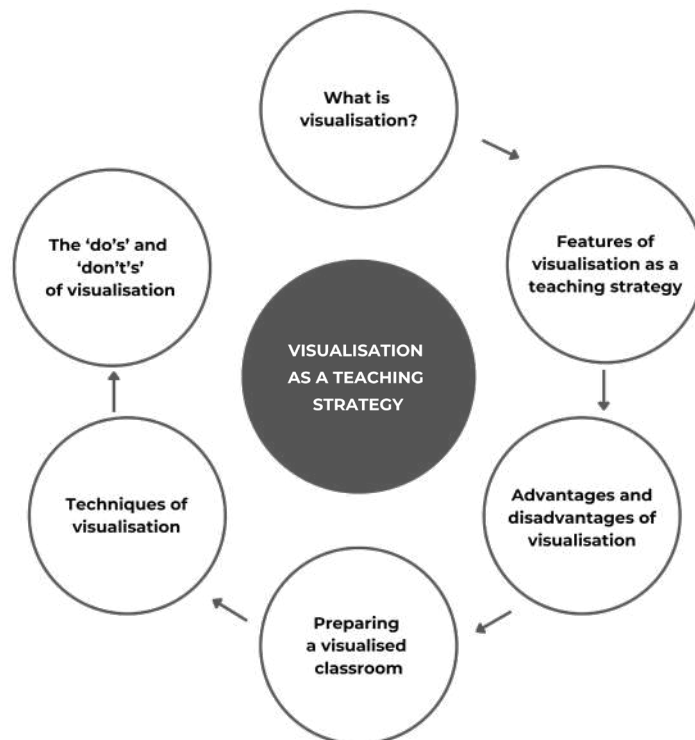
5.1. Concept Map

The concept map above illustrates the flow of the chapter's discussion on visualisation as a teaching technique. It begins with the definition and features of visualisation, followed by the advantages and disadvantages of the approach. The map then outlines how to prepare a visualised classroom, the techniques to be utilised in visualisation, and finally the 'dos' and 'don'ts' of visualisation.

5.2 Learning Outcomes

At the end of this chapter, the reader will be able to:
• explain visualisation as a teaching strategy

- identify the features of visualisation as a teaching strategy
- state the advantages and disadvantages of visualisation as a teaching strategy
- prepare a visualised classroom
- discuss different techniques to be utilised in visualisation
- note what to do and what not to do in the use of visualisation

5.3 Clarification of key terms

Visualisation: The creation of mental images as the learners are involved in the learning process
Teaching strategy: A technique that aids the learning and knowledge acquisition process
Learning: The process of gaining knowledge, abilities, attitudes, or competencies through instruction, study, or experience.
Critical thinking: This is the ability to analyse and evaluate information objectively and systematically, in order to form reasoned judgments and make decisions.

5.4 Unpacking visualisation and its features

Our biological and socio-cultural existence depends on vision. As a result, the following is a good description of the biological element (Adams & Victor, 1993, p. 207): "The faculty of vision is the most important source of information about the world. The largest part of the cerebrum is involved in vision and in the visual control of movement, the perception and elaboration of words, and the form and colour of objects. The optic nerve contains over 1 million fibres, compared to 50,000 in the auditory nerve. The study of the visual system has greatly advanced our knowledge of the nervous system. Indeed, more is known about vision than about any other sensory system.

Visualising is a teaching technique that helps students create mental images of what they are reading or learning (Pettersson, 2020). This can be done by asking students to close their eyes and imagine the scene, or by providing them with visual prompts, such as pictures, diagrams, or videos. Albert Einstein is known for saying, "If I can't picture it, I can't understand it." This saying underscores the importance of creating mental pictures in learning.

The reading technique known as visualisation helps students to picture what they are reading in their minds. It almost seems as though the learners are creating mental movies or videos based on their prior knowledge, creativity, and the content of the text. When students read a text, they can form different interpretations and mental images based on their previous experiences and imagination. Interacting with the text can create a vivid mental image that helps students understand the meaning better. This personal visual context is unique to each reader and can enrich their reading experience. Presmeg (1992), cited in Shatri and Buza (2017, p. 23), claims that because visualisation is a tool for understanding, it is possible to talk about picturing a concept or an issue. To visualise a problem is to comprehend it as a visual (mental) image; as a result, the visualisation process entails visual imagery, with or without a diagram, as a crucial component of the method of solution (Presmeg, 1992, cited in Shatri and Buza, 2017, p. 23).

5.5 Visualisation as a Teaching strategy

Visualisation is a significant teaching strategy that can improve learning and comprehension across a variety of subject areas in the classroom. Learners can better understand complicated concepts, remember information more efficiently, and enhance higher-order thinking skills by conjuring mental images and using visual aids. Abdelhamid, Yahaya, and Shaharuddin (2023) reveal that visualisation techniques can be especially helpful for learners who struggle with conventional teaching methods, such as those with learning difficulties or non-native speakers of the language of instruction. Kelly and Kortegast (2023) mention that learners can become more engaged, complicated ideas can be understood more easily, and information retention can be improved with the use of visual aids and mental images. Thus, employing visualisation as a teaching strategy can enhance learners' educational opportunities and foster a deeper comprehension of the material.

Visualisation as a teaching strategy is an approach that utilises visual aids and mental imagery to enhance the learning process. Schwalbe and Finzel (2023) point out that visualisation techniques can help make abstract concepts more concrete and comprehensible, and can be particularly beneficial for learners who may struggle with traditional teaching methods. Visualisation can be integrated into classroom teaching by encouraging mental

imagery, using visual aids, incorporating art and design, and employing simulations and role-playing.

Encouraging mental imagery: Making mental images of ideas or events being addressed in class is known as mental imagery. Encouraging learners to conjure up mental images can help them better understand and retain the material being covered. This process allows abstract ideas to become more concrete and memorable through mental imagery. For instance, if students are studying a historical event, they would be encouraged to mentally picture the scene, envisioning the participants, the environment, and the events occurring. Similarly, teachers may help students to visualise how a complicated system works and how its various components interact when learning about its inner workings. By generating mental images, learners can more easily comprehend the material.

Using visual aids: Any visual depiction that can help explain difficult ideas or procedures is referred to as a visual aid. Visual aids include, among other things, illustrations, tables, graphs, and videos. When striving to make abstract concepts more understandable and accessible to learners, visual aids can be especially beneficial (Zulu & Mudaly, 2023). For instance, a diagram can be used to explain the various components of a complex system, enabling students to more easily comprehend how they interact. When data is presented in an understandable manner, such as through a chart or graph, students can more readily identify patterns or relationships among variables. A video can illustrate a historical or scientific experiment, allowing students to better grasp the procedure and process.

Integrating art and design as a visualisation strategy: Art and design can be incorporated into teaching as a means of creating visual representations of concepts or ideas. This approach can be especially beneficial for learners who are more visually oriented or who may struggle with traditional teaching methods. By using art and design, educators can provide students with a creative outlet to express their understanding of the subject matter and create visual aids that reinforce key concepts and ideas (Eberhard, 2023). For example, students might be asked to create a poster or infographic that summarises a topic or concept. This task can help them synthesise the information and present it in a visually appealing and easy-to-understand manner. Students may also be encouraged to create a model or sculpture representing a scientific process or historical event, which helps to bring the subject matter to life and make it more tangible. By integrating art and design into teaching, educators can make the subject matter more engaging and memorable for students, providing them with a creative outlet to express their understanding of the material. Additionally, this approach can help develop students' creativity and critical thinking skills as they work to create visual representations of complex ideas and concepts.

Establishing simulations and role-playing: In establishing a scenario or environment, learners can engage with complicated processes or events in a more concrete way through simulations and role-playing exercises. By experiencing the material personally, students may gain a greater comprehension of it through participating in these activities (Qiu & Fang, 2022). For example, learners can imitate a scientific experiment to better understand the scientific principles at work. Alternatively, students could role-play a historical event, assuming historical personas and acting out crucial decisions or moments. This approach may provide learners with a deeper understanding of the event's significance and context, as well as a more nuanced view of the individuals and factors that influenced it. Thus, visualisation as a teaching strategy can help to engage learners, make complex concepts more accessible, improve retention of information, and promote a deeper understanding of the subject matter. By incorporating visualisation techniques into their teaching practice, educators can create a more dynamic and effective learning environment for their students.

5.6 Advantages and disadvantages of visualisation Teaching

Visualisation teaching has several benefits for learners. When students create vivid mental images while reading, they are more likely to remember the content better. This is because the act of visualisation helps to form stronger connections in the brain and facilitates better recall. Additionally, students who engage in visualisation often ask more questions, leading to a deeper understanding and engagement with the text. When learners visualise, they can better comprehend the text or concept they are studying, as they connect the information to their own experiences and prior knowledge. Visualisation teaching can enhance learning by making it more engaging, interactive, and memorable. It can help learners understand complex concepts by providing visual aids that make the information more tangible and easier to comprehend. Furthermore, visualisation teaching enhances memory and helps learners remember information more effectively, as the images they create are stored in their long-term memory.

Another advantage of visualisation teaching is that it stimulates creativity, as learners use their imagination to generate new ideas based on the visual aids presented.

This approach can enhance retention by making the information more memorable; learners are more likely to remember visual aids than textual information, which can help them retain knowledge for longer periods. Communication is also improved through visualisation teaching, as it provides a common visual language that learners and teachers can use to convey ideas. This method can help learners understand the language of the subject matter being taught, leading to better communication and comprehension.

However, visualisation teaching also has disadvantages. There are costs involved in the process, as creating visual aids can be expensive, and not all educational institutions can afford to invest in these resources. Another disadvantage is accessibility; not all learners have access to the same equipment or technology, which can limit their ability to benefit from visualisation teaching. Additionally, there may be an over-reliance on visuals, leading learners to become too dependent on visual aids, which can hinder their ability to think critically and independently. Visualisation teaching can also become a distraction if the visuals are not designed effectively. If the visuals are too complex or distracting, learners may find it difficult to focus on the lesson and absorb the information being taught.

5.7 Preparing a visualised classroom

Preparing a visualised classroom involves creating an environment that is visually stimulating and conducive to learning. This can be achieved by incorporating various types of visual aids such as posters, charts, diagrams, and maps. It is essential to start by defining the learning objectives to determine which visual aids will be most effective in conveying the information. For example, if the objective is to teach geography, maps and globes would be suitable visual aids. The next step is to identify the target audience. Visual aids should be appropriate for the age, education level, and cultural background of the learners. For instance, young learners may benefit from colourful and engaging visual aids, while older learners may prefer more sophisticated options. Once the learning objectives and target audience have been established, the appropriate visual aids can be selected. These can include posters, charts, diagrams, maps, videos, and slideshows, among others. It is important to choose visual aids that are relevant to the learning objectives and that will engage the learners.

After selecting the appropriate visual aids, they should be organised in a way that is visually appealing and easy to understand. For example, posters and charts should be placed in areas where they can be easily seen and read. Visual aids can also be organised in a sequence that follows the flow of the lesson. Technology can be a powerful tool for creating visualised classrooms. Interactive whiteboards, projectors, and tablets can display visual aids and engage learners in interactive activities. Additionally, technology can be used to create digital visual aids such as videos, animations, and infographics. It is important that visual aids are updated and refreshed regularly to maintain a visually stimulating and engaging classroom environment. Outdated or irrelevant visual aids should be removed, and new ones should be added to keep the classroom dynamic and exciting.

Therefore, preparing a visualised classroom requires careful consideration of the learning objectives and target audience, selection of appropriate visual aids, organisation of visual aids, incorporation of technology, and regular updates and refreshment of visual aids. A well-prepared visualised classroom can enhance learning and make the classroom environment engaging and memorable.

5.8 Techniques in effective visualised classrooms

Techniques for creating an effective visualised classroom are essential for engaging learners and enhancing the learning experience. The techniques for effective visualised classrooms include:

- **Engage all five senses:** Encourage students to engage all their senses when visualising a scene. They can use a group mind map to ensure they cover each sense and ask themselves what they see, hear, smell, taste, and feel.
- **Practice visualisation:** Ask students to close their eyes and imagine a scene that you describe, either made up or from a book. Then, have the students add further details to the picture they have created.
- **Play a "soundscape":** Play a soundscape and ask students to create a mental picture of where they are and what they see, hear, smell, taste, and feel.

- **Identify descriptive words:** With a text in front of them, students should identify the words that helped them to visualise while reading. They can compare their choices with their peers to determine if some words were more helpful than others and why.
- **Use descriptive words in writing:** Encourage students to visualise a setting using all their senses when writing. Urge them to include descriptive words that will help their readers visualise and create a vivid picture of the scene.

5.9 The Dos in visualisation teaching

Best practices and typical errors to avoid when instructing students in visualisation techniques are referred to as "dos and don'ts." Dos are the advised procedures that instructors should follow when teaching visualisation. By adhering to these dos and avoiding the don'ts, teachers can create an efficient and engaging learning environment for their students, allowing them to develop the skills needed to create impactful visualisations.

When teaching visualisation techniques, it is important to start with the basics. This includes the use of colours, shapes, and charts, and how they can be used to convey information effectively. For example, colours can highlight important information or distinguish between different categories, while shapes can represent various types of data. Similarly, charts can present data in a visually appealing and easy-to-understand manner. By providing a strong foundation in these fundamental concepts, students can build on their knowledge and skills to create more complex and sophisticated visualisations in the future.

Visualisation teaching also involves using real-world examples to show students how visualisation can be applied in various industries and contexts. This helps students understand the practical applications of visualisation and how it can be used to solve real-world problems. For instance, visualisation can be used in finance to track stock market trends, in healthcare to monitor patient health data, and in sports to assess athlete performance. By providing examples from different fields, students can see the versatility of visualisation and appreciate its relevance in diverse contexts. This can also motivate them to learn more about visualisation and how it can positively impact their chosen field.

Furthermore, visualisation teaching encourages exploration as students experiment with different visualisation tools and techniques. This could involve using various chart types, trying different colour schemes, or exploring different software programs. By fostering exploration, learners can develop their creativity and problem-solving skills, gaining a deeper understanding of the strengths and limitations of various visualisation techniques. This process can also help students cultivate their own unique visualisation style and approach, which can be invaluable in their future careers.

Offering constructive criticism on students' visualisations as feedback helps learners improve their skills and understand what makes a good visualisation. Feedback can include suggestions for improvement, highlighting areas where the visualisation is particularly effective, and pointing out aspects that could be enhanced. Learners gain a better understanding of what constitutes a successful visualisation and how they can refine their own work through this feedback. Furthermore, encouraging learners to collaborate on visualisation projects assists them in learning from each other and developing teamwork skills. Collaborating on visualisation projects can involve sharing ideas, brainstorming, and providing mutual feedback. Working together fosters a deeper understanding of the strengths and limitations of different visualisation approaches and techniques, while also enhancing their communication and interpersonal skills, which are valuable in any setting.

Teaching students how to use visualisation to tell a story involves understanding the audience and identifying the key message that needs to be conveyed through the visualisation. For example, a visualisation designed to persuade investors may need to focus on financial metrics, while one aimed at informing the public about a health crisis may prioritise public health data. Through storytelling, learners can create visualisations that are not only informative but also compelling and engaging. This process helps students develop their communication and presentation skills, preparing them for future careers where they may need to convey complex data clearly and engagingly. Furthermore, incorporating hands-on activities and exercises keeps learners engaged in the learning process, aiding their understanding and retention of the information being taught while making the experience more enjoyable. Interactive activities can take many forms, such as creating visualisations on a whiteboard, working with real data sets, or using online visualisation tools. By engaging in these activities, students can acquire practical experience with the concepts being taught and develop their skills in a more applied setting. These activities encourage students to collaborate, exchange ideas, and share insights.

This collaborative approach often leads to a deeper comprehension of the subject matter and a more engaging learning experience. By working together, students can learn from one another's perspectives and contribute to each other's ideas, resulting in a more comprehensive understanding of the material.

5.9.1 The don'ts in visualisation teaching

When it comes to teaching visualisation, there are certain "don'ts" that educators should avoid to ensure their visual aids are effective and enhance learning. Do not overload visual aids with too much information, as this can overwhelm learners and make it difficult for them to focus on key points. Visual aids should be concise and focus on the most important information. While visual aids are an essential part of teaching visualisation, they should not be the only mode of instruction. Teachers should also incorporate other instructional strategies, such as discussions, activities, and assessments, to ensure that learners are engaged and actively learning. Low-quality visual aids, such as blurry images or unreadable text, can be distracting and ineffective. Teachers must ensure that the quality of visual aids is high and that learners can easily read and understand the information.

It is crucial to avoid using inappropriate visuals. Visual aids should be suitable for the topic being taught, as well as for the age and cultural background of the learners, as inappropriate visuals can be confusing and may even offend some students. Accessibility should not be overlooked; instead, teachers should ensure that learners with disabilities or other special needs have access to visual aids. This may involve using larger fonts, providing audio descriptions, or incorporating tactile aids. While repetition is an important aspect of learning, teachers should be careful not to overdo it, as excessive repetition can be boring and unengaging, causing learners to lose interest in the lesson. Visual aids should be used to engage learners and encourage active participation in the learning process. Teachers should remember to engage learners through questions and answers, encourage discussions, and provide opportunities for learners to apply what they have learned.

Thus, teaching visualisation can be a powerful instructional strategy, but educators should be mindful of the "don'ts" of visualisation teaching. By avoiding these mistakes, teachers can create effective visual aids that engage learners and enhance the learning experience.

5.10.1 Case Study A - visualisation in teaching

Background: Plastic pollution is a major environmental issue affecting marine ecosystems worldwide. Plastic waste can harm marine life by entangling animals, blocking digestive tracts, and releasing toxic chemicals into the water. In this case study, students will use visualisation techniques to understand the impact of plastic pollution on marine life.

Scenario: Students are given a real-world dataset that shows the amount of plastic waste in the ocean over time and the corresponding impact on marine life. The dataset includes information on the types of marine animals affected, their population trends, and the severity of their injuries.

Task: Working in groups, students are asked to create a visualisation that illustrates the impact of plastic pollution on marine life. The visualisation should include:
- A clear and concise title that describes the topic
- An introductory section that explains the problem of plastic pollution and its impact on marine life
- A data visualisation section that shows the trends in plastic waste and the impact on different types of marine animals
- A call-to-action section that encourages viewers to take action to reduce plastic waste and protect marine ecosystems.

Students are encouraged to use various types of visualisation tools, such as line charts, bar charts, or heat maps, to effectively represent the data. They may also incorporate images or videos of marine animals to make the visualisation more engaging and relatable.

Outcome: At the end of the project, students present their visualisations to the class, explaining the key insights and design choices they made. The visualisations are evaluated based on their clarity, accuracy, and ability to communicate the impact of plastic pollution on marine life. Through this case study, students enhance their visualisation skills and gain a deeper understanding of plastic pollution and its effects on the environment.

5.10.2 Case Study B - visualisation in reading comprehension

Lesson Objective: Learners will learn how to use visualisation to improve their reading comprehension.

Materials:
- A picture book with rich imagery and specific language
- Paper and pencils
- Markers or crayons

Procedure:
1. The educator introduces the concept of visualisation and explains that visualisation is when one creates a mental image of something you are reading about. This can help learners to understand the text better and to remember what they would have read.
2. The educator reads aloud the picture book to the learners and should stop at several points throughout the story to ask learners to visualise what they are reading about. For example, the educator may ask the learners to close their eyes and imagine what the setting looks like, or to picture the characters' facial expressions.
3. After reading the book, the educator may ask the learners to draw a picture of what they visualised. This will help them to solidify their understanding of the story.
4. The educator should discuss the learners' drawings. Ask them to share what they visualised and how it helped them to understand the story.

Learning Assessment:
- Observe learners' ability to visualise as they read.
- Review learners' drawings to see how well they were able to depict what they visualised.
- Ask learners questions about the story to assess their understanding.

Catering for differences:
- For learners who are struggling to visualise, the educator should provide them with more support. For example, the educator might give them a list of descriptive words to help them create their mental images.
- For learners who are advanced, the educator should challenge them to visualise more complex scenes or characters. The educator may also have them write a paragraph describing what they visualised.

Extended work:
- The educator should have learners create a visualisation journal. In their journal, they can write about what they visualise as they read different texts.
- The educator should have learners create a visualisation game. This could involve drawing pictures or creating storyboards to depict what they visualise.

5.11. Conclusion

Visualisation is a valuable teaching strategy applicable in any discipline. This technique promotes active learning by enabling learners to create a mental picture of concepts they have learned. Visual images are used to form powerful mental representations that enhance the attainment of higher-order learning outcomes. Educators should incorporate the visualisation teaching strategy to improve teaching and learning processes.

5.12 Reflective Questions

1. How can I utilise visualisation in my classroom to increase students' interest and comprehension?
2. What kinds of visual aids would be most useful for my course material? How can I make sure that all students can access these visual aids?
3. How can I most effectively include visuals in my courses to support other teaching methods including discussions, exercises, and assessments?
4. How can I utilise visualisation to inspire students to think critically, challenge presumptions, and take into account opposing viewpoints?
5. How can I evaluate the success of visualisation as a method of instruction in my classroom? What measures should I employ to assess how well visuals enhance student learning?
6. How can I ensure that my use of visualisation respects cultural norms?

5.13 References

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