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Innovation meets Healthcare: MedVision

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Abstract
This study describes MedVision, a pioneering healthcare and innovation platform to improve medical education. MedVision uses advanced technologies such as 3D modeling, augmented reality (AR) and smart tests to overcome the limitations of traditional medical education methods. In addition, a 3-D model is available to understand the subjects taught in class, while augmented reality views and a fairly advanced evaluation module are available for interactive teaching. For example, visitors can easily navigate the site with an easy-to-use chat that also helps them get to the information they need. Again, MedVision has a resource download module that aims to promote collaboration between doctors in sharing information. MedVision plans to revolutionize medical education by leveraging its innovative features that will ensure an era of engaging and effective medical training.

Keywords: Healthcare, Innovation, 3D Modeling, Augmented Reality (AR), Smart Tests, Immersive Learning

1. Introduction

Healthcare and innovation have been important in recent times. The convergence of these is a must to meet the ever-changing health care needs and intricacies. The technology advances have increased the need for new ways of enhancing patient care, quickening procedures and improving health results. Moreover, augmented reality (AR) technology enables 3D models to be more useful in healthcare education and practice by overlaying virtual content on real world physical environment where learners can interact with it as if it were a physical object. When used in medical training programs, AR applications can project three-dimensional anatomical models onto tangible objects like mannequins or images of patients thus providing learners with an environment-based learning experience. This enhanced view allows one to see anatomical structures and how they are related in space, thereby deepening understanding among students. Furthermore, AR-powered simulations can imitate surgery operations, diagnostic tests as well as patient contacts thus refining skills and decision-making capacity of surgeons without incurring any risks.

There are many advantages of using 3D models and AR in medical education. First, they promote the personalization of learning by providing different modes that match individual learners' varieties of learning styles or preferences. In addition, interactive simulations and real-time feedback support active engagement while also enabling mastery learning for improved competence and confidence among health care providers. By permitting learners from diverse healthcare disciplines to visualize complex medical ideas from multiple perspectives, 3D models and AR facilitate interdisciplinary cooperation. Team work, communication and mutual understanding which improve patient care and safety emerge through this interdisciplinary approach. Overall, the integration of 3D models and AR into medical training holds immense promise for advancing healthcare education, improving clinical outcomes, and ultimately, enhancing the quality of patient care.

2. Literature Review

The use of technology in medical education (ME) situations presents several difficulties for educators, from helping students apply their theoretical knowledge to increasing their performance through well-thought-out instructional strategies. Instructors and educators must find ICT-supported assignments that will better engage and motivate students to learn than traditional lectures to increase student motivation. Studies evaluating instructional videos in ME [1, 2] provide examples, showing that students appeared to do noticeably better than those who adhered to the traditional approaches. Additionally, Scott *et al.* [3] demonstrated how using mobile devices in clinical settings helped students learn new information. According to these researches, ICT technologies enable students to develop various practical and cognitive skills in secure, well-managed learning environments.

AR provides some unique benefits in the context of medical education, including the ability to be implemented in a professional work environment, the capacity to simulate pertinent elements of real-world tasks, the skill to provide instantaneous learner feedback, and the ability to eliminate the need for an expert or instructor to watch trainee performance [4].

Several AR systems have already been developed specifically for anatomy education [4-5]. Blum *et al.* [5] describe the magic mirror ('Miracle') as an AR system that can be used for undergraduate anatomy education. Part of an anonymous CT dataset is augmented to the user's body and shown on the TV screen. This creates the illusion that the trainee can look inside his body. A gesture-based user interface allows real-time manipulation and visualization of CT data. Using different hand gestures, the trainee can scroll through the dataset in sagittal, transverse, and coronal slice modes. Several recent augmented reality applications in medical applications are presented in [6-8].

3. Methodology

The main goal of this paper is to make a significant improvement in the learning process of medical students through three major modules. The first module will focus on 3D models for presentation of six organs: Heart, brain, spinal cord, kidney, lungs and intestine. These models provide an all-round visual aid for better understanding and study of anatomical structures. The second module incorporates a mobile-friendly feature that allows users to experience the 3D models in AR. This integration with AR technology not only increases availability but also promotes more interaction between students making learning more immersive and interactive. The last module concentrates on assessment by incorporating multiple-choice questions tailored for each organ model out of the six. These questions are carefully standardized and organized to assess whether students have understood or remembered what they were taught. The paper envisages a situation where these modules would be integrated into medical education so as to revolutionize conventional teaching techniques resulting in improved comprehension and proficiency among students ultimately.

This innovative approach holds promise in advancing the quality and effectiveness of medical training programs, preparing future healthcare professionals more adeptly for clinical practice.

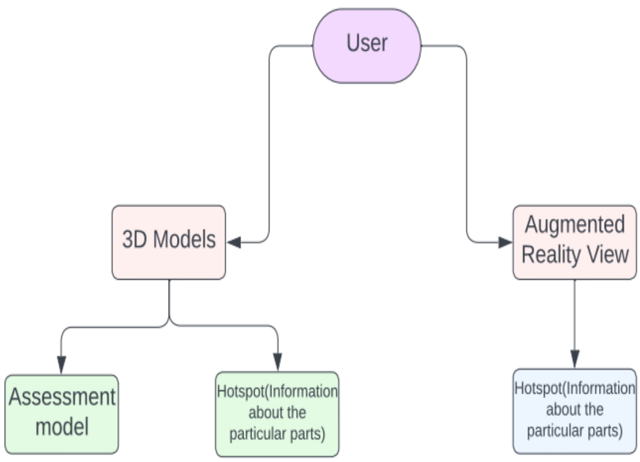
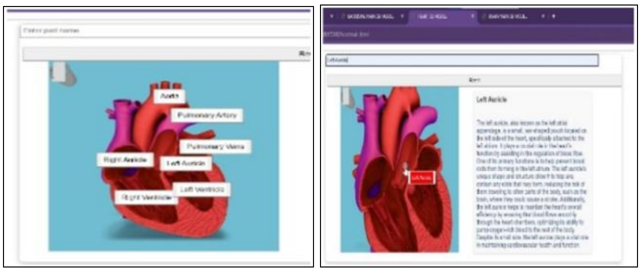


Fig 1: Data Flow Diagram

4. Experiments and Reality

In the 3D model interface, users have the capability to search for specific cases, prompting the model to zoom in on the requested area.

Once examined, users can reset the model to return to its original view. The platform features six organs: Heart, brain, kidney, spinal cord, intestine, and lungs. Each organ model has specific hotspots that can be clicked to zoom the user's attention to selected parts of interest. Besides, relevant data related to the place selected by a hotspot would appear on the screen. This interactive functionality makes it possible for medical students to investigate body elements in detail, resulting in comprehensive learning opportunities.

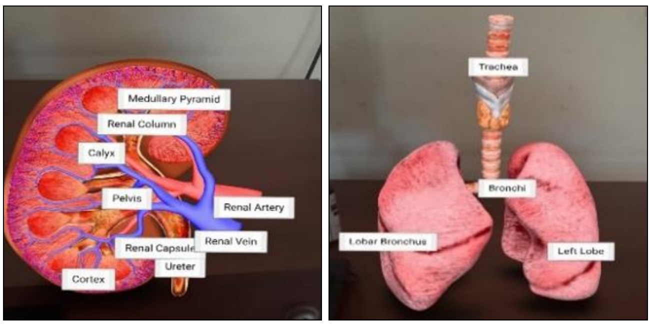


(a) Normal 3D view (a) Zoomed in view

Fig 2: Normal and Zoomed View

In addition, users have an option of seeing 3D anatomical models through Augmented Reality (AR). Enabled on mobile phones this feature provides real-time visual representation of models making learning more interesting. Incorporating augmented reality technology adds another level to the education process thus allowing students to engage with physical structures.This is not only about strengthening perception but also ensuring connectedness and retention. By utilizing potentialities of mobile devices, accessibility is maximized and human anatomy becomes available always and everywhere.

Besides boosting adaptability and efficacy of study tools provided, this creative attribute considerably makes medical student's journey towards knowledge enrichment richer than ever before.



(a) AR view of Lungs (a) AR view of Kidney

Fig 3: AR Views of different organs

All six 3D models are represented in the assessment interface through multiple-choice questions based on their content. These questions assess how well the students understand and remember anatomical knowledge that is covered by all organs such as intestines, kidney, lungs, brain, heart and spinal cord. The aim of each question is to test whether users appreciate the functions and structures in illustrations of the models. Besides acting as a useful instrument for reinforcing learning objectives, its role is also to identify weak points that need more attention. The platform takes a holistic view of human anatomy knowledge among students by using assessments linked directly to 3D models. As such, the learning process in medical schools becomes better off.

5. Conclusion

To conclude, the utilization of advanced technologies such as Augmented Reality and 3D modeling in medical education can change the learning processes of students. They create virtual models of body parts that enable learners to explore different structures interactively and hence significantly improve their understanding and recall of complicated areas in medicine. Additionally, this study is carried out on mobile devices meaning education can be done at anytime from anywhere, making it easier and more comfortable for learners. These are the kinds of changes we should embrace in order to make medical education fun, exciting and efficient in preparing future healthcare experts to cope with the fast-changing nature of the field.

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