
THE AUGMENTED REALITY IN FAVOUR OF THE PRIMARY PHYSICAL EDUCATION AND SPORT TEACHER

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Abstract: The proposed model for the integration of augmented reality in physical education classes focuses on the creation of AR-cards that the teacher can easily prepare, without the need for advanced skills. The introduction of AR-cards aims to overcome the traditional reliance on verbal explanations and static illustrations alone, providing multi-channel visual and audio reinforcement. Through some platforms the student scans the card and instantly sees a three-dimensional model, hears instruction and can reproduce the motion. This results in a significant reduction in demonstration and correction time, as some of the instruction is delegated to the animation itself. The teacher selects key sports from the curriculum - athletics, gymnastics, football, mini basketball - and prepares short visual cards for each discipline. The cards are laminated and placed in the gym or handed out to students, and the teacher demonstrates the scanning with the app before class. Students, working in pairs, "discover" the animations on their own, which enhances their motivation and leadership skills in each other's corrections. The opportunity for students with special educational needs to play the animation repeatedly until they feel confident is particularly valuable. Within the lesson, time in moderate to powerful activity increased, indicating that AR stimulated more independent and quality repetitions. The element of play and discovery maintained attention by turning routine exercises into an interactive challenge. The practical implementation through the Roar platform demonstrates that the technological barriers are low: all that is needed is an account, the selection of a "Target Image" and a finished video. An automatically generated QR code gives easy access to AR content via smartphone or tablet. The main obstacle remains the initial uncertainty of some educators who are not used to digital tools. Brief orientation trainings aimed at creating a trial AR- card can overcome this fear and drive widespread adoption. The proposed linking of AR-cards with science and mathematics reveals the potential of physical education as a cross-curricular platform. Embedding short facts about physical laws or launch angles supports the integration of the topic into the general curriculum. The discussion underlines that technology improves visualisation and accelerates assimilation, but raises the question of schools' technical readiness. The unstable connection and the different devices require additional instructions and advance preparation of the infrastructure. Some teachers prefer traditional demonstrations until they are convinced of the benefits of AR through hands-on experience. Next steps include conducting multi-school research with different AR platforms and automated feedback. Wearables and real-time data analysis would enrich subsequent studies and support individual student progress. In conclusion, the AR-card model can become a sustainable innovation that renews physical education (PE) lessons and meets the needs of the digital generation. To realise this potential, however, systemic actions are needed - teacher training, investment in basic infrastructure and the promotion of collaboration between subjects. The vision is for physical education to become an engine for integrated learning, where movement and cognition are developed synergistically through modern technological solutions. Only in this way will physical education classes transform the educational environment and prepare students for an active and technologically aware life.

Keywords: Augmented reality, Physical Education, Multisensory learning, Technology integration, Interactive visualisation

1. INTRODUCTION

Augmented Reality (AR) is a technology that opens up many opportunities for new developments in life. The use of AR in physical education learning makes it easy for teachers and students to understand teaching material in an interesting way. This application is still in progress so there is still much to be improved in both the design of images, programming and harmonization of movements in sports (Widyaningsih et al., 2023).

Augmented reality (AR) technology is incorporated to enhance students' understanding by visualizing textbook content engagingly and interactively. Existing AR applications were used alongside newly developed augmented modules representing key PE textbook concepts. The Augmented Reality (AR) module designed for this study focused on visualizing physical exercises from the PE curriculum, including flexibility, muscle strength, and endurance (Azman & Ramlee, 2025).

The application of technological resources was presented as a real alternative to put into practice in the area of physical education. They are tools that provide a new vision when it comes to accessing knowledge, and that allow

us to dynamize and better attend to the diversity that exists in the classroom. In this way, the aim is to establish a change from an obsolete traditional teaching to a different way of building learning, which is inherent to the time frame and the student body of today (Moreno-Guerrero, 2020).

In augmented reality, real and virtual environments represent two ends of a continuum. Educators and researchers can integrate emerging technologies, such as AR and multimedia tools, into teaching and learning activities, and the resulting sensory experience and interaction extend the concept of augmented reality. The main feature of this system is augmented reality, which is combined with 3D action skill modules to present visual effects, improving the current form of traditional sports teaching and integrating information technology into action skills and sports (Liang et al., 2023).

There has been a significant increase in the number of studies conducted in the field of physical education in recent years. This growth can be attributed to the emergence of new technologies, both at the social level and within educational institutions, including augmented reality, virtual reality and mixed reality. Moreover, this type of study can be regarded as an invaluable tool for assessing the current state of research on the topic, outlining potential avenues for further investigation and identifying challenges associated with integrating physical education into the school curriculum. (Pérez-Muñoz et al., 2024).

It can be concluded that the method of teaching through augmented reality is effective in teaching high school students in the subject of physical education, especially for the acquisition of spatially oriented content (Moreno-Guerrero, 2020).

The findings from the study, conducted by Omarov et al., illuminate the significant advantages of integrating Augmented Reality (AR) in sports education, particularly in enhancing student motivation and physical activity levels compared to traditional methods. This study has effectively demonstrated the substantial benefits of implementing Augmented Reality (AR) in sports education, highlighting its potential to significantly enhance both physical activity levels and motivation among students. By integrating AR into a game-based learning environment, we observed a notable increase in student engagement and participation in physical activities compared to traditional sports education methods (Omarov et al., 2024).

Technology integration in Physical Education has been slow; however, technology provides a means to promote physical activity and participation (Steedman, 2022). The use of digital technologies in physical education lesson content can make the lessons interesting and promote health (Ospankulov et al., 2023). Technology has enough potential to simplify more effective instruction in physical education and to provide physical educators with key pieces of information that can be used in advocacy efforts (Suriya & Arumugam, 2020). Following the development and diversification of digital technologies in today's society there is an increase in research into the integration of these technologies to discipline physical education (Modra, 2023).

2. MATERIALS AND METHODS

Currently, a significant number of primary physical education and sport teachers have limited knowledge and practical experience of working with interactive and augmentative technology solutions. There are several reasons for this - insufficient presence of the topic in university curricula, lack of targeted qualification courses, and the perception that implementing new digital tools requires expensive hardware or a lot of preparation time. As a result, ultra-modern visualisation tools remain 'reserved territory' mainly for after-school clubs or experimental projects, while regular classroom sessions often rely solely on verbal explanations and traditional demonstrations. To bridge this gap between technological capabilities and everyday practice, in this paper we propose a quick and easy model for illustrating learning content, accessible to any educator, even without specialized technology skills.

Create AR- cards - The teacher selects key sports from the curriculum (athletics, gymnastics, football, basketball, etc.) and for each sport makes a short visual card - an illustration or photo in a style suitable for children. Free online platforms such as AR Makr, 3DBear or Metaverse Studio allow 3D-models, short videos or audio instructions to be "overlaid" on any image with just a drag-and-drop. So when scanned with a tablet or phone, the card comes to life, showing throwing technique, proper launch, position in defense, etc.

Lesson integration - Cards can be laminated and attached to a poster in the gym, to a classroom board or handed out to students in pairs. At the beginning of the lesson, the teacher demonstrates how to scan the card (using an app) and lets the children "discover" the animation on their own. In this way, each student gets a multi-sensory introduction - they see a 3D model, hear a short comment and can immediately try the movement.

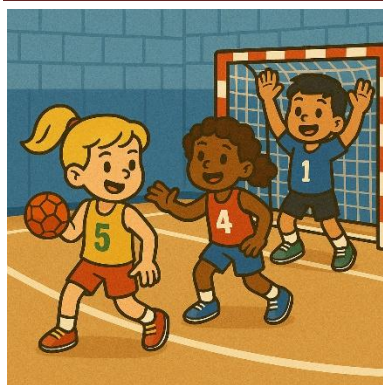
Methodological effects - Faster technique learning - the model shows the exact trajectory or position, which reduces the time for verbal instructions and corrections. More motivation and engagement - the element of "discovery play" keeps attention and turns even routine exercises into an interactive challenge. Support for students with explicit visuals and the ability for the student to 'play' the animation repeatedly supports slower or sensory challenged children.

Linking to other subjects - short facts on Man and Nature (e.g. "Why is a floating body lighter in water?") or Mathematics (angle of the ball) can be embedded in the cards. In this way, the teacher turns traditional pictures into "living supports " without investing in expensive holographic devices or sophisticated software, and students get visual-dynamic support that makes first steps in different sports clearer, more fun, and more memorable.

Before proceeding to the actual creation of the augmented reality, it is necessary to prepare in advance images representing the different sports, as well as videos that will correspond to them and be part of the augmented reality. If preferred by the teacher, images can be created using various AI applications. In our case, we have used [ChatGPT](#) to generate stylistically appropriate and child-appropriate images that represent the sports covered at the primary level in the Republic of Bulgaria (Image № 1).

Image № 1: Sports covered in the primary stage



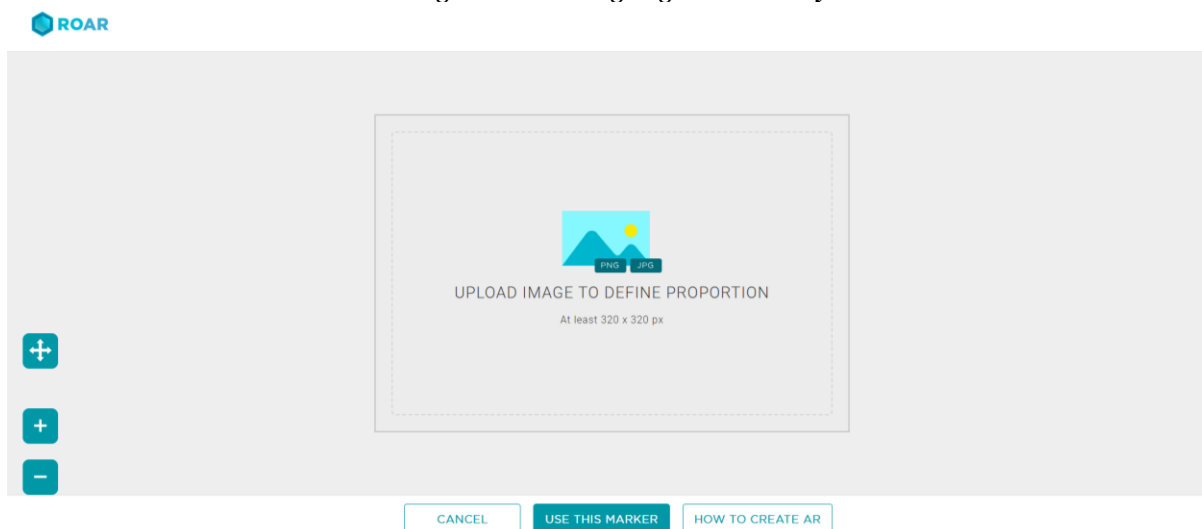


In the Republic of Bulgaria from the first to the fourth grade students are introduced to the following sports: compulsory - athletics, gymnastics, folk choir, football, basketball, handball; elective - hiking, swimming, badminton, table tennis, tennis.

Source: Authors

Regarding the videos - the same approach can be used (to generate them with the help of artificial intelligence), to find on the Internet appropriate videos, presenting clearly and in detail the sport to which they are dedicated, or at best to be filmed by the teacher. No matter which approach is chosen, the next step is to create the augmented reality itself. Currently, there are a large number of applications that allow using an image as a marker to launch a pre-selected additional visual resource (in our case, a video file). One of the easiest to work with platforms containing such functionality is [Roar](#). It is necessary to create a profile in which to store relevant projects. After creating it and logging in with the relevant input data selected by the user, a standard home screen opens on which it is enough to select the “Create AR button”. The screen provides three options – “Target Image, ARKit & ARCore and Web AR”. Select the first option and the following screen opens (Image № 2).

Image № 2: Creating augmented reality



Source: Authors

Here we just need to upload the corresponding image to use as a marker, the recognition of which will allow the launch of augmented reality. We specify the location and select the file we want to start with. We position it carefully on the scene, as we may need to resize it to make full use of the space. When we're done we select the “Use this marker” button. If needed, we can review the step-by-step explanation of creating an AR by selecting the “How to create AR button”.

After the confirmation there is a wait, when the marker is ready in the right part of the screen we can define the settings of the augmented reality. In the left part we have additional menus for setting text, images, video, 3D models, audio, etc. In addition to attaching a pre-prepared video resource, we also have the option to specify a hyperlink to a video-file platform. We define the way of starting the video. Once we are ready the platform will generate a QR code and publish the augmented reality we have created. There is a proper file organization where we can more easily find the resources we have created - grouped by categories - published, drafts, archived, etc. With

the help of the QR code we can download the corresponding application, with which we can run the augmented reality on a device of our choice - phone, tablet, etc. Then it is enough to scan the marker (the image we have defined).

3. DISCUSSION

The proposed model for the use of AR-cards demonstrates that with minimal resources a teacher can - without in-depth technology-skills - turn static illustrations into dynamic "living" facilitation. When the student scans the image, he simultaneously sees a 3D visualization, hears a short audio description and can instantly try out the movement. This multichannel stimulation directly addresses the problem described in the text - the prevalence of verbal explanations and lack of visual aids in the traditional lesson. As a result, demonstration time is reduced, and some of the adjustments are transferred from the teacher to the technology itself.

AR- cards also change the nature of participation in the class. The element of "discovery play" embedded in scanning the marker keeps students' attention and turns even a routine exercise into an engaging challenge. The described ability to play the animation repeatedly provides additional support for children with special educational needs who can practice the movement at their own pace without falling behind the pace of the class. In this way, the technology fulfils a dual function: it illustrates the content and facilitates individualisation at the same time.

The practical implementation through the Roar platform shows that the technical barrier is relatively low: all that is needed is an account, the selection of a "Target Image", the addition of a ready-made video and an automatically generated QR-code. However, it is the initial fear of 'complicated equipment' that remains a major barrier for many teachers referred to in the text. Observations suggest that a brief introductory training focused on the creation of a sample card may be the key to overcoming this uncertainty and to engaging a broad group of educators in the process.

Finally, the proposed linking to other subjects - embedding science or math facts in the AR-cards themselves - highlights the prospect of physical education becoming a cross-curricular core that combines movement and cognition. Such an approach not only enriches the physical education lesson but also supports the overall educational strategy of integrated learning without requiring additional time in the curriculum.

4. CONCLUSION

The proposed model with AR-cards proved that even with limited resources and without specialized skills teachers can enrich visualization in PE and sport classes. Through a simple combination of illustrations and a mobile app, static posters are transformed into dynamic aids that speed up demonstration, reduce the verbal explanation required and support motor skill acquisition. Additionally, the ability to play the animation repeatedly provides individualized pacing of the exercise and supports students with special learning needs while keeping the attention and engagement of all participants.

However, sustainable implementation of this innovation requires targeted training and support for teachers to overcome the initial uncertainty of new technologies. The integration of AR into the curriculum can lay the foundations for cross-curricular learning, incorporating elements of science and mathematics, and thus turn physical education into an engine for integrated learning experiences. In a next stage, it is advisable to conduct larger-scale and longer-term studies to evaluate the effects on different age groups and learning contexts, and to explore the possibilities of incorporating wearable devices and automated feedback systems.

ACKNOWLEDGMENTS

The study was conducted within the project: "Research of possibilities for the development of methodological instrumentarium for the application of modern educational and information technologies in teaching", Contract KP-06-M 70/1/ 13.12.2022, Competition for financial support of projects of junior basic researchers and postdocs - 2022, The Bulgarian National Science Fund.

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