MAGIC WITH MERGE CUBE - A NOVEL TECHNOLOGY OF INFORMATION RETRIEVAL

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Abstract :

The soft foam Merge Cube features unusual patterns on each of its six sides. When one of the sides is scanned with a compatible app, the Merge Cube enables an interactive AR experience. Moving and rotating the Cube in the hand can shift the AR object in every possible way. The Merge Cube requires apps to be used on either iOS® or Android devices. It can be used with or without a set of VR goggles. In this paper, the author explained all four apps and their functionality in detail. What are the instructions. From where can we purchase it? Which libraries are providing this service to their patron? All information is elaborated in this paper.

Keywords : Magic with Merge Cube - A Novel Technology of Information Retrieval, Virtual Reality, Augmented Reality.

Introduction :

The Merge Cube is an interactive AR Teaching and Learning Device. Merge experiences provide students with opportunities to learn about Earth science, life cycles and traits, ocean animals, space systems, the structure and properties of matter, energy, waves, light, and sound, and more. Such virtual learning simulations are designed to replace or amplify real-world learning environments by allowing users to manipulate objects and parameters in a virtual environment. The visualized, experiential, and handy are the features of this device. The library is the right place to procure it and provide it to its patrons. The investigator explained and elaborated on the Merge Cube, Merge EDU Apps, their applications, and their availability.

Review of Literature :

"Merge Cube as a New Teaching Tool for Augmented Reality" authored by PATRIK VOŠTINÁR (2023) explained that AR technology which is increasingly popular not only in the education process. The author described some of the applications for augmented reality that used hologram cube Merge. The author devoted to this application because of distraction of sick children from their disease.

"Digital Worlds and Transformative Learning: Google Expeditions, Google Arts and Culture, and the Merge Cube" authored by Jasmin Bey Cowin (2020) explained digital content, digital aids, and digital teaching techniques with a thoughtful, student-centered curriculum requires analysis, planning, and practice. Simulation environments such as Google Expeditions, Google Arts and Culture, and the Merge Cube empower learners to take ownership of their learning by allowing them to collaborate, work at their own pace, access a variety of resources, and extend their learning beyond the four walls of the classroom.

AR Merge Cube :

The Merge Cube is a foam cube featuring distinctive silver designs that serves as a tangible trigger for augmented reality (AR) experiences when seen through a compatible mobile device. By directing the camera of a smartphone or tablet at the cube while using a Merge EDU app, users can observe and interact with holograms of three-dimensional objects, such as the solar system or a human heart, that seem to be in their hands. This offers an engaging and accessible platform for hands-on digital learning and creativity, blending the physical world with virtual content.

Figure 1- Merge Cube

Thanks to the unique patterns displayed on the cube's sides, these models can be examined in detail and rotated. This experiential way of learning—uncovering new information—holds more value than viewing it in a flat image. Moreover, these models can feature various animations and sound effects, which enhance engagement and stimulate multiple senses of students. Currently, available applications span a wide array of technologies. The Merge Cube can be utilized across numerous educational fields, including mathematics, geology, biology, geography, and more. The library can purchase it to provide the AR , 3D audio visual contents to the users. Figure 2 illustrates an application related to the human body designed for the Merge Cube.

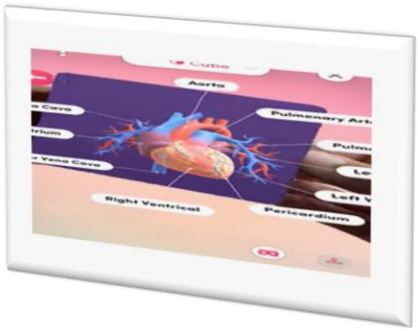

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Figure 2 - application related to the human body

1. Educational apps for the merge cube :

There are currently several applications that can harness the potential of the Merge cube. The disadvantage of these applications is that they provide only part of their functionality for free and then you have to pay for a license

1. Explorer :

Explorer is the official Mergeedu app that provides the most extensive collection of detailed educational resources presented through animated scenes. The app is organized into multiple sections. Alongside animated scenes, the Augmented Reality application includes a variety of knowledge-based quizzes. It is compatible with popular devices like smartphones and tablets running on Android and iOS operating systems. Figure 3 illustrates an example of the educational resources available in the Explorer app, showcasing the formation of the solar system.

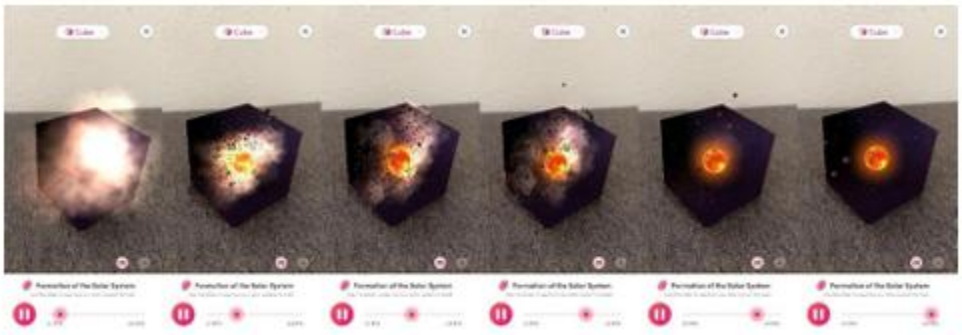

Figure 3 - formation of the solar system.

2. **Object viewer** :

Object Viewer is a software designed to isolate and display various objects. Its database includes hundreds of items that can be examined closely and scaled up or down as needed. This application spans numerous fields that are conducive to educational purposes, such as dinosaurs and ancient artifacts in history, animals and human anatomy in biology, as well as components related to computers and computer science. It is also compatible with

smartphones and tablets running on Android and iOS operating systems. Figure 5 illustrates a sample view from the Object Viewer. FIGURE 4. Example of a merge cube application object view.

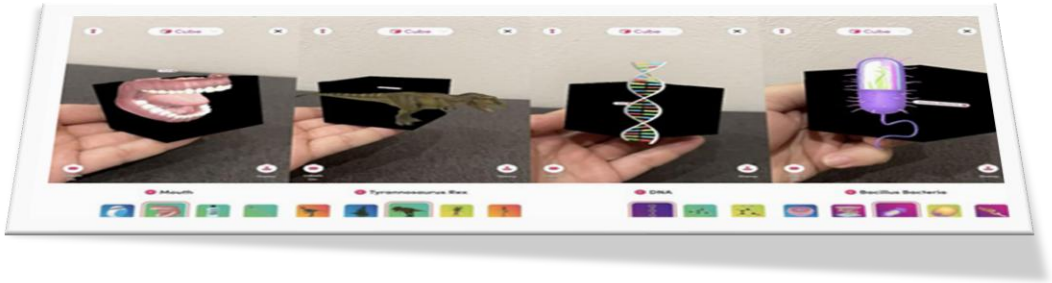

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Figure 4 - Example of a merge cube application object view.

3. Hologlobe :

Hologlobe is an app that enables users to explore detailed satellite images of Earth. It provides various visualizations featuring scientific information, such as data on rainfall, cloud cover, ocean and land temperatures, glacier formations, and fire occurrences. Each animation is accompanied by textual descriptions, which may include voiceovers in English. The application is compatible with Merge cubes and is available on devices running Android 5 and iOS. Figure 5 illustrates a selection of images from the HoloGlobe app.

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Figure 5 – HoloGlobe App Images

4. Cospaces :

CoSpaces is a web-based application, that allows users to build virtual worlds or to create object which can be located in augmented reality. The application has also Merge cube support, but the implemented object gallery is limited. The Figure 6 shows a preview of some models from the application gallery. The pictures show models from CoSpaces.

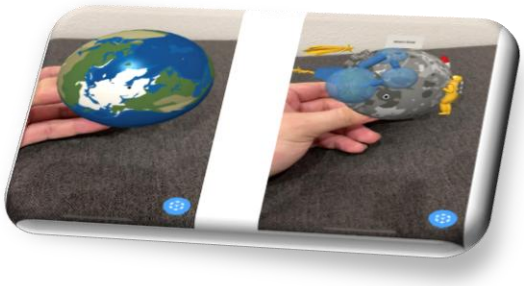


Figure - 6 Models from CoSpaces

Hold Anything with the Merge Cube! The Merge Cube lets you hold digital 3D objects using augmented reality technology, enabling an engaging way to interact with the digital world. Students can explore a galaxy in the palm of their hand, hold fossils and ancient artifacts, explore a DNA molecule, investigate the Earth's core, dissect a virtual frog, and hold their own 3D creations in the palm of their hand.

The Library is all about sparking curiosity—and that makes them the perfect place for a Merge Cube. With Merge, students don't just look at science concepts—they hold them in their hands. From exploring the layers of the Earth to inspecting ancient fossils, the Merge Cube adds a hands-on AR experience that turns learning into discovery.

Applications of Merge EDU apps :

The applications of Merge EDU App are as below.

1. Hold the Solar System, Dissect a Frog, Explore DNA :

Merge EDU apps like Merge Explorer and Object Viewer bring science to life with more than 100 interactive simulations and over 1,000 digital teaching aids. Whether it's holding a great white shark or examining the structure of a plant cell, students experience science concepts in a way that's fun, intuitive, and unforgettable.

2. Perfect for Free Exploration or Structured Lessons :

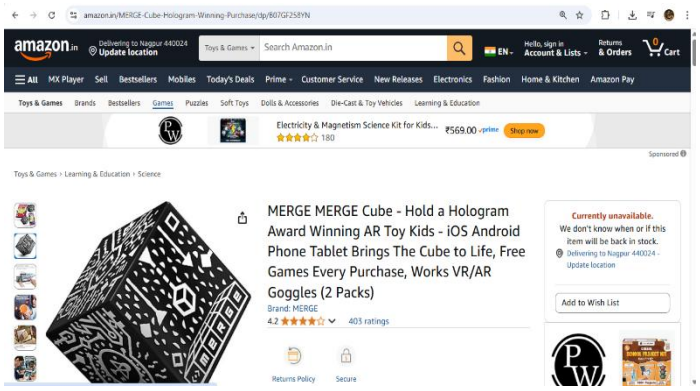
Merge fits seamlessly into any library setup. Add it to free exploration stations, use it for collaborative projects, or pair it with standards-aligned activity plans. Merge content is designed for K-12 and integrates easily with NGSS and state science standards. Plus, with multisensory learning—visual, tactile, auditory, and kinesthetic—every student gets a chance to engage.

Instruction to use the Merge Cube:

- Download and run a "free" app (such as Scanner, Merge Explorer, Object Viewer, or Merge Hologlobe).
- **Select the mode :** Choose phone mode (VR mode is for headsets) when you launch an app. Some programs include 3D, Cube, World, and Headset Mode options.
- Turn on your cube. Make a free trial educator access account or Individual Merge Edu account. If necessary, verify your account using the activation code that was sent with your merging cube.
- **PLAY** : Give your camera access. With the merge cube on the table, hold your phone in one hand (or get a buddy to hold it for you!) OR hold one in each hand to rotate the merge cube.
- Try using Tinkercad to create your own 3D designs. 7.5. Try creating your own 3D designs with Tinkercad & view in Object Viewer or try Scanner to find objects in your environment.

Merge Cube available on :

This merge AR Cube available on Amazon. Any library, school, college and any individuals can purchase it .



Here are some examples of libraries using the Merge Cube:

a. **Broward County Library :** MERGE Headsets and MERGE Cubes bring MERGE's 3D content to life. Users can access over 300 kid-safe VR and 360 video experiences

from sources such as NASA, National Geographic, Disney, Google and even your Android or iOS smartphones. Recommended for age 10 and up. The Merge Cube also available in different branches of Broward Country library. (https://www.broward.org/Library/Services/Pages/GearToGo.aspx)

2. **Nanyang Technological University** - NTU Singapore's NIE Library: Uses Merge EDU Apps and the Merge Cube for AR experiences. (https://libguides.nie.edu.sg/c.php?g=961797&p=6985091)
3. **University of Wisconsin-Whitewater's Andersen Library**: Includes Merge Cubes in its teaching tools collection for patrons to borrow and use. (https://libguides.uww.edu/c.php?g=548702&p=6277148)
4. **Central Northern Regional Library**: Offers the Augmented Reality Merge Cube as part of its STEM kits. (https://cnl.nsw.gov.au/cgi-bin/spydus.exe/MSGTRNGEN/WPAC/STEMCUBE)
5. **The University of Adelaide**: The CSER National Lending Library provides Merge Cubes to bring augmented reality to classrooms and libraries(https://csermoocs.adelaide.edu.au/news/term/merge-cube)

Conclusion :

While libraries across the globe—especially in developed nations—are increasingly embracing immersive technologies, the concept remains relatively novel in the context of Indian libraries. However, with the rise of tools like Virtual Reality (VR), Augmented Reality (AR), and Mixed Reality (MR), there is enormous potential for transforming the Indian library landscape into a more interactive and engaging learning environment.

A significant milestone in the development of AR-based educational tools was the introduction of the Merge Cube in 2017. This foam cube, embedded with unique patterns on its sides, enables users to experience 3D holograms when viewed through a compatible device and app. Essentially, it allows users to hold digital objects in their hands, offering a tactile and visual learning experience unlike any traditional educational tool.

The Merge Cube can serve as a powerful educational aid in libraries. It supports a wide range of 3D augmented, audio-visual content, such as models of the human body, planets, ancient artifacts, and more. This makes complex topics more understandable and engaging, especially for younger users and visual learners.

If Indian libraries begin to procure and implement devices like the Merge Cube, they can:

- Enhance user engagement with interactive content.
- Attract more footfall, especially from students and young learners.
- Bridge the digital divide by offering exposure to cutting-edge educational technology.
- Support experiential learning, a crucial element in NEP 2020 (National Education Policy).

The investigator (or researcher) has explored the applications and functionality of the

Merge Cube and associated apps, establishing its viability as a cost-effective and impactful tool in educational settings.

Incorporating such immersive tools into Indian libraries would not only modernize their services but also redefine the role of libraries from passive knowledge repositories to active learning hubs.

References :

- Voštinár, P., & Ferianc, P. (2023). Merge cube as a new teaching tool for augmented reality. *IEEE Access*, *11*, 81092-81100.
- Cowin, J. B. (2020). Digital Worlds and Transformative Learning: Google Expeditions, Google Arts and Culture, and the Merge Cube. *International Research and Review*, *10*(1), 42-53.
- SOLANO, G. L. Merging AR into the Reality of Education: Perspectives and Strategies for Integrating Merge EDU in the K-12 Classrooms. *Bridging the XR Technology-to-Practice Gap: Methods and Strategies for Blending Extended Realities into Classroom Instruction Volume II*, 211.
- Probst, C., Fetzer, D., Lukas, S., & Huwer, J. (2022). Effects of using augmented reality (AR) in visualizing a dynamic particle model. *Chemkon*, *29*(4), 164-170.
- Adams, J. L., South, L., Çöltekin, A., Goodman, A., & Borkin, M. (2023). Augmented Reality for Scholarly Publication of 3D Visualizations in Astronomy: An Empirical Evaluation.
- DuBose, J. (2023). 2022 Association of Creative Technologies in Academic Libraries (ACTAL) Conference Report: Reporter: Joy DuBose, Mississippi State University. *Journal of Electronic Resources Librarianship*, *35*(1), 60-66.