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Augmented Reality for Teaching Storytelling in a Rural Foundation Phase Primary School: Integrating a Place-Based Approach

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ABSTRACT
Augmented reality (AR) has recently become a new leading edge in mobile-assisted language learning attributed to the popularity of smartphones. The place-based approach (PBA) is a situated, context-rich teaching and learning modality characterized by its relationship to place. AR and PBA have proven to be useful in educational settings; however, few studies have observed them being used jointly. This study aims to explore the combination of AR and PBA in teaching storytelling in a foundation phase (FP) rural primary school. Based on current trends, the study also aims to design learning principles for teaching that will help language teachers integrate this innovative technology and approach into literacy teaching. The study was tested with two FP teachers and 12 FP learners in a real classroom and carried out with qualitative observations and semi-structured interviews. The findings reveal that learners are more motivated and interested in activities that have been enhanced because they encourage problem-solving, discovery, and socialization. The findings also suggest that technological interventions, particularly when learners work as a team, may have a bigger impact than non-technology-integrated instruction. These results offer demonstrable support for technology use and have useful results for future practice.

KEYWORDS
Augmented reality; place-based approach; storytelling; foundation phase; rural primary school; literacy teaching

INTRODUCTION

Many skills are required in our increasingly connected digital world. These skills include problem-solving, communication, critical thinking, creativity, and teamwork. It is becoming more crucial for learners to develop these skills in school if they are to succeed. Digital technologies are a useful tool for fostering the development of these skills. Among these digital technologies, augmented reality (AR) is being employed in educational settings. It has gained more interest in the scientific community as a result of studies reporting its benefits and reviews on its effectiveness and advantages when utilized for educational reasons (Bacca Acosta et al., 2014; Bujak et al., 2013; Diegmann et al., 2015; Liu & Tsai, 2013; Wang et al., 2018). AR represents the essence of a digital culture-learning tool. The overlay of computer-generated content in an actual environment is made possible by a variety of technologies through mobile games, TV dramas, professional skill training, global positioning systems (GPS), and so on. It has been demonstrated to be helpful in promoting engagement, motivation, creativity, imagination, and teamwork, to name a few of its advantages (Diegmann et al., 2015; Yuen et al., 2011).

Researchers have carried out empirical studies on mobile-assisted language learning (MALL). For example, Loewen et al. (2019) promoted the use of mobile tools in language education, as well as in custom educational software (Wang et al., 2018). Some reviews (Bacca Acosta et al., 2014; Diegmann et al., 2015) show that AR has been used in a number of educational settings where the primary goal is to promote learner-centered learning. The AR in ELE falls especially under the purview of MALL, which facilitates interaction and maintaining access across all diverse contexts for language teaching and learning (Kukulska-Hulme & Shield, 2008). The education sector offers favorable conditions for the wide acceptance of AR technologies and applications. Therefore, incorporating AR in teaching storytelling pushes learners to visualize what they are learning while developing a feeling of belonging that is conceived and acted out in certain areas such as the fundamentals of computer usage, how to use computers to enhance reality, the fundamentals of AR systems, and the fundamentals of a given environment.

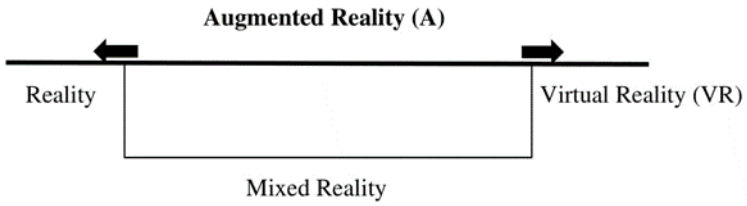
The place-based approach (PBA) is built on the local community's assets and values and emphasizes the utilization of the local community as a context linked with the school (Powers, 2004). It has its origins with John Dewey, who criticized education within fortified walls, contending that it was life itself at school rather than a setting that helped students prepare for life (Pasiechnyk, 2018). Since the mid-1990s, the application of PBA has gained special interest. The practice became a hallmark when initiatives to help the resuscitation of rural education were financed by the Annenberg Foundation, and several of those projects relied on place-based instructional paradigms (Smith, 2007). PBA research has grown since 2004 (Barrentine, 2015; Lester, 2012; Mpiti et al., 2021; Smith, 2007; Waller & Rodríguez-Pose, 2018). The most recent research regards PBA as an extraordinary, thought-altering, and successful teaching strategy. Researchers have emphasized its benefits, including how it can improve literacy skills (Barrentine, 2015; Mpiti et al., 2021; Waller & Rodríguez-Pose, 2018), enhance learning

outcomes and boost the efficiency of learning sessions (Semken et al., 2017), as well as encouraging and assisting with failed learning (Mpiti et al., 2021).

There has not been much exploration of the combination of AR and PBA. Given that AR makes it possible to create real-time, interactive virtual worlds and play with real-world learning items (maps, books, and tools) in games, combining AR and PBA is beneficial. PBA gives the AR application a natural environment, transforming the real-world visualization into an actual learning experience. The workings of AR are depicted in Figure 1 below:

Figure 1

Adapted from the realism virtuality continuum, AR in a band (Milgram & Kishino, 1994)



The above figure identifies any mixture of actual and virtual items (mixed reality) that exists between the two opposites of virtual reality and reality (Milgram & Kishino, 1994). One aspect of VR is a world entirely made up of virtual items. The material world is at the opposite end. AR technology overlays digital content in the real environment while operating on the same band. This study, therefore, aims to facilitate the bridging of the learning design community with ARPBA in teaching storytelling to develop learners' vocabularies, pronunciation, right intonation, and speaking in front of the class. ARPBA may enrich storytelling activities because learners concentrate on the speech that is presented in a physical, real-world learning item (such as a book), and their experience is improved when virtual layers with interactive components relevant to the storytelling are included (the AR ingredient). AR applications are more effectively rooted in a learner's regular learning environment because of the coordinated presentation of both physical and virtual aspects.

The goal of this study is to help learners understand key contemporary issues facing their local environment and take responsibility while developing storytelling abilities. The following research questions are examined in the study:

- What is the overall effectiveness of the ARPBA task for foundation phase (FP) learners?
- How is the storytelling activity itself enriched? In other words, how is the activity enriched in terms of collaboration, problem-solving skills, argumentation skills, etc.?

LITERATURE REVIEW

Wang et al. (2018) defined AR as a set of technologies used in combination to overlay computer-generated content over the real world. It is generally characterized as any system that combines the physical and digital worlds, allows for real-time interaction, and appears to be three-

dimensional (Azuma, 1997). Instead of the standard learning activities given inside the limitations of a regular classroom, learners can use AR to examine simulated experiences based on the reality of specialists in the area (Lee, 2012). The education sector offers favorable conditions for the widespread adoption of augmented reality technologies and applications.

Benefits of AR

In addition to traditional classroom instruction, AR can blend the learner's perception of the virtualized version of the actual world produced by mobile devices to create a semi-realistic world and increase motivation to learn a foreign language (Liu & Tsai, 2013). The most well-known application of AR is as a visualization tool that may improve any physical sense, or even several senses at once, with moving 3D models and images as well as two-dimensional text (Wang et al., 2018). AR is more than a simple physical or sensory encounter. Bujak et al. (2013) sum up how learning is impacted by AR experiences along three main dimensions: 1) Physical, which deals with interacting with and manipulating objects; 2) Cognitive, which deals with spatial and temporal proximity; and 3) Contextual, which relates personal significance to real-world situations.

The significance of AR is how the technologies and applications are implemented, just as other digital advances can support meaningful learning outcomes (Wang et al., 2018). In contrast to the normal learning activities provided within the limits of a standard classroom, AR allows students to investigate the simulated, actual-world experiences of specialists in the area. Learners today are "digital natives," having dealt with digital information at an early age. Unsurprisingly, they have positive opinions about AR as a teaching tool. Place-based language learning is made possible by mobile AR technology (Godwin-Jones, 2016). AR can encourage learners to actively participate in language learning activities and support their participatory learning process (Lee, 2012). An exploratory study conducted by Thorne et al. (2015) found that the use of AR technology and the coordination among social, physical, and informational surroundings mediated/facilitated the entire learning process.

Benefits of PBA

PBA entails direct involvement with the environment and occurs outside of the traditional classroom, whether at school or elsewhere. When adopting PBA as a learning strategy, learners placed a strong emphasis on using their bodies to connect with their thoughts (Üztemur & Dere, 2022). In PBA, learners can focus and deepen their learning by using objects outside of the classroom as opposed to only learning in a classroom (Glassner & Eran-Zoran, 2016). As a result, students are urged to find and develop economic possibilities in their local community rather than looking for jobs elsewhere. This approach enables learners to continue living in the neighborhood after graduation and to help their families and neighbors (Larty, 2021). PBA enhances learners' self-control, originality of thought, and problem-solving abilities in such a learning environment (Smith & Sobel, 2010). As a result, learners become more civically responsible and feel more empowered (Glassner & Eran-Zoran, 2016). Teachers and learners must take responsibility and work together to become collaborative researchers of regional

issues and challenges if they are to be in command of their own learning in such a learning environment integrated with the community (Smith & Sobel, 2010).

PBA also attracts attention as a crucial method in teacher preparation (Dani, 2019), encouraging teachers to use local resources as learning tools, transforming local areas into learning labs (Buxton & Provenzo, 2012) and offering teachers the opportunity to develop a sense of place (Dani, 2019). PBA applications assist teachers in comprehending the sociocultural setting of the learning process. Teachers' feeling of location is enhanced by these practices, which also enhance their capacity for creating engaging learning activities. In order to help learners have "strong, transferable, and worthwhile" experiences, teachers might assimilate the sociocultural framework of the local community where their students live (Basu & Barton, 2007).

Storytelling

According to Gunadi and Lubis (2021), telling stories to friends, relatives, or other individuals about an event that has taken place or an action that has been taken conveys experiences, impressions, and information about that event or action. It is a technique that anyone can use to communicate a range of messages such as thoughts, opinions, and emotional states. Storytelling requires a number of additional psychological skills such as mental fortitude and employing other emotional intelligence skills like using language in a formal manner (Gunadi & Lubis, 2021). Learners encounter experiences and knowledge regarding the subject matter, characters, and methods of storytelling through reading, listening, and watching. On the other hand, storytelling can assist teachers in better understanding their learners, being more proficient in addressing the social and emotional needs of learners and being able to design a curriculum that takes students' needs and interests into account (Wright et al., 2008). More importantly, storytelling provides a rich literacy environment for learners.

This study is aimed at developing learners' knowledge of practical issues and the ability to address them while developing storytelling skills by incorporating AR with PBA to improve learners' storytelling abilities. ARPBA has the advantages of expanding learning outside of physical spaces, providing chances for collaborative learning, and giving learners contextual knowledge. In this respect, learners have opportunities for autonomous thought, information gathering, analysis, synthesis, critical thought, communal issue solving, and the generation of original ideas.

THEORETICAL FRAMEWORK

The idea of applying ARPBA to storytelling activities is set within the theoretical framework of constructivism and learning theory. The basic premise of constructivism is that each person develops their own sense of meaning via experience. This implies that learners discover the major idea before deriving the detail, as opposed to being taught all the details that lead to the main notion. Robinson and Coltz (2013) describe AR as a "powerful means to constructivist learning" (p. 3353). With AR, learners can actively engage with digital content and incorporate new knowledge into their current body of knowledge while following their own unique path of

discovery (Wang et al., 2018). As a result, AR learning experiences are consistent with constructivism's principles. With the use of AR, learners can learn contextualized language and content, absorb it, and create their own understanding before applying it to useful tasks (Liu & Tsai, 2013).

In the same vein, PBA emphasizes the idea of the obligation to preserve and restore our shared surroundings as well as the experience of being human in relation to people and the natural world for future generations (Gruenewald, 2003). Beames and Brown (2016) assert that authenticity is a key factor in adventurous learning, in part because it connects these constructivist ideas to the academic work incorporated into outdoor and environmental education. The value of past knowledge, information in context, and meaningful interaction is amplified by genuine learning theory by encouraging research, innovation, and the profound building of concepts in real-world scenarios (Hornstra et al., 2015). Learners are immersed in the outdoors, and the learning is customized to the setting in which it takes place.

AR combined with PBA aims for a relevant context because the use of interactive tools and settings is consistent with the Vygotskian idea—the foundation of the Whole Language—that social contact should be a part of the learning process, including speaking. According to Godwin-Jones (2016), the combination of ARPBA encourages students to participate in their own education and encourages them to take part in literacy activities.

METHOD

To evaluate AR combined with PBA, the researchers conducted a case study, exploring facts and experiences by collecting information on a small group of foundation phase (FP) teachers and students in a rural primary school setting. In order to describe cases in great depth during this inquiry phase, the researchers used anecdotes (Hancock et al., 2021). The nature of this qualitative study enabled the researchers to choose participants who were most knowledgeable about the subject being studied (Leedy & Ormrod, 2019). Teachers and learners who speak isiXhosa were chosen by the researchers to explore the integration of AR and PBA in teaching storytelling in a rural FP primary school.

Purposive and convenient sampling techniques were used in this study. Purposive sampling involved gathering information via storytelling activities, and convenient sampling involved taking advantage of schools' accessibility. Participants included 12 FP Grade 3 isiXhosa-speaking students aged 11 to 12, and two classroom teachers. They made four groups of three learners in each group. Teachers were labelled as Tea1 and Tea2 and learners were labelled as Lea1 – Lea12.

The researchers conducted semi-structured interviews to gain an understanding of the depth and complexity of the teachers' experiences with ARPBA. A thorough observation of the teaching and learning process was conducted to ascertain how the teacher applied and the student learned using ARPBA.

The researchers in this study collaborated with teachers to plan the activity. The researchers created an ARPBA-based narrative that would promote storytelling with the aid of the teachers.

Crafting with the teachers. The researchers worked with the teachers to create a storytelling activity that incorporates AR and PBA. The fundamental concept of the story, "the outdoors," taken from the textbooks, was provided by the teachers. Due to its simplicity of use, the BuildAR program was chosen. Then, the researchers and teachers designed an activity for determining 3D objects.

Interactions with learners. We questioned the learners in a way that got them to consider significant places in the schoolyard, their perceptions of those places, and the messages they wanted to convey about those locations. We concentrated more on assisting the four groups in developing the narrative during our brainstorming sessions. In this way, we wrote down all the repeated words (refer to Table 1) and we introduced five characters (grass, a playfield, a ball, a boy, and a girl).

Table 1

The outdoors-themed objects reported by learners

Picture	Words
	Run
	Kick
	Pass
	Ball
	Goal
	Playfield

After that, researchers and participants took pictures in the schoolyard that are related to the brainstorming session, and the designs of the 3D and 2D objects were created. Figure 2 includes samples of the materials created.

Next, learners in their groups created stories while using a computer to view their displays (see Figure 3). Learners were told to think of a story that fits with the pictures. They were given time to think about their ideas. Learners took turns sharing their version of the story.

Figure 2

RESULTS

The current study examines the effects of AR integrated with PBA in teaching storytelling on rural FP learners' stories regarding narrative skill, length, and creativity. For both teachers and learners, this was their first time integrating AR and PBA into teaching and learning. The results revealed that learners using an integrated approach of ARPBA created better stories. Teachers were pleased with this strategy and emphasized its benefits in developing learners' narrative skills as well as expanding their vocabulary repertoire. On the other hand, they mentioned that this exercise helped learners familiarize themselves with the school grounds and attractive spots and learn to take care of their environment. The storytelling skills of the learners improved from the first activity to the final, according to the teachers. They also concurred that using technology in the classroom has a significant, beneficial impact on learning and achievement. Teachers expressed gratitude for participating in the project and using this model when it was finished, saying:

Tea1: I appreciate being part of this innovative project; moreso, I can say combining AR with PBA is a useful and complex, technology-enhanced learning experience. But I cannot run from the fact that the technical challenges of creating 3D videos are a daunting task and need gurus of the field.

Tea2: For me, it was difficult to plan, and I can see IT people are needed when it comes to developing the 3D characters. Nevertheless, the results yielded fruitfully. Also, it made it easy

for these kids to see their story characters moving. They may have been inspired to describe what they saw and use numerous vivid words as a result.

Tea1: Giving children computer-based lessons and a variety of options gave them the chance to write more powerful stories. Nevertheless, by the look of things from this experience, I think working with smaller groups yields good results. To my thinking, a larger number might be a challenge.

Tea2: From this experience with PBA, I noted that it involves children in investigations that call for careful observation and problem-solving, activities that might strengthen their bonds with the social and natural worlds around them.

Tea1: PBA activities encourage children to take on the responsibilities of the place they live at. To add more, it makes them feel confident in themselves and extremely excited about what they are studying. I wish we could accomplish the same thing together.

Data gathered from interviews indicated that both teachers appreciated the tasks. They added that to create effective AR applications that improve learning outcomes, a collaboration between teachers and learning designers is required. In addition, both teachers noted as the important advantage of integrating the PBA with AR in teaching literacy to EFAL learners. They believed that collaboration was necessary, and it enabled learners to respect their environment and learn using technology while developing storytelling skills.

According to observations, all participants cooperated with their teammates. The researchers believe that ARPBA played a major role in engagement and motivation because new technologies usually motivate and engage young learners. The fact that learners tended to interact with one another after participating in the group work activity was a typical and expected outcome. These connections involved the learners cooperating, imparting knowledge, and engaging in some form of training while guiding one another. Noting how the activity emphasis provides a justification for disputing, arguing, and supporting arguments, it is possible to see how these interactions represent opportunities to acquire language-related skills. As an illustration, one learner persuaded a reticent teammate to share her story, which she duly did.

One of the most salient observations is that the learners seemed to like narrating the story, and the use of technology motivated them. Learners enjoyed the story they created in their groups. Most learners believed that the story was not too long or too short, and they did not get tired of hearing each other talk. The duration of the storytelling varied between one and one-and-a-half hours. One learner expressed her embarrassment and desire for more after the task was completed. She further noted ARPBA as an important factor for engagement and authenticity in the use of the school grounds as the scene of the story. This reveals an advantage of integrating place when teaching. Finally, all of them revealed that they would like to learn other subjects integrating ARPBA, which reveals that learners develop a positive attitude about this approach.

DISCUSSION OF FINDINGS

Researchers believe that because new technologies typically engage and motivate young people, especially learners, this fact has a significant impact on motivation and engagement (Gikas & Grant, 2013). This is in line with Kesim and Ozarslan (2012), who indicated that multidisciplinary teams are required to create AR activities and applications for education and training in order to maximize learning outcomes.

From data gathered through interviews, it is evident that combining AR and PBA created richer experiences by utilizing learners' imaginations to produce more imaginative stories (Cassell & Ryokai, 2001; Wang et al., 2018). This study shows that allowing learners to use their imaginations to develop original stories boosted their creativity.

As revealed by observation, integrating technology into teaching storytelling in EFAL has a large and positive effect on learners' learning and achievement. This result is typically consistent with place-based language learning practices and mobile AR technology (Godwin-Jones, 2016), which underscores the beneficial impacts of expanding learning outside of traditional classroom settings and can foster collaborative learning and give learners access to context-relevant information. Furthermore, this finding is consistent with Thorne et al. (2015) in that the integration of social, physical, and informational environments with AR technology makes the entire learning process easier.

Observations revealed that the high degree of narrative expertise is because AR storytelling is an alluring, thrilling, and enjoyable activity in and of itself. In line with this, Kim et al. (2013) said that when utilized with 3D objects, AR technology is an intriguing application for interactive storytelling. Similarly, Zhou et al. (2004) found that utilizing 3D items with AR improves the appeal and comprehension of narrative activities. The exercise is made more thrilling and enjoyable in this way. The use of 3D characters could be another factor in this discovery. Dünser and Hornecker (2007) found that giving learners more control over and interaction with the story's characters through the use of paddles can increase their interest in it. This is true because observation indicated that the connection with story characters provided a positive contribution when creating a story. It was observed that generated cartoon characters positively affect learners. Telling a story with familiar characters facilitates understanding and heightens the experience for children (Cassell & Ryokai, 2001).

CONCLUSION

In this study, learners' narrative skills, length of stories, and creativity in stories were investigated. AR integrated with PBA constitutes an effective method of teaching storytelling. This situation makes the ARPBA method for storytelling more feasible and attractive. To sum up, ARPBA has attracted teachers' interest and focus in four areas: (1) encouraging learner-centered literacy learning; (2) developing interactive and collaborative learning environments; (3) boosting learners' motivation for learning storytelling; and (4) supporting literacy learning outcomes.

Recommendations

It will be essential to give guidance and instruction to teachers and learners to effectively use the AR-infused teaching and learning materials.

The jigsaw cooperation method will be used in upcoming iterations. Jigsaw collaboration is anticipated to boost involvement, which in turn stimulates cooperation, increasing learner engagement and experience authenticity.

Another direction for future development is the design of games with opponents, which may make the task more challenging.

These conclusions might be expanded upon with a larger sample size and a broader range of grade levels.

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