ARYAVART SHODH VIKAS PATRIKA
RNI TITLED NO. UPBIL04292RNI
REG. NO. UPBIL/2014/66218 **PP. No.- 195-197**

I S S N NO. - 2347 – 2944 (Print)
e-I S S N NO.- 2582 – 2454 (Online)
Vol.-18, No.-IV, Issues-34, YEAR-Oct-Dec. 2024

Leveraging Medical Imaging and Visual Representations for Improved Medical Fragment

1. DR. Vijay Laxmi Choudhary
2. Ms. Akankasha Kathuria

1. Assistant Professor 2. Research Scholar, Nirwan University, Jaipur (Rajsthan) India

Received-15.12.2024, Revised-22.12.2024, Accepted-29.12.2024 E-mail : aaryvart2013@gmail.com

Abstract: ***Animation providing a holistic approach has also covered Medical Science to means of visual representation of complex concepts & processes. In today's era animation is playing a boom role in almost each and every sector. After the various challenges & exists, visuals stepped successfully in the field of medical. One of the growing impact of graphics & visuals can be seen in Medical Science. Graphics and animations have experienced sweeping advancement in the various sectors over the years. The continuous evolution of the technology promises to bring further innovations & up gradation in the graphics & animations. There are several ways in which visuals have proved their vital role. This paper deals with the multifaceted ways in which visuals played an important role in the medical sector with the positive outcome and will focus on animations impact in this sector, like making the patients understand about the diseases & solutions in more easy way, educating the medical students about the complex procedures in simple way, spreading the health awareness and much more in the related context.***

Key words : Medical Science, Animations, Graphics, Communication, Education, Medical Practices

Introduction-: In today's scenario animations can be used as vital tool in the domain of medical science. With the help of visual representation complicated medical concepts and procedures can be understood very easily. It offers several benefits & methods that enhances the communication, understanding & education to the medical students. Medical professionals may successfully communicate complex information by utilizing visuals, engaging and educational qualities, which can improve patient outcomes and healthcare delivery as a whole. Studying this background is necessary in order to comprehend the significance of interactive media and animations in the fragment of medical science. Student's education and several medical tests, such as CT scans and ultrasounds, have demonstrated that better and more relevant findings can be obtained when virtual reality (VR) or interactive media is used. It also aids in the researchers' quest for more accurate results & highlights the necessity and significance of visual aids in the sector. This study was carried out to find out what the public thought about physicians and medical students' use of graphics and images for learning, communication, and practice.

Visuals usage in Medical Fragment-Visuals are potentially a strong method to convey complex information or to explain tangled procedures to the patients or to the medical students. VR platforms are being offered by numerous tech businesses, which serves as an additional source of medical animations. VR platforms use a variety of cutting-edge robotics and equipment to create an exact copy of operating rooms. Surgeons and practitioners can roam around in this and use the sophisticated app to review cases and even learn new procedures. Additionally, it offered a virtual anatomy so that clinicians could easily comprehend the information. Essentially, our brains are visual processors. Before you know what's going on, it can automatically memorize visual encounters. For example, text is always a little trickier to memorize because it is abstract and much more sophisticated for our brains to store and recall. For example, to illustrate complex anatomical details, a camera can be moved along a predefined path.

Some of the ways are discussed below where can see that how visuals played an important role in medical sector-:

For medical students- Medical students can better understand complicated anatomical structures and physiological processes with the help of animations than they do with static images or text-based learning materials because animations promote a realistic learning environment. Rather than experimenting on the real organs, they can practice that with the help of visuals via different methods. Also, through animations, virtual simulations offer medical students a risk-free setting to perform different medical operations, enhancing their confidence and skill growth. Interactive medical animations encourage active participation from students and help them retain and comprehend complex medical ideas. It also helps them in demonstrating the medical devices about their working & usage.

Figure 1 : The above showcased visual is taken from the animated video which demonstrates about the endotracheal tube.

I S S N NO. - 2347 – 2944 (Print)
e-I S S N NO.- 2582 – 2454 (Online)
Vol.-18, No.-IV, Issues-34, YEAR-Oct-Dec. 2024

Source : Suctioning the endotracheal tube - medical animation, https://www.youtube.com/watch?v=pN6-EYoeh3g

With the help of these types of visuals, students can easily understand about the terms & process, with the help of this, their conceptual knowledge can get stronger.

For patient education- Animated videos are used to educate patients about surgical procedures, potential therapies, and medical conditions. With the help of this patients can know exactly what the thing is and what to expect, this can help them to take better healthcare decisions. Even with the help of this language barrier & gap between low & high literacy rate can also be overcome. Patients who never had medical training before and may find it difficult to trust a doctor can benefit from this type of education.

Figure 2: The above image is captured from an animated video, which was made to explain about the human body cell. Now this particular capture, explained about the DNA & Chromosomes, this can be the perfect example to showcase how patients can easily understand about the thing even without having medical knowledge.

Source: Overview of Cell Structure, https://www.youtube.com/watch?v=0xe1s65IH0w

For surgical training & communicating- Animation is used to teach surgical professionals and to explain the surgical procedure to patients. Surgeons can practice complex procedures in virtual environments using surgical simulators, honing their skills without putting real patients in jeopardy. Comparatively speaking, this may be less dangerous than testing on actual patients. Preoperative visualization, which combines virtual reality and 3D imaging, has increased surgical precision and decreased the risk of complications during challenging surgeries.

Figure 3: The above visual is depicting about the Craniectomy brain surgery, with the help of 3d animated video. sometimes with the text notes, exact procedure cannot be understood & it becomes difficult too but when it is explained with the help of 3D animation it is more realistic & can be explained properly.

Source: Craniectomy brain surgery - 3D animation, https://www.youtube.com/watch?v=1RkseDeYS9g

For safety & measures precautions & public awareness-Since one of the main obstacles to raising awareness can be a linguistic barrier. However, by using them, graphics and visuals can aid in getting past this barrier. In addition to being entertaining and educational, animated videos can help convey concepts and share ideas in a more visually appealing manner. By creating instructive and amusing cartoons, healthcare facilities may encourage healthy behaviours and disseminate vital health information to the general public.

Figure 4 (a): The above visual is explaining about the spreading of infection from one individual to another.

Figure 4 (b): With these visuals it can be easily understand that how awareness can be easily spread with the help of animations as language barriers problems also doesn't occur in between. Even less or no educated people can also get aware easily.

Source: Covid- 19, https://www.youtube.com/ watch?v= RSu1who-Bk8

I S S N NO. - 2347 – 2944 (Print)
e-I S S N NO.- 2582 – 2454 (Online)
Vol.-18, No.-IV, Issues-34, YEAR-Oct-Dec. 2024

For R&D (Research & Development)- Animations can aid researchers in understanding issues and producing better results and solutions in the field of medical research and development. It can be useful in several areas, including the course of disease, pharmacological mechanism, and tool and equipment operation. Since animations present novel ideas in a more enticing manner, they can also be utilized to introduce new medical advancements to stakeholders and potential investors.

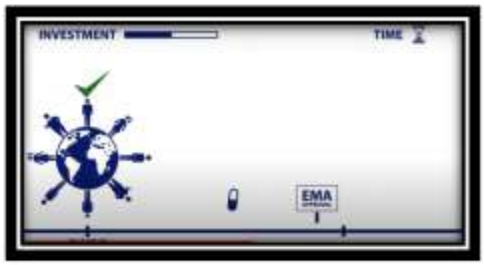

Figure 5: The above visual is elucidating about the new medicine research invention process. Even animations can help researcher a lot as they can showcase their research with the help of visuals rather then with the help of texts or oral presentations.

Source: R&D – The Journey of a New Medicine, https://www.youtube.com/watch?v=ZZnOfxeMdis

Conclusion- After the one-to-one interaction with medical students and doctors it can be concluded that interactive media significantly contributes to the advancement of medical science by enhancing patient outcomes, teaching, visualization, and communication. It advances medical research and practices by making complicated information visually appealing and contributing to a deeper knowledge of medical concepts. The use of visuals in medical science has profoundly a positive impact providing healthcare workers with cutting-edge tools to accurately diagnose, treat, and educate patients. Visuals have completely changed the medical industry, from conventional medical imaging procedures to cutting-edge 3D visualization and virtual reality. Visuals are anticipated to play an even more significant role as technology develops in the future of medical science, ultimately benefiting patients all around the world. The visualization of molecular interactions, pharmacological mechanisms, and disease processes can be aided by animations, which can help researchers comprehend and explain their findings more effectively. Animations can also be used to introduce new medical innovations to stakeholders and possible investors.

REFERENCES

1. Peckham, D., Vernon, T., (2002), 'The benefits of 3D modelling and animation in medical teaching', Journal of Audiovisual Media in Medicine, ISSN: 0140-511X (Print).
2. Mastrangelo, J. M., , Adrales , G., McKinlay, R., George, I., (2003), 'Inclusion of 3-D computed tomography rendering and immersive VR in a third-year medical student surgery curriculum', Studies in health technology and informatics. 94. 199-203, 10.3233/978-1-60750-938-7-199.
3. Jean, M. L., Gwenael G., (2005), 'Skin lesions segmentation and quantification from 3D body's models', Skin Research and Technology, 11(2):123-31, DOI:10.1111/j.1600-0846.2005.00095.x.
4. See, . L-C., Chang, Y-H., Chuang, K-L., Lai, H-R., Peng, P-I., Jean, W-C., Wang, C-H., (2011), 'Animation program used to encourage patients or family members to take an active role for eliminating wrong-site, wrong-person, wrong-procedure surgeries: Preliminary evaluation', International Journal of Surgery, doi.org/10.1016/j.ijsu.2010.11.018, Volume 9, Issue 3, 2011, Pages 241-247.
5. Cingi, C. C., (2013), 'Computer Animation in Teaching Surgical Procedures', Procedia - Social and Behavioral Sciences 103, DOI:10.1016/j.sbspro.2013.10.330, License- CC BY-NC-ND 3.0.
6. Preim, B., Meuschke, M., (2020), "A Survey of medical Animations", Computers and Graphics, ISSN: 0097-8493, Volume 90, Issue C, pp 145–168.
7. Tou , S., Tou, W., Mah, D., Karatassas, A., Hewett, P., (2013), 'Effect of preoperative two-dimensional animation information on perioperative anxiety and knowledge retention in patients undergoing bowel surgery: a randomized pilot study', Colorectal Dis, 15(5):e256-65, doi: 10.1111/codi.12152, PMID: 23350660.
8. Hadi, W., Yuksafa, R., Yarmi, G., & Safitri, D., Lestari, I., Suntari, Y., Umasih., Marini, A., Sudrajat, A., Iskandar, Rossi. (2022), "Enhancement of Students' Learning Outcomes through Interactive Multimedia", *International Journal of Interactive Mobile Technologies,* (iJIM). 16. 82-98. 10.3991/ijim.v16i07.25825.
9. Knapp, P., Benhebil, N., Evans, E. *et al.* (2022), "The effectiveness of video animations in the education of healthcare practitioners and student practitioners: a systematic review of trials", *Perspect Med Educ* **11**, 309–315, DOI: https://doi.org/10.1007/s40037-022-00736-6.
10. Moe Byrne, T., Evans, E., Benhebil, N., Knapp, P., (2022), "The Effectiveness of Video Animations as Information Tools for Patients and the General Public: A systematic Review", *Frontiers in Digital Health, Front Digit Health,* 2022; 4: 1010779, doi: 10.3389/fdgth.2022.1010779, PMCID: PMC9910310.
11. Pamela, K., Rosemary, J. Redfied., (2022), "Using Animations to Teach Biology Processes & Principles", *PLOS Biology*, Vol. 20, Issue: 11, pp e3001875-e3001875, ISSN- 1544-9173, doi: 10.1371/journal.pbio.3001875.
12. Syed Abdul S., Upadhyay U., Salcedo D., Lin CW., (2022), "Virtual reality enhancing medical education and practice: Brief communication", *Digit Health*, Dec; 18;8:20552076221143948. doi: 10.1177/20552076221143948. PMID: 36569822; PMCID: PMC9772931.

*****