

Development and Application of Intuitive 3D Digital Global Health Information Teaching System in Nursing Education

Pao-Ju Chen^{1*} and Wei-Kai Liou²

¹Department of Nursing, College of Healthcare and Management, Asia Eastern University of Science and Technology, Taiwan

²Empower Vocational Education Research Center, National Taiwan University of Science and Technology, Taiwan

*Corresponding Author

Pao-Ju Chen, Department of Nursing, College of Healthcare and Management, Asia Eastern University of Science and Technology, Taiwan.

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Abstract

Nowadays, global health information is emphasized in the courses of the front line of nursing education. Therefore, the demand for global health information aids and teaching materials for various topics is extremely urgent in nursing. Virtual Reality (VR) or Augmented Reality (AR) is currently the effective method for solution to the above problems. However, these auxiliary devices are not only expensive and inconvenient to wear but also are mostly only suitable for personalized learning and cannot teach the entire class at the same time. With the current technology and price, AR&VR cannot truly become digital teaching methods in the front line of nursing education. Creating an intuitive global health information teaching system will change the current teaching lacking creativity and innovation and form a new teaching aid tool with its powerful digital and interactive functions. The purpose of this project is to develop a highly interactive digital teaching system suitable for the front line of nursing education and try to effectively solve the current problem of lack of digitization and interactivity in teaching based on using the superior features of this system. To effectively and gradually improve the practicality and usability of the system by conducting systematic empirical research on the system, which can completely change the current dilemma of insufficient digitization of the present teaching situation of this global health information topic.

Keywords: Global Health Information, Virtual Reality (VR) or Augmented Reality (AR), Interactive Digital Teaching System, Intuitive Global Health Information Teaching System

1. Introduction

Currently, global and international health information teaching is often included in the courses in nursing education. Therefore, there is an extreme demand for teaching aids and materials on global health information topics. For example, large-scale teaching wall charts on global health information are frequently needed teaching aids in the classroom. And teaching materials. However, there are many problems in these teaching aids and teaching materials that need to be solved urgently. First, it is challenging to draw large-scale wall charts (often, a wall chart has been used for more than ten years) [1-6]. Not only does the relevant global health information fail to keep pace with the times, but the production cost is high, and it cannot meet the ever-changing teaching needs of various global health information. In addition, there are no digital and interactive functions. VR virtual reality (Virtual Reality) or AR augmented reality (Augmented Reality) are currently effective methods to solve the above-mentioned on-site teaching problems. Digital 3D modeling and interactive design, various teaching methods can be implemented in a 3D interactive way [7-9]. Presented in front of students, it effectively improves the efficiency of teaching and the effect of learning. However, currently, whether it is VR or AR technology, teaching must be assisted by wearable devices.

These auxiliary devices are not only expensive and inconvenient to wear, but most of them are only suitable for personalized learning, the entire class cannot be taught at the same time. In terms of current technology and price, it cannot truly become a digital teaching assistance system at the teaching site [10,11]. The above reasons make digital teaching, such as AR or VR, out of reach for the public. The teaching models of VR and AR can often only be practiced on paper. Although related research papers have sprung up, which have also verified its feasibility and effectiveness in teaching, due to the above-mentioned core issues, VR or AR for many years, digital teaching has only been a teaching system demonstrated by a few research centers, and rarely can it be widely implemented in teaching sites. Therefore, if we can develop a digital teaching system that can replace the current large-scale teaching wall charts on global health information with various software that can be produced by ourselves, and with the existing classroom teaching equipment (such as projectors), there will be no need to add additional equipment and With limited funds, the creation of an intuitive 3D digital global Health Information Teaching System will change the current nursing global health information teaching scene that lacks creativity and innovation, and form a new teaching aid through its

powerful digital and interactive functions. The purpose of this research is not only to develop a highly interactive digital teaching system that is suitable for use in the teaching field to effectively solve the current problems of insufficient digitization and interactivity in the teaching field but also to enable the teaching field to use the advantages of this system indeed. Characteristics to carry out teaching and conduct systematic empirical research on the approach to effectively and gradually improve the practicality and usability of the system, in the hope that the system will have the opportunity to meet the needs and expectations of the teaching site progressively in the future and thus be able to completely change the current teaching the dilemma of insufficient digitalization in the current situation.

2. Methods

2.1 System Development

This study will develop an innovative, intuitive 3D digital global Health Information Teaching System that utilizes existing classroom equipment to improve learning outcomes in nursing courses. In addition, this system allows teachers to interact with the intuitive 3D digital global Health Information Teaching System through mobile devices. The low-cost 3D digital global information teaching system developed in this research can be used in schools, hospitals, health education fields, and other places to replace various global health information systems often used in teaching. With various teaching software, it will be transformed into a low-cost, highly interactive, intuitive 3D digital global Health Information Teaching System.

Most of the current 3D displays or projection equipment use active or passive 3D wearable stereoscopic imaging technology to achieve 3D stereoscopic imaging and cannot present global health information in a 3D stereoscopic manner using naked vision. Although it has been used, Screen angle polarization technology allows viewers to watch 3D stereoscopic images directly without wearing any equipment. However, the input format of the image must be processed, and the image is also limited by distance and angle. It may even make people feel dizzy and uncomfortable. The cost is The effect cannot meet the needs of ordinary consumers. This research aims to provide an intuitive 3D stereoscopic imaging technology. The naked-eye

3D imaging effect can be achieved by applying current image formats without conversion. There will be problems with viewing angle restrictions and dizziness and discomfort. Therefore, how to develop a low-cost, highly interactive, intuitive 3D digital global Health Information Teaching System is the primary purpose of the research.

The intuitive 3D digital global Health Information Teaching System in this study includes a hemispherical body with a projection material surface, a wireless image transmission unit, an image projection unit, and a data processing unit. In practical applications, the data processing unit is a tablet computer (a device with data computing capabilities). The data processing unit stores multiple instructions (for example, instructions for rotating, playing, and pausing images) and multiple input rules, and each input rule corresponds to one teaching. The data processing unit can communicate with the image projection unit through the wireless image transmission unit. The screen image of the data processing unit projects the image of the projection unit onto the surface of the hemisphere through the wireless image transmission unit. The interactive simulated sphere display system of this project only needs to use half a sphere to project an image that makes the viewer feel that it is a global body, and there are no imaging dead spots (the global information of this system can be viewed through a 360-degree image of the system image) The rotation function allows the viewer to freely choose the viewing angle and picture angle, so the system picture can rotate the sphere through the software so that the viewer will not have any image dead spots). The wireless image transmission unit can communicate with the data processing unit to faithfully transmit the image to the image projection unit and then project the image to the surface of the hemisphere, as shown in Figure 1. The low-cost, highly interactive, intuitive 3D digital global Health Information Teaching System developed in this research, combined with professional teachers of nursing courses, can gradually build a complete teaching software and teaching material platform to share various fields through the Internet platform. The intuitive 3D digital global Health Information Teaching System software produced by professional teachers of the course allows teachers to download and use it to optimize digital transformation freely.

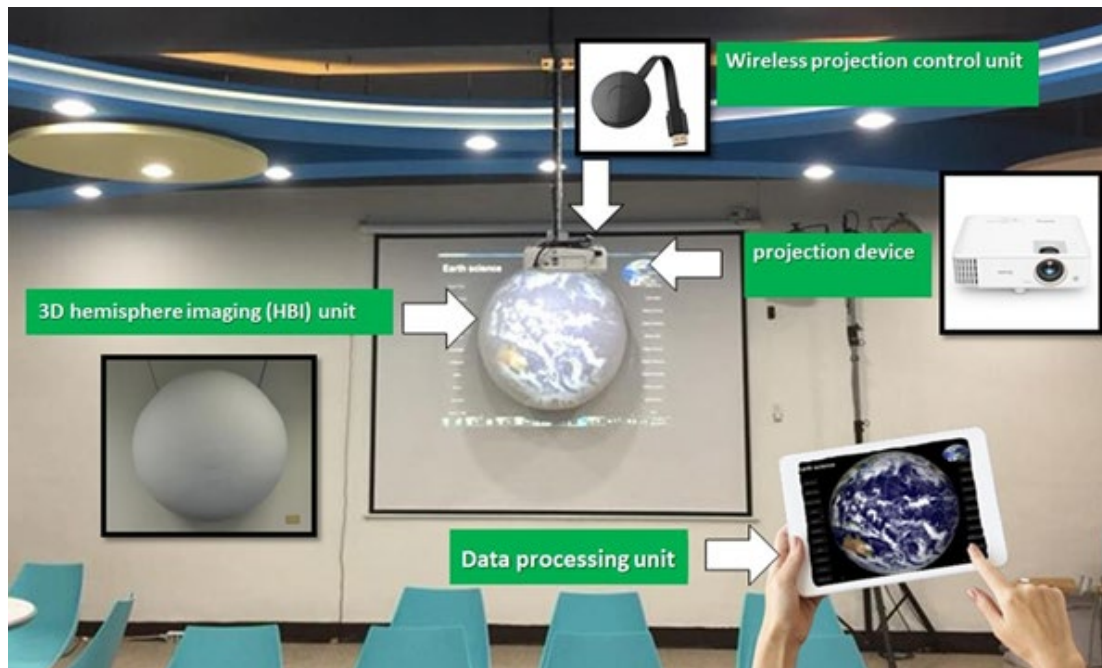


Figure 1: The 3D digital global health information teaching system and platform developed in this research includes a data processing unit, a wireless projection control unit, a projection device, and a 3D hemisphere imaging (HBI) unit

3. Hardware

The intuitive 3D digital global Health Information Teaching System developed by this study comprises a hand-held mobile device, a WIFI wireless projection device, a projector, and a 3D stereoscopic projection ball in the classroom to form an intuitive 3D digital Global Health Information Teaching System. The intuitive 3D digital global Health Information Teaching System includes a data processing unit, a wireless projection control unit, a projection device, and a 3D hemisphere imaging (HBI) unit, as shown in Figure 1. The 3D HBI (Hemispherical Body Imaging) screen is designed to display the output image of the data processing unit. The 3D hemispherical imaging body used in the product developed in this research is a lightweight, portable, inflatable soft PVC projection surface material hemisphere that can be inflated and erected at any time in any classroom. It is simple and convenient and will not increase the burden and difficulty of the school's erection. The wireless projection control unit is used to wirelessly project images on the projection device, acting as an interface that bridges the screen between the tablet and the projector.

4. Software

The product software system developed by this patented technology uses the Unity development engine to produce an output interactive program APP (Figure 2). Unity is a powerful software development engine. For independent developers, the software breaks time, platform, and cost barriers (<https://unity3d.com/>). We chose this cross-platform development software because it supports many teaching and design resources.

5. System Operation Instructions

Use a hand-held mobile device (tablet computer) to open the intuitive 3D digital global Health Information Teaching System APP developed in this research. The image of the hand-held device is transmitted to the classroom projector through the WIFI wireless projection device, and the idea is projected. The specially developed inflatable 3D hemispheric projection surface of the technology allows the picture to display a three-dimensional 3D global information image instantly. Through the operation of the teacher's hand-held tablet, digital interactions such as global rotation and screen object clicking, drawing, writing, and annotation can be performed. Functions and allows teachers to interact with students at a variety of distances. Through the robust processes of mobile vehicles, coupled with the support of professional teaching software platforms, it can become a global health system that meets the needs of modern teaching. The method developed in this research visualizes 3D global health information system dynamic images without any wearable device. It is a unique and innovative teaching system. This system can be used in schools, hospitals, health education fields, etc., in the future. Place, replacing the various flipcharts that are often used in teaching global health information. Combined with multiple Global Health Information APP teaching software developed in this research, it will be transformed into a low-cost, highly interactive, and visual 3D digital global health information teaching system with mobile teaching functions. It must only be matched with the current classroom teaching equipment (such as projectors and tablet computers) without adding additional equipment. Its powerful interaction and professional teaching design functions will form a new teaching aid tool. (As shown in Figure 3)



Figure 2: 3D digital global health information teaching system developed in this work



Figure 3: Schematic diagram of the overall architecture of the 3D digital global health information teaching system developed in this work.

6. Results and Discussion

This system is developed using UNITY cross-platform development SDK to create an intuitive 3D digital global Health Information Teaching System based on the learning objectives and content of the course. Through development tools, the application of various digital teaching materials and teaching aids can be quickly developed. In addition, the content of the intuitive 3D digital global Health Information Teaching System is generated through students' thematic inquiry learning teaching method. It has gradually developed into a complete set of intuitive 3D digital global Health Information Teaching System teaching models and digital teaching materials [12,13]. Under the teaching method of theme-based inquiry learning, students

only need to learn to conduct inquiry-based learning and teaching materials for the selected teaching topics and collect and produce teaching materials. This can be quickly done through the information integration platform built before class. The various global health information-themed teaching information and teaching materials completed by students' self-exploration learning are quickly integrated into an intuitive 3D digital global Health Information Teaching System exclusive to students' thematic inquiry learning. This teaching method makes thematic inquiry learning an intuitive 3D. The digital global Health Information Teaching System has become a new teaching model to help students learn independent investigations. The digital teaching materials completed in the course can also be used as

teaching materials and lesson plans for students' global health information-themed courses. This two-way process with mutual feedback teaching procedures and models will become a new and highly efficient way to develop digital teaching materials, lesson plans, and teaching models. The global health information topic-based inquiry learning method trains students' independent thinking ability. Through establishing a professional digital interactive teaching system, students are effectively trained on how to use interactive design in nursing education sites [14,15]. Through students' thematic inquiry learning, an intuitive 3D digital global Health Information Teaching System conducts teaching demonstrations to train students to integrate global health information teaching design and digital technology. This study uses thematic inquiry learning to enhance learning effects and deepen learning impressions [16-20]. It cooperates with the development and integrated teaching methods of a complete digital teaching system to provide a practical, interactive, and intuitive learning environment. Through self-exploration and practice, demonstration, and sharing, I completed the initially set course teaching goals and developed a complete thematically intuitive 3D digital global Health Information Teaching System, which can be transmitted and used by teachers around the world.

1) Low cost: This system only needs to be matched with the current classroom teaching equipment and does not need to add additional equipment. It will be able to form an innovative digital 3D mobile teaching auxiliary tool with powerful functions suitable for schools at all levels, especially for rural and regional schools where the budget leads to insufficient digitization.

2) High interaction: The system is operated by the teacher holding the tablet and can perform various digital interactive functions of the tablet. For example, functions such as global rotation and screen object selection, drawing, writing, and labeling.

3) Long-distance and multi-person use: This system uses the cloud as the connection method. With the powerful Internet function of the handheld tablet, it can provide multi-person connection and sharing functions, providing the system with a long-distance and multi-person operating environment.

4) Visual 3D stereoscopic display: The image screen of the handheld device is transmitted to the projector in the classroom through the WIFI wireless projection device, and the image is projected on the particular inflatable 3D hemispherical projection spherical surface of this project so that the image instantly presents a 3D Global Information Imaging is a low-cost, efficient, and intuitive 3D stereoscopic imaging technology.

5) Cloud-based sharing of digital teaching materials: This system uses a connection method that can directly download teaching software before class and can also be used now during the course to read images and audio-visual information provided by the cloud network in real-time through the web. The sharing of teaching information and teaching materials on the cloud will provide the driving force to accelerate the digital transformation of the education field.

6) Simple operation and installation: The 3D hemisphere imaging carrier used in this system is a lightweight, portable, inflatable

soft PVC projection surface material hemisphere, which can be easily inflated and erected at any time in any classroom. It is simple and convenient.

7) With the current classroom projectors and tablet computers, the operation and installation will not increase the additional burden on teachers.

8) Assisting the rural areas and the disadvantaged: This system has the characteristics of low cost, high interaction, and teaching specialization, which can effectively improve the current situation of insufficient digital teaching resources in Taiwan's teaching sites and help to narrow the gap between urban and rural digital education.

7. Conclusion

The purpose of this project is to develop a highly interactive digital teaching system suitable for the front line of nursing education and try to effectively solve the current problem of lack of digitization and interactivity in teaching based on using the superior features of this system. To effectively and gradually improve the practicality and usability of the system by conducting systematic empirical research on the system, which can completely change the current dilemma of insufficient digitization of the present teaching situation of this global health information topic.

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