



ClinicalModelling

D2.2

Manual on using smart glasses in clinical practice

An approach on using smart glasses in clinical practice for educational purposes



www.clinical-modelling.eu



[in/clinical-modelling.eu](https://in.clinical-modelling.eu)

Please cite this publication as:

ClinicalModelling consortium. (2024). Manual on using smart glasses in clinical practice - An approach on using smart glasses in clinical practice for educational purposes (1st version). ClinicalModelling Project Consortium - Video-modelling Approach Applied to the Initial and Continuous Professional Development of Surgery Teams (Project 101111665). Co-Funded by the European Union through the Erasmus+ Program. Retrieved from <https://clinical-modelling.eu/products/>

Partnership



Escola Superior
Saúde Santa Maria

Escola Superior Santa Maria

<https://www.santamariasaude.pt/>



SurgeonMate™

SurgeonMate

<https://www.surgeonmate.com/>

INOVA+

INOVA+ - Innovation Services, SA

<https://inova.business/>



Splošna bolnišnica
Novo mesto

Splosna Bolnisnica Novo Mesto

<https://www.sb-nm.si/>



ZF

UNIVERSITY
OF LJUBLJANA | Faculty of
Health Sciences

Univerza V Ljubljani

https://www.uni-lj.si/academies_and_faculties/faculties/2013071111552214/



UNIWERSYTET JAGIELLOŃSKI
COLLEGIUM MEDICUM
W KRAKOWIE
Wydział Nauk o Zdrowiu

Uniwersytet Jagielloński

<https://wnz.cm.uj.edu.pl/>



Universidad De Santiago De Compostela

<https://www.usc.es/>



HOSPITAL
DE SANTA MARIA
PORTO

Hospital de Santa Maria - Porto

<https://hsmporto.pt/>



SERVIZO
GALEGO
de SAÚDE

Servizo Galego De Saude

<https://xxisantiago.sergas.gal/Paxinas/web.aspx>



INSTITUTO DE INVESTIGACION SANITARIA
SANTIAGO DE COMPOSTELA

Fundacion Instituto de Investigacion Sanitaria de Santiago de Compostela

<https://www.idisantiago.es/>



The work is licensed under the Creative Commons Attribution NonCommercial 4.0 International License.

Content

Partnership.....	2
Content.....	3
1. Introduction.....	5
2. Project Overview.....	6
Section 1 - The potential of digital learning technologies for clinical practice	7
3. Digital Learning Technologies.....	8
3.1. Importance of digital learning in medical education and training	8
3.2. Overview of digital learning platforms and resources.....	9
3.3. Integration of smart glasses with digital learning technologies.....	11
Main Takeouts.....	13
4. Continuous Education, Technology and Performance Improvement.....	14
4.1. Importance of continuous education in medical practice.....	14
4.2. Using smart glasses technology in learning contexts.....	15
4.3. Feedback mechanisms and performance evaluation.....	17
Main Takeouts.....	19
5. Safety and Responsible Use	20
5.1. Guidelines for safe and responsible use of smart glasses.....	20
5.2. Potential risks and precautions.....	21
5.3. Compliance with privacy and data security regulations	23
Main Takeouts.....	25
6. New Roles and Collaboration.....	26
6.1. Evolving roles for healthcare professionals in smart glasses integration	26
6.2. Collaboration among interdisciplinary teams.....	27
6.3. Strategies for effective teamwork using smart glasses	28
Main Takeouts.....	31
Section 2 – A practical guide to the project's digital tools	32
7. Video Capture for Professional Purposes	33
7.1. Smart glasses Setup and Calibration	33
7.2. Recording Procedures in Clinical Settings	35
7.3. Alternative Recording Methods and Considerations.....	36
8. Video Editing for Professional Purposes.....	38

8.1.	Introduction to Video Editing software	38
8.2.	Anonymization Techniques and Best Practices	40
8.3.	Sound Editing and Enhancement	40
8.4.	Export Formats and File Management	41
9.	Uploading and Managing Video Assets	43
9.1.	Secure Access and Anonymity Protocols.....	43
9.2.	Uploading and Organizing Video Assets on Moodle	44
9.3.	Data Management and Privacy Considerations on the Platform	45
10.	Using video modelling and video self-modelling.....	47
10.1.	Introduction to Video Modeling and Video Self-Modeling.....	47
10.2.	How to Plan a Video Modeling and Video Self-Modeling Activity	49
	Conclusions	52
	References.....	56
	Appendix	61

1. Introduction

The ClinicalModelling project aims to design, test, and scale up a telementoring and video modelling approach aimed at enhancing the competencies of healthcare professionals and students in various technical procedures, particularly surgeries.

Among its main outcomes, the **Manual on Using Smart Glasses in Clinical Practice** stands as a cornerstone, serving as a reference point for the ongoing training of healthcare professionals and their team efficiency.

This manual is set to serve as a practical guide, addressing essential topics, from an exploration of the potential of digital learning technologies to safety protocols, risk management, and responsible conduct. **(Section 1)**

Central to its core is, however, an in-depth exploration of the features and utilization of the project's digital resources, with a particular focus on smart glasses and the accompanying platform. **(Section 2)**

The manual provides practical and succinct directives on leveraging smart glasses in real-world scenarios to capture and edit instructional videos. These resources facilitate educational activities and self-directed learning, empowering participants — surgeons and scrub nurses — to produce videos during critical moments of surgeries. These videos serve as digital assets for learning contexts, both in initial training and continuous professional development, fostering proficiency in instrument handling and surgical procedures.

Critical to the manual's objectives is the definition of essential guidelines for ensuring patient safety, privacy, and dignity during surgical recording sessions. Equally important is the assurance of staff members' compliance with medical ethics and professional standards while using smart glasses. The manual underscores the importance of recording videos that showcase not only exemplary practices but also errors or improper techniques with inherent learning potential.

Furthermore, practical instructions are provided for a proper video editing to accentuate educational content effectively. These edited videos are seamlessly transferred to the project's digital platform or library, facilitating knowledge sharing among healthcare professionals. By adhering to these guidelines, surgeons and scrub nurses can use the transformative potential of smart glasses in surgeries while upholding the highest standards of safety, professionalism, and ethical conduct.

In essence, the **Manual on Using Smart Glasses in Clinical Practice** represents an essential resource for healthcare professionals seeking to use technology for educational advancement and surgical excellence within a framework of ethical integrity and patient-centred care.

2. Project Overview

The ClinicalModelling project, funded under the ERASMUS-EDU-2022-PI-ALL-INNOV Programme, represents a collaborative effort among nine partner organizations from four European countries: Portugal, Slovenia, Poland, and Spain. This consortium comprises a diverse array of institutions, each bringing unique expertise and resources to the table. In detail, the project has as objectives:

- To endow surgeons and nurses with equipment, guidance and competences to successfully use smart glasses to capture, edit and analyze video images to support learning processes in the healthcare sector using video modelling and video self-modelling approaches.
- To capacitate teachers, trainers and tutors to use and support students in the use of smart glasses to capture, edit and analyze video images to support learning processes in the healthcare sector using video modelling and video self-modelling approaches during classes and simulation.
- To empower and strengthen students' social-emotional competences promoting their lifelong learning propensity.
- To design and test new lessons and case studies for nursing master's and nursing specialization courses.
- To launch the foundations to scaling up the innovative teaching approach to medical residences and nursing internships.

The project's outcomes will be delivered through various manuals, toolkits, and educational assets, including reference books, training toolkits, and catalogues of lessons. Activities include expert consultations, training courses, pilot tests, community meetings, and peer learning events.

Target groups include organizations, professionals, researchers, and policymakers in the healthcare, educational, and ICT sectors.

The direct target group is the “end-users”, those who will use the new methodologies and tools for initial and continuous training at higher education, VET and at the job-place. The end-users will be involved during the project implementation at different phases (e.g. Surgeons, Nurses, Teachers will receive training and will implement pilots; Students will implement the pilots).

The indirect target groups are stakeholders and multipliers that have the power of decision to influence the adoption of our methodology and tools. They have a limited direct participation at the project activities but will receive constant news and updates on the project development and learnings (e.g. Expert consultation moments, roundtables for discussion and exploitation of the project results).

Section 1 - The potential of digital learning technologies for clinical practice

3. Digital Learning Technologies

3.1. Importance of digital learning in medical education and training

In the evolving landscape of healthcare, where technology and medicine are advancing faster than ever, digital learning has become an essential asset for the continuous development of healthcare professionals. Digital learning moves beyond the traditional passive lectures and study materials, into more interactive engaging experiences that cater to the diverse learning styles and preferences of modern learners (Alenezi, 2023). This sub-section discusses the significance of digital learning in healthcare professionals education, as a quite useful methodology by opening the gates of opportunities that transform the ways of learning and teaching in the healthcare provider professional settings.

One of the main strengths of digital learning in healthcare education lies in the possibilities it offers to go beyond the physical, geographical and temporal limitations. Through online platforms, which are accessible through computers and mobile devices, medical students and healthcare professionals can develop a vast array of learning activities **anytime, anywhere**. This freedom allows the residents to combine their academic work with their patient-care duties, allowing them to constantly learn and gain competences in their field all throughout their careers.

Digital learning platforms allow students to be in touch with various multimedia formats, such as videos, animations, simulations, and quizzes, to provide content in a visually engaging and interactive fashion (Xu & Patnaik, 2023). These interactive elements not only engage learners but also reinforce the understanding and memorization of intricate medical topics. Different interactive simulations such as virtual learning environments can embed learners in a virtual clinical experience where they can practice decision-making and critical thinking without the associated risk. Meanwhile, practices such as video-modelling, enable learners and professionals to return to and **enhance their practice in a safe setting**.

These digital learning technologies can also enable learners to **co-create their own individualized learning experiences** and play a more active role in orchestrating their learning experiences as desired by their learning styles. Adaptive learning, similar to personalized learning, opens the possibility of a deeper dive into how learners are performing and provides a suggested learning path or additional resources for what to review next, based on their performance. Moreover, asynchronous learning modalities enable learners to move through course content at their own pace, making

it more flexible for different styles of learners and expertise levels among a greater cohort of learners.

For those currently working in medicine or training to practice medicine in the future, permanent access to information is critical, so they can **keep their clinical records and skills updated** and provide patients with the best care available. The use of digital learning platforms provides up-to-minute information related to the latest medical research, guidelines, and best practices to its learners (Moore et al. 2015). This access to the latest information improves the usefulness of medical education curricula and supports the ability of healthcare practitioners to keep up with the new developments in their specific area.

Moreover, digital learning encourages learners to **network and collaborate** with a diversity of tools, such as online forums, discussion boards or virtual study groups. These shared tools enable student-to-student interactions, by which they can explore cases together, debate the more difficult cases, and collaborate in research publications. In addition to this, tele-conferencing and video-conferencing technologies facilitate asynchronous communication, collaboration as well as telementoring among the learners and instructors at different locations in real-time, which is critical to build a sense of community and sharing in the virtual classroom.

Digital learning can also constitute a more **cost-effective and environmental friendly** alternative to traditional methods of medical education. Traditional methods often involve production, printing and distributing quite robust physical textbooks, as on the other hand, digital learning offers a more cost-effective and sustainable alternative. Furthermore, digital learning platforms enable institutions to reach a broader audience of learners without incurring additional costs associated with physical infrastructure and facilities.

3.2. Overview of digital learning platforms and resources

Digital learning streamlines for education and training, not only in the medical area, as well as many platforms and resources are arising to keep up with ever evolving needs of both learners and educators. In this sub-section, we present the digital learning platforms and resources, most commonly used in medical science, and education, and shed some light on their abilities, functionalities, and their role in providing improved learning opportunities.

These platforms usually designated by Learning Management Systems (LMS) which provide higher education institutions and other education and training organization, with opportunities of **delivering, managing and tracking educational content and activities** (Firat, 2023). LMS platforms, which include Moodle, Blackboard, and Canvas for example, combine a range of features that allows users to manage courses,

content, assignments, and assessments. It also allows educators to organize course materials, offer interactive learning tools, and track student progress through analytics and reporting features. LMS offers asynchronous learning, enabling learners to work with course materials on their schedules and engage in self-paced study.

In medical education and training the use, for example, of virtual patient simulators enables learners to take part in **immersive, interactive and realistically constructed clinical scenarios** that challenge decision-making and procedural skills (Kleinert et al. 2015). i-Human Patients, Touch Surgery, and CyberPatient are platforms that can expose learners to virtual patient encounters in which they can evaluate symptoms, perform diagnosis, and formulate a treatment plan in a simulated clinical environment. They simulate actual patient encounters and clinical cases, providing an opportunity to develop clinical skills, enhance procedural skills, and increase confidence in their clinical abilities through learning by doing. These simulators can provide feedback, and performance metrics to help the learners to improve and guide them along their path.

Interactive resources such as anatomy software, use multimedia elements and features, specifically mimicking the human anatomy and physiology. These tools offer 3D models, animations, multiple quizzes, etc., to help students dive into the complexity of the human body in a **controlled environment**. These resources allow learners to visualize anatomical structures, comprehend physiological processes, and relate anatomical concepts to clinical scenarios.

Online video lectures and webinars, allow a more generalist perspective by providing a convenient method of distributing educational content and to discuss topics in real-time with an instructor. It's well known that there are plenty of professional instructors or professors who teach many different generalist and medical topics from intro-level to specialized clinical subjects, ranging from basic sciences to high-stakes disciplines by recording videos or constructing tutorials and then **uploading them in huge peer-based educational platforms** like Udemy, Coursera, YouTube. These tools allow learners to access expert content via live lectures, demonstrations, and case presentations which can complement in-person classroom instruction. Interactive online video lectures and webinars enhance the active learning, engagement, and retention in medical students, residents, and practicing clinicians (Ismail et al., 2021).

In the context of medical education and practice, mobile applications allow the **portable and interactive capacity** of these devices to provide tools for learning and reference. Some medical apps, such as Epocrates and others offer access on tablets and smartphones to clinical guidelines, drug information, medical calculators and diagnostic support. Such applications allow healthcare providers to access relevant knowledge at the point of care, help to make better clinical decisions, and improve patient safety. Integrating active learning components with mobile apps including

quizzes, flash cards, case studies can encourage self-directed learning and skill development from anywhere.

On a wider scenario, digital learning platforms and resources are essential to the evolution of medical education and training. Educators have every advanced technology at their disposal, allowing them to create immersive, interactive and personalized learning environments that prepare learners for the complexity they will have to face when they enter the modern practice of healthcare. In a near future, healthcare digital training will require establishment of these platforms and resources to maintain the professional excellence of healthcare employees and patient dignity (Miguel-Alonso, Rodríguez-García, Checa, & Bustillo, 2033).

3.3. Integration of smart glasses with digital learning technologies

Different from traditional education, smart glasses have become an innovative approach to combine digital learning technologies with medical education and training in the era of technology-healthcare intersection. This sub-section reports on the integration of smart glasses with established digital learning tools and resources, and their ability to revolutionize learning, facilitate technical skills acquisition, and advance patient safety.

One of the benefits of smart glasses in medical education is their **hands-free** nature, which allow learners to receive information and carry out tasks simultaneously. Devices using augmented reality (AR) or mixed reality (MR) can provide an entirely seamless experience, augmenting the physical world with digital information and visualization, in order to create immersive and interactive learning contexts (Miguel-Alonso et al. 2023). This hands-free capability allows learners to interact with multimedia educational content while continuing to work on their primary task, whether that is interacting with anatomical structures, refining surgical skills or receiving immediate feedback during clinical simulations.

This type of devices provides users the access to instructional content, guidance, and feedback during clinical encounters or procedural tasks, in real-time. Smart glasses have built-in cameras and sensors which records live video-feed of whatever the users see from their point of view, to enabling instructors to view an activity live while simultaneously streaming live or conduct a **telementoring activity** at a later point in time. This capacity to watch these procedures live streamed also creates opportunities for virtual precepting where experienced clinicians can almost watch the learner "over their shoulder" and offer insights, tips, and best practices during the procedure itself (Barcala-Furelos et al., 2023). Smart glasses can also be used to present guides, step-by-step instructions, checklists, and annotations that will be displayed on the user's screen over eye level, which can assist training teams into more complex tasks and improve their procedural memory.

Smart glasses will also support **interactive case-based learning experiences**, allowing learners to walk through virtual clinical scenarios, make choices and receive immediate feedback in real time. AR/MR applications with smart glasses projects virtual patients into the user's environment permitting learners to interact with the virtual patients, conduct examinations, and make diagnosis and therapeutic options. Interactive simulations allow students to manage various patient scenarios in a risk-free environment, thereby ensuring students engage in critical thinking, clinical reasoning, and decision making. Additionally, by capturing performance data and user interactions, smart glasses allow instructors to evaluate competencies and deliver directed feedback to help learners improving.

Combined with other digital communication technologies, smart glasses can provide these benefits to help **facilitate remote collaboration** and team-based learning for learners and instructors based in different geographic locations. Synchronous communication and collaboration are also a possibility, thanks to the telepresence and video conferencing of smart glasses in virtual classrooms, simulation centers and operating rooms (Barcala-Furelos et al, 2023). Learners can engage in group activities such as case discussions, problem-solving exercises, and simulated surgeries with peers and instructors in diverse locations. This empowers the creation of a sense of community, fosters teamwork, and promotes common learning perspectives that are not bounded based on physical proximity enabling accessibility and inclusiveness that is unheard of in the history of medical education and training.

Smart glasses also offer deep insights into strengths, weaknesses and areas of improvement by **integrating with learning management systems (LMS)** and analytics platforms, allowing both teachers and learners to review performance analytics, track learning gaps and implement instructional interventions based on individual performance (Pino-James et al., 2019). Smart glasses aside, guided by video modelling and video self-modelling techniques, technology also assists in self-assessment and reflection, giving students the ability to strain and monitor their own progress and navigate their learning journey.

In summary, the combination of smart glasses and digital learning technologies in healthcare education and training not only allows a hands-free learning experience, but also fosters real-time guidance, direct case-based learning, remote collaboration, and the assessment of student performance. With the capabilities of smart glasses, educators have the possibility to build interactive, defying, and flexible learning contents ensuring learners are equipped to handle the vast array of challenges they will face in their healthcare practice careers. With advancements in smart glasses technology, its use in medical education and training is expected to increase, leading to radical improvements in the performance of healthcare professionals.

Main Takeouts

1. Importance of Digital Learning in Medical Education and Training:

- Digital learning is essential due to the rapid advancements in healthcare and technology.
- It offers interactive and engaging experiences tailored to modern learners.
- Transcends geographical barriers and time constraints, enabling flexible learning.
- Utilizes diverse multimedia elements to enhance comprehension and retention.
- Empowers learners to customize their educational experiences.

2. Benefits of Digital Learning Platforms

- Provides real-time access to up-to-date medical information and research.
- Promotes collaboration, networking, and knowledge exchange among learners.
- Offers a cost-effective and sustainable alternative to traditional methods.
- Supports personalized learning experiences through adaptive algorithms.
- Accommodates diverse learning styles and levels of expertise.

3. Overview of Digital Learning Platforms and Resources

- Learning Management Systems (LMS) centralize educational content and activities.
- Virtual patient simulators offer immersive clinical scenarios for skill development.
- Interactive anatomy resources facilitate the study of human anatomy and physiology.
- Online video lectures, webinars, and mobile applications provide convenient access to educational content and reference materials.

4. Integration of Smart Glasses with Digital Learning Technologies

- Smart glasses offer hands-free functionality and immersive learning experiences.
- Enable real-time access to instructional content and feedback during clinical tasks.
- Support interactive case-based learning experiences and remote collaboration.
- Facilitate the capture and analysis of user interactions and performance metrics.
- Empower learners to monitor their progress and take ownership of their learning journey.

Overall, digital learning technologies, including smart glasses, revolutionize medical education by offering personalized, interactive, and immersive learning experiences that prepare healthcare professionals for modern healthcare practice.

4. Continuous Education, Technology and Performance Improvement

4.1. Importance of continuous education in medical practice

Continuous education is one of the cornerstones of excellence in medical practice, allowing healthcare providers to stay current with the ever-evolving medical knowledge, technology, and best practices during their careers (Moskovtseva et al., 2022). In the present, with the development of healthcare landscape, consubstantiated in the advent of new treatments, techniques, and technologies, ongoing learning appears as important as ever. This sub-section reviews the need for lifelong learning in the practice of healthcare and demonstrates how it ensures competence, improves patient outcomes, and contributes to professional development and personal well-being.

Like in many other professions, continuous training helps **healthcare professionals to keep up to date with medical research and clinical guidelines**, as well as with the new technologies. Healthcare professionals can access new information and remain up to date by participating in activities such as conferences, workshops, and webinars which enable them to attain the necessary knowledge-based skills that are important for providing evidence-based care throughout their careers. Being current about these developments will help to ensure healthcare professionals are applying the most current and effective diagnostic and therapeutic strategies during patient care, with an end outcome of providing better results and maintaining patient safety (Parisi et al, 2018).

Medical practice evolves, much of it driven by changes in healthcare policies and regulations as well delivery models. Continuous education provides healthcare professionals with the knowledge and skills needed to **adapt to evolving practice settings**, whether it be transitioning to electronic health records (EHRs), implementing telemedicine services, or participating in interdisciplinary care teams. Healthcare providers who maintain awareness of changes in healthcare delivery and practice standards will be able to balance better the increased complexity within their working environment and provide a higher standard of care.

Thus, continuous education plays a significant part in **improving the clinical skill of healthcare professionals** (Enoch et al., 2022). Ongoing learning activities including hands-on workstations, simulation training and case-based discussions are designed to help enhancing clinical reasoning and decision-making skills as well as procedural competence in the diagnosis of disease. It offers a way for healthcare professionals to

build on areas in which they already have knowledge or strengthen their skills within other clinical domains.

Continuous education promotes the culture of **evidence-based healthcare practice** in which staff combine the best available scientific evidence with clinical experience and patient preferences to drive reasoning on practice recommendations for patients (Longhini et al, 2021). Involvement in activities such as critical reading and appraisal of research literature, project teams, and participation in interdisciplinary case conferences allows healthcare professionals to ask their own questions about the validity and relevance of clinical evidence to their practice. Continuous education promotes evidence-based practice which ensures that healthcare interventions are consequently derived from the best scientific evidence, resulting in improved outcomes and quality of care for patients.

Continuous education also creates opportunities for healthcare professionals to grow and enhance their practice, as well as progress in their careers. Healthcare professionals should be leaders in implementing new knowledge and skills, conducting and participating in research and scholarly activities, as well as seeking advanced certification or specialty training. Keeping updated on new insights and knowledge also raises a sense of professional satisfaction and fulfillment, as healthcare professionals remain intellectually stimulated, challenged, and engaged in their professional development path.

In essence, continuous education is essential for ensuring the ongoing professional development, clinical competency, and quality of care delivered by healthcare professionals. It ensures that their practices remain current and in line with the dynamic nature of healthcare practice, advancements in medical science and technology while keeping them prepared to deliver safe and effective care. Continuous education will remain vital as the healthcare system's scenario evolves, since it has always been a vital element for excellent medical practice and better patient results (Longhini et al, 2021).

4.2. Using smart glasses technology in learning contexts

Smart glasses have become a potentially pioneering instrument for initial and continuous training in clinical activity, providing new prospects for the healthcare professional to reinforce their skills and professional competence (Barcala-Furelos et al., 2023). In this sub-section, the use of the smart glasses for healthcare training is presented, as well as the capability they provide for real-time guidance, hands-on learning opportunities, and reflective practice.

Smart glasses are an emerging technology that will give medical and nursing students, as well as healthcare professionals real-time access to resources for guidance during

clinical and procedure-based learning experiences. With augmented reality (AR) or mixed reality (MR), smart glasses can display digital information, visualizations and annotations in the user's sight to deliver step-by-step instructions, checklists and reference material alongside patients at point-of-care. Healthcare professionals gain instant access to learning resources which lets them use fresh knowledge and improved skills in their duties leading to a better clinical work performance with more active confidence.

The versatility and cross-functionality of this technology also allows for the use of smart glasses during **hands-on learning** in the form of interactive simulations, virtual patient scenarios, and procedural training modules. Smart glasses can plug right in to medical simulation platforms and apps, allowing doctors and other healthcare professionals to simulate clinical skills, even virtual surgeries, with lifelike patient scenarios in a safe and controlled environment (Berger et al., 2013). These practical exercises offer healthcare professionals the opportunity to develop procedural skills, decision-making accuracy and the ability to respond appropriately to real-world clinical presentations.

Smart glasses also provide opportunities for **remote mentoring and coaching**, allowing experienced clinicians to deliver guidance, feedback, and support to learners who are in a different location (Long et al, 2022). Paired with 5G technology, and the ability to live stream visual content, smart glasses can capture a user's point of view enabling remote mentors to see what the users see for direct performance observation and real-time feedback in simulation, clinical procedures and patient encounters. This model of remote mentoring and coaching promotes collaborative learning environments, allowing learners to tap into expert clinical advice and insights from senior medical and nursing staff, no matter where they are in the world.

Moreover, smart glasses provide POV (point-of-view) user interactions metrics, user performance feedback and procedural outcomes, thus allowing instructors to evaluate the competency level of a learner to **help improve targeted deficiencies**. Smart glasses provide the data of learner's performance objectively by integrating with learning management systems (LMS) or performance analytics platforms that allows the instructor to understand the learners' strengths and areas for further improvement. It is this data-driven methodology to performance evaluation and review that enhances in healthcare students and workforce self-assessment, reflection, and improvement, thus enabling competent clinical skills development and patient care outcomes (Barcala-Furelos et al., 2023).

From a broader point of view, smart glasses hold considerable potential in that they can inherently be used for continued medical education, on-demand instructional content access, direct-hand experience learning approaches, remote mentoring and coaching sessions, as well as for real-time reporting of supervised evaluation and feedback. Continuous education initiatives can facilitate healthcare professionals throughout their career to develop their clinical competence, improve the level of

consultation with patients and adapt to new demands in modern healthcare practice. As smart glasses technology matures and becomes more accessible, it will play a greater role in lifelong learning and continued professional development in clinical practice.

4.3. Feedback mechanisms and performance evaluation

In terms of the continuous education and professional development which are essential for healthcare professionals (Fidan & Gencel, 2022), feedback mechanisms and performance evaluation play crucial roles. This sub-section will approach feedback and its importance in learning, performance improvement, and establishing a culture of excellence within medical practice.

Feedback has the potential to offer the healthcare professionals **insight about their performance** which helps them assessing their own performance and shed light on the areas in need of improvement. This feedback, which may come from instructors, mentors, peers, and even patients is used to help healthcare providers assess their clinical competency, diagnostic accuracy, communication skills, and procedural performance in order to increase self-awareness and effect change in reflective practice (Carden et al., 2021). Healthcare professionals can report the feedback they receive in their learning process to improve skill, knowledge gaps and aim for continuous betterment of practices.

Furthermore, in pursuing the **improvement in patient care outcomes** through evidence-based practice, mobilizing clinical decision-making and ensuring that patients and providers interact harmoniously with one another, feedback is also invaluable. Healthcare professionals can assess the efficacy and safety of their clinical interventions using mechanisms like clinical audits, peer reviews and mentoring, with the help of patient satisfaction surveys to implement evidence-based strategies that promote high-quality patient care (Mcvey et al., 2020). Feedback from patients and their families is likewise instructive for providing healthcare professionals with the insights needed to deliver care that is centered on the patient and can be responsive to their specific needs and preferences.

It is also a driver of **personal and professional development** as it helps healthcare professionals to fulfil their personal potential and move forward in their careers. Feedback from supervisors, mentors and colleagues can help healthcare workers set goals, monitor progress, and show their abilities and competences in practice. It is through the provision of feedback that an ethos of accountability and responsibility for learning and professional growth are fostered, creating a culture of excellence (Rassameethes et al 2023). Additionally, processes of feedback like performance appraisals, 360-degrees assessments or peer reviews can be used to give recognition

and promotional opportunities so that healthcare practitioners are driven to improve their quality of practice.

Enhancing teamwork, collaboration and interdisciplinary communication among healthcare professionals are facilitated and pivotal outcomes of feedback mechanisms, resulting in better healthcare quality and patient outcomes (Choe, 2023). Feedback on behaviors in performance, input and communication can also serve to improve team dynamics, conflict management and a culture of respect, valuing the healthcare professional. Feedback is also a way to prompt open dialog and information sharing amongst team members so they can effectively collaborate on patient care initiatives, quality improvement projects and clinical research.

In conclusion, feedback mechanisms and performance evaluation are important for continuous medical education and training. Timely, constructive feedback not only serves as a powerful driver of learning and a unique opportunity for healthcare professionals to develop patient care outcomes, professional growth and continuing education, but also as an essential mechanism for building whole-healthcare teams. Feedback is important to maintain high levels of quality and patient-centered care as healthcare continues to advance and strive for excellence in medical practice.

Main Takeouts

1. Importance of Continuous Education in Medical Practice

- Continuous education is foundational for excellence in medical practice, ensuring professionals stay updated with advancements.
- Vital for maintaining competency, improving patient outcomes, and fostering professional growth.
- Facilitates adaptation to evolving healthcare landscapes and practice settings.
- Enhances clinical competency, proficiency, and evidence-based practice.
- Offers opportunities for professional growth, career advancement, and personal satisfaction.

2. Using Smart Glasses Technology for Ongoing Learning and Skill Development

- Smart glasses revolutionize ongoing learning by allowing the possibility to provide real-time guidance and immersive experiences.
- Facilitates hands-on learning through interactive simulations and procedural training modules.
- Enables remote mentoring and coaching, fostering collaborative learning experiences.
- Captures user interactions and performance metrics for objective assessment and feedback.
- Enhances clinical competency, patient outcomes, and lifelong learning in medical practice.

3. Feedback Mechanisms and Performance Evaluation

- Feedback is crucial for identifying strengths, weaknesses, and areas for improvement.
- Enhances self-awareness, reflective practice, and accountability in healthcare professionals.
- Improves patient care outcomes by promoting evidence-based practice and patient-centered care.
- Fosters professional growth, career advancement, and recognition.
- Promotes teamwork, collaboration, and interdisciplinary communication for better patient outcomes.

Overall, continuous education, smart glasses technology, and feedback mechanisms play integral roles in improving performance and fostering excellence in medical practice, ensuring high-quality, patient-centered care in an evolving healthcare landscape.

5. Safety and Responsible Use

5.1. Guidelines for safe and responsible use of smart glasses

In the healthcare environment, it is essential to ensure the responsible use of technological equipment, and smart glasses in particular, to reduce risks, safeguard patient confidentiality and keep up with professional standards (Yang et al., 2022). This sub-section describes some key recommendations for the clinical use of smart glasses in healthcare and teaching scenarios.

In clinical settings, when using any type of technological equipment with the ability to retrieve or capture personal data, healthcare professionals should first ensure **patient privacy and confidentiality** (Wang et al, 2021). In the case of smart glasses and its capacity to capture images, this means that the consent of patients must be sought before any audiovisual data is recorded or streamed. In addition, healthcare professionals must ensure that patient sensitive information, captured by the smart glasses camera cannot be seen by non-authorized personnel and must take appropriate measures to comply with patient data protection and privacy regulation, both on a national and European Union level.

To further enhance the protection of patient privacy, healthcare systems should prioritize the implementation of automated mechanisms that safeguard personal data. For instance, the use of technology with built-in features, such as automatic blurring of personal identifiers in video recordings, can significantly reduce the risk of unauthorized access to sensitive information. These automated privacy protections ensure that even if images or videos are captured, they are immediately processed to obscure any identifiable patient details, thereby complying with stringent data protection regulations and maintaining the confidentiality of patient information.

Healthcare professionals need also to follow rigorous **sterility and infection control protocols** while using technology like smart glasses in surgical and sterile environments. Technological equipment should be cleaned and disinfected properly before every procedure to avoid cross-contamination and minimize healthcare-acquired infections. During surgical procedures it may be necessary to use specific covers on the equipment to prevent them from being contaminated or compromise the sterile field and the patient's safety.

Some **ergonomic considerations** should also be considered when smart glasses are used for long periods by healthcare professionals, to reduce potential discomfort during procedures, as well as the risk of a potential mishappening that may interfere with the procedures. Workflows may include regular breaks and ergonomic exercises to prevent discomfort or lesions as a result from long periods of smart glasses usage.

The use of additional security measures, such as add-ons to the equipment should also be considered.

Before the implementation of smart glasses in clinical practice, **intensive training and testing** of technical competencies are indispensable. Training programs should address topics such as device operation, data security, privacy regulations, and ethical considerations. The implementation of regular refresher training sessions should also be included in the planning to reinforce safe and responsible practices and address any emerging issues or challenges.

Healthcare providers also need to adhere to the **highest professional and ethical standards** while using smart glasses in patient care scenarios. This should be accompanied by a continued recognition of the use of technology with consideration and respect, never infringing upon the privacy or trust in patient interaction, and assuring appropriate authorization, while remaining firm advocates for informed consent, autonomy and dignity. (Forde-Johnston et al, 2022). Healthcare providers should also adhere to organically developed guidelines or policies in organizations with regard to technologies or methodologies and seek advice from the institutional review board when they encounter issues of ethical nature.

In summary, compliance with the guidelines for safe and responsible use of technology is mandatory and should not be doubted, in order to avoid endangering patient safety, privacy and confidentiality, or professional standards issues in healthcare domain. By adhering to these principles, healthcare providers can enjoy the benefits and potential of smart glasses technology while avoiding some of its pitfalls and ensuring that the technology is used ethically and responsibly.

5.2. Potential risks and precautions

While smart glass technology could bring about measurable benefits to healthcare professionals, it is critical that risks of using this new wave of technology are identified and assessed. The potential consequences of these risks are serious and should be thoroughly evaluated along with the measures necessary to ensure that introduction of this technology into clinical settings can occur in a safe manner.

One of the potential hazards associated with smart glasses is the one related to the risk of **distraction** of its user, particularly during critical tasks or procedures, with notifications or unnecessary information provided by the equipment. It's up to the healthcare professionals to stay vigilant and permanently alert, putting patient care first, while using technology. This risk can be mitigated through precautions such as adjusting notification settings, using voice commands to interrupt notifications for nonemergency tasks, or by declaring designated "no noise zones" during high-risk procedures, among other measures (Rantamaa et al., 2022).

As smart glasses can store and stream sensitive information like patient records or medical images, **privacy issues** may ensue. Robust security measures are required to secure the data that is collected via smart glasses and transferred over wireless networks for healthcare organizations is safe. Some of examples of this mitigation actions are, image anonymization, strong encryption, high user authentication burden or keep data erasable remotely to prevent sensitive information being broadcasted or avoid privacy breach situation (Khalimov et al., 2022).

As any other electronic gadget, smart glasses may find **technical glitches or malfunctions** which may affect their performance and durability, compromising the patient's safety. Smart glasses should regularly go through preventive maintenance procedures, both by the healthcare professional and the organization's technical support team to maintain their proper function. It is also important to be prepared with a good number of contingency plans, in case any device fails. It's crucial to have some backup devices and alternative ways to access critical data on the go.

Smart glasses in some cases depend on digital overlays and AR tech to convey data to users, which increases the **chance of errors or misinterpretations**. Any information emerging from smart glasses should be properly interpreted before making any clinical decision, and if needs be a second opinion can always be obtained by verifying the medical examination with clinical data followed by expert review. Training programs should highlight the importance of critical thinking and clinical judgment when using technology to make decisions in patient care settings (Rini & Aldila, 2023).

Moreover, smart glasses may post some **physical hazards** if not used properly especially in dynamic settings or high-stakes environments such as surgical room or emergency department. Smart glasses users should stay alert of the environment, not to trip on something that could make accidents or cause harm. Furthermore, good ergonomics and proper fit are necessary such that the wearer does not experience any discomfort or strain when using smart-glasses over extended periods (Barcala-Furelos et al., 2023).

Most of the concerns about recording, or streaming, audio-visual content with smart glasses is not only healthcare profession-specific but constitute legal and ethical concerns. To better protect patients, healthcare professionals are required to obtain **informed consent** prior to recording or transmitting patient interactions via smart glasses, ensuring the patient is aware that is being recorded and understands what will be done with such recordings. Preservation of patient autonomy and privacy is paramount, and healthcare providers must adhere to the ethical standards and institutional regulations that allow smart glasses to be used in patient care setting.

In the end, smart glasses have the potential to bring great benefits in the healthcare industry, however it's essential to be aware and neutralize some potential hazards of integrating this technology in healthcare. Hence organizations can maximize the benefits of smart glasses technology and mitigate risks by introducing rigorous

procedures, training programs, along with strict ethical standards to ensure patient and healthcare professionals' safety.

5.3. Compliance with privacy and data security regulations

In the era of digital healthcare, the necessity for all systems and technologies introduced in healthcare procedures to be compliant with privacy and data security regulations is key to avoid risks of potential leakage of patient information as well maintaining trust in healthcare systems as a whole (Sharma et al., 2023), and smart glasses technology despite enabling advanced capabilities, bring new privacy and security challenges when usage involves sensitive data.

In the European Union, the **General Data Protection Regulation (GDPR)** imposes strict obligations on organizations handling personal data, including healthcare data (Kok et al., 2023). Healthcare providers are required by law to follow GDPR principles and the use of smart glasses is no exception, as they must ensure the lawful and transparent processing of patient data. This includes gaining the explicit permission of patients to perform data processing, as well as employing data minimization and anonymization methods in conjunction with maintaining a high level of security and data integrity throughout the entire life cycle of personal healthcare information.

Adhering to these GDPR principles is vital for healthcare professionals in order to protect patient privacy and assure trust in the healthcare system, and absolute legal compliance.

Accordingly, smart glasses will be required to have strong **encryption and security features** to safeguard any data they store or transmit via wireless networks encryption algorithms, secure authentication mechanisms, and controlled access are ideal protections for organizations that aim to safeguard sensitive data from unauthorized access or interception by a third party.

Healthcare providers are responsible for creating **secure communication channels** and frameworks for passing information from smart glasses to other devices or networks. e.g., utilizing secure Wi-Fi networks, virtual private networks (VPNs) or encrypted communication protocols to protect data while it is broadcasting. The use of secure transmission protocols aims to prevent data leakage, as well as to guarantee privacy regulations on ongoing meetings .

It is important that healthcare professionals are trained thoroughly in the best practices for **privacy and data security** when using smart glass technology in clinical settings. Training programs need to focus on a range of issues, including dealing with the intricate new demands of GDPR compliance and requirements, as well as data encryption methods and best practices about how data should be handled securely. Enhanced user awareness of the risks of technology on privacy and security can

increase compliance with regulations, and responsible use of this technology in healthcare (Guamán et al., 2023).

In essence, compliance with privacy and data security regulations is essential for ensuring the safe and responsible use of smart glass technology in healthcare contexts. By adhering to GDPR, and other relevant regulations, healthcare professionals can protect patient privacy, maintain data security, and uphold trust in healthcare systems. Implementing robust security measures, providing user training, and fostering a culture of privacy awareness are critical steps in achieving compliance and mitigating risks associated with smart glasses technology.

Main Takeouts

1. Guidelines for Safe and Responsible Use of Smart Glasses

- Prioritize patient privacy and confidentiality, obtaining informed consent before recording or streaming any content.
- Prioritize automated features like automatic blurring of personal identifiers to enhance patient privacy protection in video recordings.
- Adhere to hygienization and infection control protocols in surgical and sterile environments.
- Consider ergonomic factors to minimize discomfort during prolonged use.
- Ensure comprehensive training and technical competency assessment before integration into clinical practice.
- Uphold professional conduct and ethics, refraining from improper recording and adhering to institutional policies.

2. Potential Risks and Precautions

- Mitigate distractions during critical tasks by adjusting settings and implementing designated quiet zones.
- Implement robust security measures to protect sensitive data stored on smart glasses and transmitted over networks.
- Address technical issues and malfunctions with regular inspection and contingency plans.
- Evaluate the accuracy and reliability of information presented through smart glasses, emphasizing critical thinking in decision-making.
- Ensure physical safety by being mindful of surroundings and practicing proper ergonomics.

3. Compliance with Privacy and Data Security Regulations

- Adhere to GDPR principles, including obtaining explicit consent, data minimization, and implementing security measures.
- Incorporate robust encryption and security measures to protect data stored on smart glasses and transmitted over networks.
- Provide comprehensive training on privacy and data security best practices for healthcare professionals.
- Foster a culture of privacy awareness to ensure responsible use of smart glasses technology in healthcare settings.

In summary, adherence to guidelines for safe and responsible use, awareness of potential risks, and compliance with privacy and data security regulations are essential for maximizing the benefits of smart glasses technology while minimizing risks and ensuring patient safety and privacy in healthcare settings.

6. New Roles and Collaboration

6.1. Evolving roles for healthcare professionals in smart glasses integration

The introduction of technology in the healthcare environment mandates healthcare professionals to shift their roles and responsibilities and therefore requires them to adapt and innovate in order to enable its maximum utilization (Taherdoost, 2023). This sub-section delves into what new and changed roles will be affected as smart glasses and other transformative digital health technology is introduced into clinical workflows.

With the introduction of smart devices in healthcare settings, the role of the **tech specialist** has emerged to oversee the implementation, maintenance, and optimization of its technology. These specialists have in-depth knowledge of the devices, how they operate, troubleshooting, software programmability and security to allow for seamless integration into patient care. They operate within the IT departments and are expected to work both with vendors and healthcare providers to tackle technology obstacles, train end-users, facilitate future smart glass applications (along with other tech and smart devices), and assist with technology product deployment.

In turn, healthcare professionals with a deeper knowledge on delivering clinical education and training are essential for this new technology to be used by peers in patient care as well as medical education. **Clinical educators** create training programs addressing smart glasses applications, and best practices to teach other healthcare professionals, as well as healthcare students, how to use this technology properly. These include opportunities for experiential learning, feedback and coaching, developing a culture of continuous tech integration improvement and the provision of hands-on support (Akram et al., 2022).

The use of technology brings healthcare professionals together across different disciplines for a **collaborative and interdisciplinary approach** to improve the delivery of patient care. The smart glasses connected to other hospital systems improve the collaboration of a variety of healthcare professionals including physicians, nurses, surgeons, pharmacists as well as all allied health stakeholders surrounding each patient for enhanced care in interdisciplinary team efforts. They collaborate by offering their expertise, insight and resources to address complex clinical problems, improve patient outcomes and promote the quality and safety of healthcare delivery.

Healthcare professionals also **innovate and lead** in technology equivalence fostering innovation into clinical practice, education, and research. Their research activities include new clinical or real-life applications for smart glasses, pilot tests and clinical

trials as well as publications, presentations at conferences. **Innovators** help bringing the reality of technology enabled solutions into mainstream, inspire others to bring innovation and creativity and mobilize market-based changes in healthcare delivery.

Ultimately, the use of technology in care environments means opportunities and changing roles for those who provide care so that they can innovate, collaborate and lead. In doing so, embracing these new roles with smart glasses, and other technologies, will enable healthcare professionals to deliver a higher level of care, enabling improved clinical outcomes and the transformation of how healthcare services are delivered in an ever-increasing cyber world.

6.2. Collaboration among interdisciplinary teams

Well-planned interdisciplinary collaboration is key to driving both team-based care and knowledge sharing between an increasingly broad selection of healthcare professionals, including the use of technological devices such as smart glasses. When technology empowers collaboration across disciplines, it also supports holistic patient care and enables innovative solutions to clinical problems - both of which translate into better outcomes.

When a technology, such as smart glasses, is potentiated, it gives us the ability to **communicate and share information** instantly across the interdisciplinary team, blurring boundaries and ensuring that it's possible to work together in real time synchrony. Peers can offer insights, advice, or decision-making support from anywhere, using smart glasses technology to analyze and learn from live video streams, images, or data (Grill et al., 2020). This improved communication creates a culture of transparency, collaboration and joint decision-making, resulting in a more integrated care for the patient.

Smart glasses technology also supports inter-departmental **cross-functional training** to enable healthcare providers to learn from their peer experts across functions. Clinicians alike can engage in experiential simulations, train virtually, or peer perform the operations and tasks from their point of view perspectives (Brown et al, 2020). The culture of continuous improvement and professional development provided by such a collaborative learning environment empowers healthcare providers to deliver world-class care.

Smart glasses technology can also be used by interdisciplinary care teams to think and work creatively together on **solving complex clinical problems**. Unlocking the power of a culture of safety, by tapping into the experts around you to discover strategies, workflows, and solutions that can be documented and shared to eliminate healthcare waste and deliver best practices that lower costs and improve patient safety and care outcomes. Real-time performance feedback, root cause analysis and clinical audits,

and a multitude of quality improvement initiatives which can be enabled through smart glasses, allow interdisciplinary teams to bring changes at a ground-based level that are more sustainable with obvious change in clinical outcomes collectively evening up to demonstrable improvements.

Moreover, smart glasses create a shared sense of **ownership and accountability** that resonates within multidisciplinary teams, guiding members towards mutual goals. By facilitating transparency within a team and the sharing of data and collaboration, technology is helping better healthcare professionals to work together seamlessly in solving problems before they arise and to adapt in real time to patient needs or healthcare trends. This model of shared responsibility eases the burden on the most vulnerable people and assures them of receiving a continuum of quality care that is tailored to their needs.

In general, collaboration from the experts in different areas is needed to maximize the technology benefits in healthcare (Liu et al., 2021). In doing so, smart glasses, amongst other technology-based devices, permit interdisciplinary communication, coordination and cooperation - thereby ensuring that every possible aspect of patient care is covered, alongside proper problem-solving techniques and quality improvement methods. Digital clinical practice will require interdisciplinary collaboration to provide care, and smart glasses have the potential to catalyze teamwork in pursuit of optimal patient outcomes.

6.3. Strategies for effective teamwork using smart glasses

In an effort to improve patient care and deliver positive clinical outcomes, successful collaboration is, as stated before, needed within healthcare settings. Technology-based devices offer powerful computational synergies in the healthcare sector to improve teamwork (such as communication, collaboration, and decision-making) between healthcare professionals in response to advanced features of technology-based devices. This sub-section describes how one of these new technologies, smart glasses, can assist with teamwork in such environments and strategies to achieve so.

To be able to work efficiently as a team, with technology-based gadgets like smart glasses, it is not possible without **clear communication lines**. Healthcare professionals need to clearly set out the roles, responsibilities and communication protocols for the different actors involved in managing patient care flows at the interface between primary, secondary and tertiary services.

Smart glasses enable **sharing information and data** in interdisciplinary teams so healthcare professionals located in front of the patient can access real-time relevant information and clinical data about the patient. Thanks to the capture, transmission and visualization of data in the smart glasses, it allows team members to decide better

together on care interventions for a patient as well as to monitor whether these actions are improving the patient's progress. It promotes transparency, accountability and alignment in the goals of the team (Barcala-Furelos et al., 2023).

However, the use of technology-based devices also allows different members of interdisciplinary teams to **work together during decision-making** with a more robust understanding of collective expertise and insights to develop effective care plans and treatment strategies (Roosan et al., 2019). By combining these perspectives through collegial case discussions, multidisciplinary conferencing and telementoring, a consensus on the best approach for each patient, that leads to improved patient outcomes can be achieved.

Smart glasses allow the possibility of **real-time feedback** and performance monitoring, thus offering healthcare professionals instant insights into their actions and behaviors when learning while in a clinical environment. Trainers and team members can give timely feedback, find areas to improve upon, and acknowledge good practices in real time by utilizing the audiovisual data capturing abilities of such smart glasses. Providing a feedback loop within the team for reevaluation of work has the potential to promote better skills and quality enhancement.

Similarly, smart glasses support **team training with simulation exercises**, enabling interdisciplinary teams to train how they communicate, coordinate and manage clinical skills in simulated environment. Smart glasses allow healthcare professionals to partake in immersive simulations that otherwise would have been impossible. It's now possible to simulate complex clinical situations, run more perfect drills during emergency responses, and practice teamwork strategies within the confines of either a high stakes work environment devoid of repercussions and even from the comfort of their own residence. Such hands-on training strategies result in an improvement of team sense, teamwork, and promise for a solution to practical adversity (Barcala-Furelos et al., 2023).

But the use of smart glasses to support teamwork is a new realm, and healthcare professionals should keep issues of **cultural sensitivity and diversity** in mind. Using smart glasses dispels boundaries of geography, culture and language, reducing silos to embrace diversity and inclusivity amongst teams that work in an interdisciplinary way. Through cultural competence and sensitivity, healthcare professionals can establish trust, develop relationships, and provide patient-centered care that is respectful of all patients' demographic differences.

In essence, leveraging technology-based devices, such as smart glasses to promote effective teamwork in healthcare setting requires clear communication channels, shared information and data sharing, collaborative decision-making, real-time feedback and performance monitoring, team training and simulation, and cultural sensitivity and diversity considerations. By implementing these strategies, interdisciplinary teams can take advantage of the full potential of smart glasses

technology to optimize patient care, enhance teamwork dynamics, and achieve excellence in healthcare delivery.

Main Takeouts

1. Evolving Roles for Healthcare Professionals in Smart Glasses Integration

- Introduction of tech specialists overseeing implementation, maintenance, and optimization of smart glasses.
- Clinical educators designing and delivering training programs on smart glasses technology.
- Interdisciplinary collaboration driving innovation, efficiency, and improved patient outcomes.
- Healthcare professionals serving as innovators and thought leaders in technology integration.

2. Collaboration Among Interdisciplinary Teams

- Smart glasses facilitate seamless communication and information sharing, fostering transparency and cooperation.
- Enable cross-functional training and skill exchange, enhancing knowledge, proficiency, and confidence.
- Promote collaborative problem-solving and quality improvement initiatives, driving meaningful change in clinical outcomes.
- Foster shared accountability and responsibility, ensuring comprehensive, coordinated care for patients.

3. Strategies for Effective Teamwork Using Smart Glasses

- Establish clear communication channels and define roles and responsibilities within interdisciplinary teams.
- Utilize smart glasses to facilitate shared information and data sharing, enabling informed decision-making.
- Engage in collaborative decision-making processes, leveraging the expertise and insights of team members.
- Utilize real-time feedback and performance monitoring to promote continuous learning and quality improvement.
- Conduct team training and simulation exercises to enhance communication, coordination, and clinical skills.

In summary, smart glasses technology facilitates collaboration and teamwork among interdisciplinary healthcare teams, enabling seamless communication, shared decision-making, and continuous quality improvement. By leveraging smart glasses and implementing effective teamwork strategies, healthcare professionals can optimize patient care, enhance teamwork dynamics, and achieve excellence in healthcare delivery.

Section 2 – A practical guide to the project's digital tools

7. Video Capture for Professional Purposes

This chapter focuses on the fundamental principles of capturing video footage in clinical settings to support professional development of healthcare professionals.

By adopting the use of smart glasses, healthcare professionals can record and capture crucial moments in clinical practice and use the videos for their own professional development, by reviewing each procedural steps.

The application of these techniques clearly surpasses the learning process, allowing professionals to save valuable information on the procedures, facilitating the administrative work associated to clinical practice.

Practical guidelines and best practices for optimizing video capture settings and techniques are provided, enabling users to create comprehensive content for skill enhancement and continuous learning, and time and effort optimization.

Although the smart glasses model that will be used in the scope of the ClinicalModelling Project is clearly identified (Vuzix M400), the information in each subsection is purposely designed to be general enough to be applicable to various brands and models of smart glasses, and even to different types of recording devices.

7.1. Smart glasses Setup and Calibration

Calibrating and setting up a technological device, such as smart glasses is essential not only for taking the best of its potential and ensuring that the video to be recorded has better quality at least according to what you want, but also to make it manageable during the editing process, and adequate to the available storage capacity.

While the specific model, such as the Vuzix M400¹, may have unique features and setup requirements, the general principles apply across different brands and models, and allow professionals to use the same steps, regardless of the equipment in use.

Before any clinical procedure, the equipment should be fully charged, and all necessary software updates installed. It's also important that this preparation stage includes testing the camera, microphone and connectivity features. The preparation of the equipment should be carried out before the procedure, to anticipate any technical issues that may compromise the objectives and the quality of the recording.

It is also a good practice to do trial recording, (e.g. before the actual procedure) to make sure the equipment meets the required quality of recording. This will entail

¹ Specific information on the procedures for Vuzix M400 can be found in the products' user's guide

assessing the quality of video and audio, checking to make sure your network connection is stable, as well as verifying there is enough storage capacity for the full procedure. It's advisable to fix any issues found in testing immediately, to avoid problems during the real recording. This further allows for the angle and settings of camera to be tested so that all relevant details should be recorded without any obstruction.

In order to setup such a system, it is important that healthcare professionals work well with the IT team. The IT team will offer tech support and troubleshooting, along with smart glasses setup. Frequent training and communication with the IT team can enable healthcare staff to become adept at utilizing the equipment. This collaboration further ensures that any potential technical issues are immediately addressed, allowing healthcare professionals to focus on their main tasks.

Correct calibration of the smart glasses allows the user to capture the needed footage correctly. This will include tweaking the camera settings to get a perfect resolution, framerates and focus. This may require, among others, some calibration for the specificities of the lighting conditions, from different angles, in clinical settings. This also contributes to a improve the quality of recordings, and these checks should be carried out as a regular part of calibrating the system.

Different conditions and distinct clinical settings are most likely to require unique configurations for smart glasses. For instance, surgical procedures may need close-up shots with high resolution, while general ward rounds may require a wider field of view. Optimizing your recording settings to align with these variations can help improve the performance of recorded footage in use for professional development.

In summary, the meticulous setup and calibration of smart glasses are fundamental to capturing high-quality video footage for professional development in clinical settings. Ensuring the smart glasses are fully charged, updated, and operational before any procedure minimizes the risk of technical issues during recording. Conducting thorough test runs to verify video and audio clarity, connectivity stability, and storage capacity is essential for smooth operation. Collaboration with the IT team is crucial for technical support and troubleshooting, ensuring healthcare professionals can focus on their primary tasks. Proper calibration tailored to the specific requirements of each clinical setting, along with regular checks, ensures the recordings meet the highest standards. By customizing the smart glasses settings to suit different clinical environments, healthcare professionals can effectively utilize the recorded footage to enhance their skills and knowledge, ultimately improving patient care.

7.2. Recording Procedures in Clinical Settings

Recording in clinical settings requires careful consideration of ethical, legal, and practical aspects to ensure that the process is conducted smoothly and professionally.

It is absolutely essential to have the informed consent of patients, as these must be informed that the procedures on them will be recorded, to know why and to provide a written consent. This respects patient autonomy and is consistent with the legal and ethical requirements. The consent form will specify what would the video be used for, where it will be stored and with whom it would be shared, as to bring transparency. When this is done for professional development, patients should be told how their anonymized data will inform and improve clinical skills and knowledge.

The recording space should be set up in such a way that sensitive personal characteristics or data are not disclosed. This also means making sure you capture only the pertinent sections of the procedure and not revealing any unnecessary personal information. How the environment is set up beforehand could make a significant difference in terms of time needed to blur or obscure certain elements during post-production editing process. This preparation involves things like making sure the lighting is adequate so everything can be clearly seen, properly positioning the smart glasses to capture and covering all angles.

In a clinical environment it is important to ensure that all the equipment components are clean and sterile. To prevent contamination, all recording equipment (e.g. smart glasses) must be promptly disinfected before and after each procedure. Healthcare professionals must adhere to established disinfection protocols and utilize cleaning agents which are not detrimental the equipment. This measure provides protection to the patient as well as healthcare staff. The only way to keep an area sterile is by training regularly and enforcing rigorous disinfection protocols.

The safety of the equipment, health professional and patient is paramount. Smart glasses should be securely attached to the head so as not to fall off during a procedure. Moreover, healthcare professionals should be trained to use the equipment without compromising patient care or their own safety. One of the essential aspects that must be considered to maintain a good standard of care is to avoid surgical glasses from obscuring the view or hindering health professional movements. Any risks associated with implementation, including interfering with medical equipment or drive to distraction, should be minimized, and could likely avoid if appropriate training and procedure adjustments are in place.

Defining standard operating procedures (SOPs) for smart glass use in clinical settings helps ensure consistency and reliability. These procedures should address all stages in the recording process, including setup and calibration, as well as data management and storage. Periodic review and updating of these procedures will guarantee they are still applicable over time.

In conclusion, Strict adherence to standardized SOPs makes the recording process reliable and consistent, making full use of video technology in continuous professional development without compromising patient care.

7.3. Alternative Recording Methods and Considerations

While smart glasses offer unique advantages for recording clinical procedures, there are alternative methods and equipment that can be used to capture video footage effectively.

Devices such as GoPro cameras, cellphone cameras, or standing recording equipment can be viable alternatives depending on the situation. GoPro cameras, known for their durability and wide-angle lenses, can be mounted on various surfaces to capture comprehensive views of the procedure. Cellphone cameras, with their high-resolution capabilities, can be handheld or mounted on stands to provide flexible recording options. Standing recording equipment, such as tripods with mounted cameras, can be strategically placed to capture the procedure from multiple angles, providing a broader perspective.

When using alternative recording methods, it is essential to consider the specific requirements of the clinical setting and the type of procedure being recorded. For instance, a GoPro camera might be suitable for capturing wide-angle shots of a surgical team in action, while a cellphone camera might be better for close-up shots of detailed procedures. Standing recording equipment can be strategically placed around the operating room to provide multiple angles and perspectives, enhancing the overall value of the video.

If multiple devices are used simultaneously, it is crucial to ensure that the footage from different cameras can be easily synchronized during editing. This involves aligning timestamps and using consistent recording settings across all devices. Synchronization allows for a seamless editing process and ensures that the final video accurately reflects the sequence and timing of the procedure. Using software tools that support multi-camera editing can simplify this process and ensure high-quality outcomes.

Managing the data from various recording devices requires careful planning and organization. Healthcare professionals should establish protocols for transferring, storing, and backing up video files to prevent data loss. Using secure, encrypted storage solutions ensures that sensitive patient information is protected. Proper data management practices also facilitate easier retrieval and editing of video footage when needed. Regular audits and checks of data storage systems can help identify and mitigate potential issues.

When using alternative recording devices, it is important to adhere to the same ethical and legal standards as with smart glasses. This includes obtaining informed consent,

ensuring patient privacy, and following data protection regulations. Healthcare professionals should be aware of the specific legal requirements in their jurisdiction and ensure compliance with all relevant guidelines.

Staying updated with advancements in recording technology can provide new opportunities for capturing high-quality video footage. Innovations in camera technology, such as higher resolution, improved stabilization, and enhanced audio capture, can significantly enhance the quality of recordings. Regular training and updates on new technologies can help healthcare professionals stay ahead and utilize the best available tools for professional development.

In conclusion, while smart glasses are a powerful tool for capturing video footage in clinical settings, alternative recording methods and devices can provide additional flexibility and perspectives. By following best practices for setup, calibration, and recording, healthcare professionals can create high-quality content that enhances skill development and continuous learning. Effective collaboration with IT teams, adherence to ethical standards, and thorough preparation of the recording environment contribute to the successful use of video technology in clinical settings.

8. Video Editing for Professional Purposes

In this chapter, we will analyze the potential and applications of video editing as a tool to improve the development of content destined to be used in the continuous education and development of health professionals.

Either for the purpose of refining footage, or with the intent of adding annotations and graphics, but mostly for ensuring full anonymization of content, healthcare professionals are expected to gain insights on how to transform raw video footage into engaging and informative resources.

An introduction to some practical tips and techniques for editing videos effectively will be shared, empowering users to create impactful learning experiences for health professionals and preparing them for further practical training.

The ClinicalModelling project adopted the use of Wondershare Filmora 13 as a tool to edit the videos, but the main idea behind this chapter is to provide guidance and instructions that can be used regardless of the software that is being used.

8.1. Introduction to Video Editing software

Video editing software is a software tool that allows users to edit and improve video footage, in several formats, and collected resourcing different gadgets, to create a final product that meets their specific needs. The main idea behind editing videos will depend on the intended purpose, either it is to make them more manageable by cutting out irrelevant parts, anonymizing sensitive aspects, and enhancing sound and visual elements to improve the overall quality of the video. In most cases it's all the aforementioned.

These software tools cater a wide range of functionalities, that include trimming and cutting video clips; adding transitions and effects; incorporating audio tracks; and overlaying text and graphics and allowing the use of masking effects that distort elements or potentially identifying characteristics of the participants. These tools enable users to edit the original recording and to create a final original product that meets the requirements.

The first key functions that are at the core of adding value to educational contents is the possibility of cutting and trimming parts of a video that do not contribute to the final intent of the video. This helps the viewers focus the most important parts of the footage and allows them to comprehend and retain essential information, free from distractions, while at the same time keeps the file size manageable to be used and uploaded into different supports.

The second vital feature is the sound editing. This allows to improve the audio quality of your video, allows the removal unwanted background noises and makes it easier for viewers to hear both the speech and the content included in the video. Good audio is a major key to a good quality educational video.

Another important feature in video editing software is the incorporation of subtitles, annotations and graphics. Editors can take notes, bookmark clips for future reviewing or focus to specific areas of the video. As a complement to the sound editing process, the software also allows to create subtitles to enhance the comprehension of sections the sound isn't clear enough, or to make the video accessible in different languages.

In general, added graphics serve the purpose of emphasize highlights and draw a viewer into the most important aspects of the video. Annotations and graphics are used to indicate important points visually, which serve as an additional takeaway for the pedagogical objectives of the video.

Another important function, particularly in sensitive contexts in which the respect for privacy and confidentiality is paramount as in healthcare environments, is anonymization. This functionality allows to blur any personally identifiable information of individuals present in the video frame to protect their privacy and ensure ethical standards are upheld. Anonymizing is a way to making sure none of the subjects shown on your video can be identified, namely by blurring faces and other identifiable physical features, distorting voices or by simply removing the audio track.

Although video editing plays a crucial role in producing quality material, having high-quality raw footage significantly simplifies the editing process. Clear, stable, and well-lit video recordings provide a strong foundation for creating a professional final product. Good audio quality is equally important, as it ensures that verbal communication is easily understood.

In conclusion, video editing software is an indispensable tool for creating high-quality educational videos and will be essential in the scope of the ClinicalModelling project. By offering functionalities like cutting and trimming, sound enhancement, the addition of annotations and graphics, and anonymization, these tools help transform raw footage into a polished, professional product that effectively meets educational objectives. The ability to remove irrelevant sections, improve audio clarity, and protect participant privacy ensures that the final video is both informative and compliant with ethical standards. High-quality raw footage, coupled with robust editing practices, results in educational content that is engaging, clear, and impactful, ultimately enhancing the learning experience for viewers.

8.2. Anonymization Techniques and Best Practices

One of the most important features for the ClinicalModelling project is anonymization, as this process is crucial for ensuring ethical compliance and protecting patient privacy. Even with informed consent, it is essential to anonymize all identifiable elements to maintain confidentiality and trust.

Anonymization involves several key elements. First and foremost are patient identifiers, which include faces, tattoos, birthmarks, and any other distinctive features that could identify a patient. Ensuring these elements are obscured helps protect the individual's identity. Additionally, voices must be distorted to prevent recognition. This ensures that patients and healthcare professionals cannot be identified by their speech patterns. Another critical aspect is the blurring out of any visible text, such as names on medical records or labels on medication, that could reveal personal information. Ensuring that any textual information that could lead to identification is obscured is paramount.

To effectively anonymize video content, certain best practices should be followed. Techniques like blurring and pixelation are essential for obscuring faces and other identifiable features, maintaining the anonymity of individuals involved. Voice distortion, achieved through audio editing tools, involves modifying the pitch and tone of voices to prevent recognition. This step is crucial in ensuring that no one can be identified by their voice. In cases where blurring is insufficient, adding a text overlay can cover sensitive information, ensuring that no sensitive data is visible in the final video. Consistent application of these techniques throughout the video is essential to ensure that no identifiable information is inadvertently exposed, providing a uniform level of privacy protection.

By adhering to these anonymization practices, the ClinicalModelling project can ensure that all video content remains ethically compliant and protects the privacy of all individuals involved. This meticulous approach to anonymization is fundamental to maintaining the trust and confidence of patients and healthcare professionals alike.

8.3. Sound Editing and Enhancement

Editing sound is a fundamental aspect of video editing that significantly enhances the overall quality and comprehension of the content. It ensures that the audio component of a video is clear, balanced, and engaging, which is crucial for effective communication, especially in educational materials.

Anonymizing sound is a critical step in protecting the identities of individuals featured in the video. One key technique is voice distortion, which involves adjusting the pitch, speed, and tone of voices. This alteration is particularly important for maintaining the anonymity of patients and healthcare professionals, ensuring that they cannot be

recognized by their speech patterns. Another essential method is background noise reduction. Utilizing noise reduction tools helps eliminate unwanted ambient sounds, thereby ensuring that the primary audio is clear and comprehensible. This not only enhances the audio quality but also ensures that the focus remains on the relevant speech or sounds.

Enhancing sound quality involves several techniques to make the audio more pleasant and effective. Audio balancing is crucial, as it ensures that the volume levels of different audio tracks are harmonized, preventing any single element from overwhelming the others. This includes balancing dialogue, background music, and sound effects to create a cohesive audio experience. Adding music and sound effects can further enhance the video's engagement. Background music and sound effects help maintain viewer interest and can complement the content of the video. Selecting appropriate tracks that align with the video's message is key to enhancing its overall impact.

Adding automated subtitles is another vital aspect of sound editing that improves understanding and accessibility. Subtitles can significantly enhance comprehension, especially for viewers who are non-native speakers of the language used in the video. This ensures that the content is accessible to a wider audience. Furthermore, automated subtitles can be used to translate spoken words into different languages, broadening the video's accessibility. This is particularly useful in multilingual educational settings, where the content needs to reach a diverse audience.

In conclusion, sound editing is an integral part of video editing that enhances the quality and comprehension of the content. Techniques such as voice distortion and background noise reduction are essential for anonymizing sound, ensuring the privacy of individuals involved. Enhancing sound quality through audio balancing and the addition of music and effects can make the video more engaging and effective. Finally, adding automated subtitles improves accessibility and understanding, making the content more inclusive for a broader audience. These features are all possible with Wondershare Filmora 13, the software used in the ClinicalModelling project. It's important to note that some features may vary if using a different video editing tool, so users should explore their specific software capabilities to achieve similar results. By paying careful attention to these aspects, editors can produce high-quality educational videos that effectively communicate their intended message.

8.4. Export Formats and File Management

Exporting the edited video in the appropriate format is crucial for ensuring compatibility and ease of access. Selecting the right export format is essential as it affects the video's usability across different platforms and devices. Common formats such as MP4, AVI, MOV, and WMV are widely used and compatible with most video

players and online platforms. Each format has its own strengths and is suitable for different purposes. For example, MP4 is often preferred for web use due to its balance of quality and file size, providing good video quality while keeping the file size manageable, which is ideal for online streaming.

Managing file size and quality is another critical aspect of the export process. Video editing software allows users to compress files, reducing their size without significantly compromising quality. Compression is essential for managing storage space and ensuring quicker upload times, especially when dealing with large files. Adjusting the resolution and bitrate settings helps balance quality and file size. Higher resolution and bitrate result in better quality but larger files. Therefore, finding the right balance is key to maintaining video quality while keeping file sizes reasonable.

Effective file management is crucial for organizing and storing video projects. Creating a structured folder system to organize raw footage, project files, and final exports ensures easy access and retrieval of files, streamlining the editing process. Regularly backing up video files is also essential to prevent data loss. Using external hard drives or cloud storage solutions to keep backups secure can protect against accidental loss. Having multiple backups in different locations further ensures data safety.

In conclusion, video editing is a powerful tool for enhancing professional development in clinical settings. By utilizing video editing software, healthcare professionals can refine raw footage, ensuring it is concise, anonymized, and of high quality. Adhering to best practices in anonymization, sound editing, and file management ensures that the final product is both ethically compliant and educationally valuable. Effective use of these techniques and tools enables healthcare professionals to create impactful training materials that contribute to continuous learning and improved patient care.

9. Uploading and Managing Video Assets

This chapter guides users through the process of uploading and managing video assets for educational purposes. Healthcare professionals are expected to gain insights into selecting appropriate platforms for hosting and sharing videos, optimizing metadata for searchability, and ensuring compliance with privacy and accessibility standards.

By becoming familiar with the procedures of uploading and managing video content, professionals can effectively use the educational content and support learning processes in professional development.

The platform to be used in the project is Moodle. However, all the information provided in this chapter is adaptable to any other Learning Management System (LMS) or customized platform.

9.1. Secure Access and Anonymity Protocols

Ensuring the security and anonymity of video content is paramount when uploading to any platform. Before any video content is uploaded, it is crucial to make sure the content was properly anonymized through editing.

This step protects patient privacy and maintains compliance with ethical standards. Moodle, the chosen platform for this project, offers robust security features to ensure that access to video content is restricted to authorized users only.

Moodle's key security features begin with user authentication, which supports various methods including manual accounts, LDAP, OAuth2, and single sign-on (SSO). These methods ensure that only verified users can access the platform. Additionally, role-based access control allows administrators to assign specific roles to users, such as students, teachers, or managers, with defined permissions. This ensures that users only access content relevant to their role, enhancing the security and organization of the platform.

Data encryption is another vital feature of Moodle's security. By using SSL/TLS encryption, data transmitted between the server and client is protected, ensuring that sensitive information is not intercepted during transfer. This encryption is critical for maintaining the confidentiality of the data being handled.

Moodle also employs a secure file storage system that restricts access based on user permissions. This ensures that only authorized users can access and download files, further protecting sensitive content. Additionally, Moodle maintains comprehensive logs of user activity. These logs allow administrators to monitor access and identify any unauthorized attempts to access content, providing an additional layer of security.

By leveraging these security features, Moodle ensures that video content remains secure and accessible only to those with proper authorization. This combination of authentication, role-based access control, data encryption, and activity logging creates a secure environment for managing educational content, thereby upholding ethical standards and protecting user privacy.

9.2. Uploading and Organizing Video Assets on Moodle

When uploading video assets to Moodle, it is essential to adhere to technical recommendations to ensure the content is accessible, high quality, and optimized for viewing. Following best practices, using widely supported video formats such as MP4 is recommended because it offers a good balance between quality and file size. Aim for a resolution of 720p (1280x720) or 1080p (1920x1080) to ensure clear visuals while keeping file sizes manageable.

Keep video files as small as possible without sacrificing quality. Compress videos if necessary to facilitate faster uploads and smoother playback. For 720p videos, a bitrate of 1500-4000 kbps is recommended, while 4000-8000 kbps is suitable for 1080p videos. This helps maintain a balance between video quality and file size. A frame rate of 24-30 frames per second (fps) is ideal for most educational videos, ensuring smooth motion and reducing file size.

Ensure clear audio by using a sample rate of 44.1 kHz or 48 kHz and a bitrate of 128-256 kbps, making spoken content easily understandable. Including subtitles or captions is essential to improve accessibility for hearing-impaired users and non-native speakers. Use descriptive file names that include relevant information such as the topic, date, and version to make it easier to manage and locate files.

Creating a structured folder system within Moodle to categorize videos by topic, course, or module enhances navigation and ensures that users can easily find the content they need. This organization is crucial for maintaining an efficient and user-friendly repository of educational materials.

By following these technical recommendations, healthcare educators and practitioners can ensure that video content uploaded to Moodle is of high quality, accessible, and well-organized. This approach not only enhances the learning experience for users but also ensures that educational resources are managed effectively.

9.3. Data Management and Privacy Considerations on the Platform

Effective data management and privacy considerations are critical when uploading and managing video content on educational platforms. Building on the principles outlined in the previous sections, it is imperative to ensure that all identifiable information is anonymized before uploading any video content. This includes blurring faces, removing names, and altering voices if necessary to protect patient privacy and comply with ethical standards. Anonymization safeguards patient confidentiality and maintains trust in the educational process.

Moodle's role-based access control is an essential feature for restricting access to video content based on user roles. This ensures that only authorized users, such as enrolled students and faculty, can view the videos. By assigning specific roles and permissions, administrators can control who accesses what content, thus maintaining a secure environment.

Optimizing metadata for each video enhances searchability. Including relevant keywords, descriptions, and tags makes it easier for users to find specific content. Proper metadata management ensures that educational materials are accessible and organized, facilitating an efficient learning experience.

Utilizing Moodle's secure file storage system is crucial for ensuring that video files are stored securely. Regularly reviewing and updating security settings protect against unauthorized access. Implementing a robust backup and recovery plan prevents data loss by regularly backing up video files and ensuring they can be restored in case of accidental deletion or technical issues. This redundancy is vital for maintaining the integrity of educational resources.

Compliance with relevant privacy laws and regulations, such as the GDPR, is mandatory. Obtaining necessary consent from individuals featured in the videos and providing clear information on how the videos will be used ensures that the content adheres to legal standards. This compliance not only protects the institution but also respects the rights of the individuals involved.

Regularly monitoring user activity and access logs to detect any unauthorized attempts to access video content is another important aspect. Using Moodle's auditing features, administrators can maintain an overview of who accessed what content and when, providing an additional layer of security.

Educating users on best practices for data management and privacy is essential. Providing training on how to upload, organize, and manage video content while adhering to privacy and security standards ensures that all users are aware of their responsibilities. This education fosters a culture of security and compliance within the institution.

In summary, by following secure access and anonymity protocols, adhering to technical recommendations for uploading and organizing video assets, and implementing effective data management and privacy practices, healthcare educators and practitioners can ensure that video content on Moodle is both secure and accessible. This enables the effective dissemination of educational content, supporting continuous learning and professional development in clinical settings. By maintaining high standards of privacy and data management, institutions can enhance the learning experience while protecting the rights and privacy of all participants involved.

10. Using video modelling and video self-modelling

Video modeling and video self-modeling are dynamic tools that, when implemented in healthcare education, can significantly enhance the training of future healthcare professionals. This section will provide a comprehensive understanding of these techniques, their applications, and the step-by-step process for planning such activities. Additionally, a detailed checklist will be provided to ensure thorough preparation and execution.

10.1. Introduction to Video Modeling and Video Self-Modeling

Video modeling and video self-modeling are innovative techniques used in healthcare education to enhance the training of future healthcare professionals. These methods leverage visual learning to improve the acquisition and retention of skills, making them especially effective in complex fields like healthcare where precision and accuracy are paramount (Alkatout et al., 2021).

Video modeling involves recording a skilled individual, such as an experienced healthcare professional, performing a specific behavior or task. This video is then shown to students or peers, who are expected to replicate the behavior. The key to this method's success lies in its ability to provide a clear, visual demonstration that learners can observe and imitate. This technique is particularly beneficial in healthcare settings where procedural accuracy and the development of soft skills like communication and empathy are critical.

The applications of video modeling in healthcare professional development are vast. For instance, it can be used to demonstrate clinical procedures, such as suturing, inserting IV lines, or conducting physical examinations. These visual demonstrations help learners understand the step-by-step process involved in these procedures, reducing the likelihood of errors when performing them in real-life situations. Video modeling is also effective in teaching patient communication skills. For example, videos can show how to effectively communicate with patients, deliver bad news, or explain complex medical terms in a way that is understandable to patients. Additionally, video modeling can illustrate teamwork and collaboration during multidisciplinary meetings, emergency responses, or surgical procedures, demonstrating effective teamwork and collaboration.

The benefits of video modeling are numerous. Firstly, it appeals to visual learners who comprehend better through watching and observing rather than reading or listening (Lin et al., 2022). This visual demonstration of tasks and behaviors makes it easier for learners to understand and replicate them. Secondly, video modeling ensures consistency in training. Since the same high-quality instruction is delivered to all

learners, it promotes uniformity in the training process. Thirdly, video modeling is accessible and flexible. Videos can be accessed anytime and from anywhere, allowing learners to review and practice at their own pace. Fourthly, the method allows for repetition. Learners can watch the videos multiple times, reinforcing learning and improving retention. Lastly, videos can depict real-life scenarios, providing a realistic context for learning and application, which is particularly beneficial in healthcare settings where real-world application is crucial.

Video self-modeling takes the concept of video modeling a step further. It involves recording the student performing the desired behavior or task correctly and then having the student watch the video to reinforce the correct behavior (Drill & Bellini, 2021). This technique is particularly effective for building self-confidence and enhancing self-awareness. For example, learners can record themselves performing clinical tasks and review the videos to assess their performance. This self-assessment helps learners identify their strengths and weaknesses, leading to targeted improvements.

The applications of video self-modeling in healthcare professional development are equally extensive. In addition to self-assessment, video self-modeling can be used for behavior modification. By highlighting successful actions and reinforcing positive behavior, learners can modify their behaviors effectively. Moreover, watching themselves perform tasks correctly helps learners internalize the correct procedures and techniques, promoting skill mastery.

The benefits of video self-modeling are significant. Seeing oneself perform a task correctly boosts self-efficacy, reinforcing the belief that one can achieve similar outcomes in real situations (Goh et al., 2021). This positive reinforcement is particularly important in building confidence among healthcare professionals. Video self-modeling also provides personalized feedback. Learners can identify their strengths and weaknesses by reviewing their performance, leading to targeted improvements. This personalized feedback is crucial for continuous professional development. Additionally, positive self-modeling can be highly motivating, encouraging learners to strive for excellence and continuous improvement. Watching oneself can also promote reflective practice, a key component of professional development in healthcare. Reflective practice involves critically analyzing one's actions and experiences to improve future performance, and video self-modeling provides a concrete reference for this process.

In conclusion, video modeling and video self-modeling are powerful techniques for enhancing healthcare education. By providing clear, visual demonstrations and opportunities for self-assessment, these methods improve skill acquisition, promote consistency in training, and boost learners' confidence and motivation. Integrating these techniques into healthcare professional development programs can lead to better educational outcomes and improved patient care. These methods not only enhance the understanding of complex procedures and behaviors but also support the development of essential professional skills. Adhering to best practices in recording, editing, and managing video content ensures that educational materials

are both high-quality and ethically sound, ultimately contributing to the continuous professional growth of healthcare practitioners and students. For more detailed guidelines and resources on implementing video modeling and self-modeling in your educational programs, refer to various educational strategy guides and online resources.

10.2. How to Plan a Video Modeling and Video Self-Modeling Activity

Planning a video modeling or video self-modeling activity is a multifaceted process that requires a series of carefully considered steps to ensure the activity's effectiveness and alignment with educational objectives. This comprehensive section provides an in-depth guide on how to meticulously plan and execute these activities. It covers every aspect necessary to make the process thorough and impactful, from initial conceptualization and goal setting to detailed technical execution and final evaluation. By following this guide, educators and practitioners can create high-quality, effective educational videos that enhance learning outcomes and professional development in healthcare settings.

Step 1: Define Learning Objectives

The first step in planning a video modeling or video self-modeling activity is to clearly define the learning objectives. These objectives should specify what skills or behaviors the video aims to teach. Having clear, well-defined objectives helps in creating a focused and effective video. For instance, if the goal is to demonstrate a clinical procedure like inserting an IV line, the video should methodically cover each step of the process, from preparation to execution. The objectives should be specific, measurable, achievable, relevant, and time-bound (SMART), ensuring that they are clear and attainable within a defined timeframe. This clarity helps educators and learners focus on the critical aspects of the behavior or skill being taught, facilitating better learning outcomes.

Step 2: Secure Consent

Securing informed consent is a crucial ethical consideration when planning video activities. Informed consent involves explaining the purpose of the video, how it will be used, and obtaining agreement from all participants. This process ensures that participants are fully aware of their involvement and the potential dissemination of the video. It is essential to document consent properly and store these records securely. In healthcare education, where patient interactions might be recorded, additional confidentiality agreements might be necessary to protect patient privacy. This step not only adheres to legal and ethical standards but also builds trust with participants, ensuring they feel comfortable and respected throughout the process.

Step 3: Plan the Environment

The next step is to carefully plan the environment where the recording will take place. The chosen setting should be relevant to the skills being demonstrated. For example, a clinical procedure should be recorded in a simulated clinical environment or a real healthcare setting, depending on the context. Ensuring the environment is quiet, well-lit, and free from distractions is crucial for producing high-quality video content. Adequate lighting helps avoid shadows and ensures that all actions are clearly visible, while a quiet setting minimizes background noise, ensuring clear audio. It is also essential to prepare all recording equipment, such as smart glasses, cameras, microphones, and lighting, to ensure they are functioning correctly. Proper preparation of the environment enhances the quality and professionalism of the final video.

Step 4: Script and Storyboard

Creating a detailed script and storyboard is an essential part of the planning process. The script should outline the steps and key points to be covered in the video, ensuring that all necessary information is included and presented clearly. This preparation helps in maintaining focus and structure during the recording. A storyboard helps visualize the final product by planning the visual elements of the video, including camera angles, close-ups, and transitions. This visual planning tool guides the recording process and ensures that the video captures all essential elements. By having a clear script and storyboard, the recording process becomes more organized, reducing the likelihood of errors and omissions.

Step 5: Record the Video

Recording the video involves several important steps to ensure high-quality footage. Conducting rehearsals before the actual recording can help participants feel comfortable with their roles and the flow of the video. It is also beneficial to record multiple takes to ensure that high-quality footage is captured, providing options for editing. Maintaining a steady focus on the relevant actions and ensuring clear audio and visual quality are crucial. Using techniques like clear communication, visual aids, and stable camera work can enhance the video's effectiveness. By following these best practices, the recording process becomes smoother and more efficient, resulting in a professional and educational video.

Step 6: Edit the Video

Editing the video is a critical step in refining the content and ensuring it meets educational standards. This process involves reviewing the footage to check for any issues with lighting, audio, or content coverage and making necessary adjustments. Anonymizing sensitive information is crucial for protecting privacy. This can be done by blurring faces, removing names, and altering voices using video editing software. Enhancing the quality of the video through trimming unnecessary parts, adjusting lighting and sound, and adding annotations or captions improves clarity and accessibility. Including subtitles can also enhance understanding and accessibility,

especially for non-native speakers and those with hearing impairments. Proper editing ensures that the final video is polished, professional, and educationally valuable.

Step 7: Review and Approve

Before the video is shared, it should be reviewed by subject matter experts to ensure accuracy and completeness. This step helps identify any errors or areas that need improvement. Obtaining final approvals from all stakeholders, including participants, educators, and administrators, is essential to ensure that everyone involved is satisfied with the final product. This review and approval process helps maintain high standards of quality and accuracy, ensuring that the video effectively meets its educational objectives.

Step 8: Upload and Share

Once the video is finalized, it needs to be uploaded to an appropriate platform for hosting and sharing. Choosing a secure and user-friendly platform like Moodle or another Learning Management System (LMS) ensures that the video is easily accessible to learners. Optimizing metadata by adding descriptive titles, tags, and descriptions improves searchability and organization. Setting appropriate access permissions ensures that the video is accessible only to authorized users, protecting sensitive information and maintaining confidentiality. Properly uploading and sharing the video ensures that it reaches the intended audience effectively.

Step 9: Monitor and Evaluate

After the video is shared, it is important to monitor its impact and collect feedback from learners. Gathering feedback helps assess the effectiveness of the video and identify areas for improvement. This continuous improvement process ensures that future videos are even more effective and aligned with educational goals. Using feedback to refine future videos helps maintain high standards and ensures that the video modeling and self-modeling activities continue to meet the evolving needs of learners.

By following these detailed steps, healthcare educators and practitioners can effectively plan and execute video modeling and video self-modeling activities. These techniques not only enhance the learning experience but also ensure that educational materials are high-quality, ethically sound, and aligned with professional development goals. Integrating video modeling and self-modeling into healthcare education can lead to better educational outcomes, improved patient care, and continuous professional growth.

Conclusions

The ClinicalModelling project stands at the leading edge of innovation in healthcare education, proposing advanced methodologies to build up the professional development of healthcare practitioners. Also, by leveraging advanced technologies such as smart glasses, the project endeavors to transform how clinical skills are taught and learned in medicine education programs, and throughout the health professionals' careers. This manual (a complete guide on how to use smart glasses in clinical environments), is the essence of all knowledge gathered through the first stage of this project.

The project aims to play a central role in transforming traditional medical education into a more dynamic, interactive, and effective learning experience. Traditional methods, which have time, resource and space-dependent constraints are being complemented and, in some cases, replaced by digital learning technologies offering new timings of availability, and reducing geographical limits, leading to an unparalleled flexibility. The project proposes the use of smart glasses to generate educational content during practice, allowing real-time feedback and the possibility of improving by reviewed practice.

The comprehensive approach to professional development is one of the project's differentiating watermarks. This manual takes on the technical procedures but gives equal importance to human aspect attached with it like communication, empathy and teamwork. Video modeling and video self-modeling techniques, central to this initiative, provide clear visual demonstrations and opportunities for self-assessment, enabling healthcare professionals to refine their skills continually.

Central to the ClinicalModelling project is an unwavering commitment to ethical and legal standards. The use of smart glasses and video technology in clinical settings requires rigorous compliance with privacy and data security regulations to protect patient confidentiality. The project ensures that all activities adhere to the General Data Protection Regulation (GDPR) and other relevant laws, thereby maintaining the highest standards of patient privacy and trust.

At the core of the project's ethical principles is obtaining informed consent. Patients, and all participants, must be fully aware of and consent to being recorded and involved in all the activities, understanding the purpose, use, and storage of the video content. This transparency fosters trust and respects patient autonomy. The project provides comprehensive guidelines on obtaining and documenting consent, ensuring that healthcare providers uphold these ethical standards consistently.

Anonymization techniques are also critical in protecting patient identity. The manual details best practices for anonymizing video content, including blurring faces, altering voices, and removing identifiable text. These measures are essential for maintaining confidentiality and ensuring that educational content can be used without compromising patient privacy.

The manual is an interactive guide that walks participants through the processes of how to set up and calibrate smart glasses for use in clinical environments. This entails making sure the gear is properly loaded with charged batteries, that all updates are fully loaded and that a pre-trial has been done in advance of any recording, cutting down the chance of any technological problems when an activity is taking place. It also stresses the importance of collaboration with health professionals and IT teams to quickly identify any technical issues.

Recording procedures ought to be carefully planned to ensure the highest standards of quality and ethical compliance. The manual discusses the importance of preparing recording environment, keeping hygiene and sterile state during the procedure. In doing so healthcare professionals can produce high-quality educational content that enhances learning and skill development.

The process of video editing also plays a very important role in the project, as it allows transforming raw footage into engaging, but also manageable content. The manual provides practical tips for editing videos, including trimming of parts that may be irrelevant to the learning process, enhancing audio and visual quality, and adding annotations and graphics. In this process, anonymization is given particular attention, due to its crucial importance in the process of ensuring legal and ethical compliance. The manual provides detailed instructions on how to blur any identifiable personal characteristics, to protect patient privacy.

The manual is designed to help users upload and manage video assets within educational platforms such as Moodle. It deals with secure communication, storage management and privacy issues so that the video contents only available to authorized users. Lastly, the document recognizes the importance of metadata in making content searchable and organized within file structures.

The ClinicalModelling project clouts video modeling and video self-modeling techniques to enhance professional development among health professionals. These techniques allow visual demonstrations of clinical procedures and grant healthcare professionals the possibility to review and assess their performance, and to improve in specific aspects. By integrating these methods into training programs, the project promotes continuous learning and skill refinement, ultimately leading to improved patient care.

The ClinicalModelling project constitutes a significant breakthrough in healthcare education, blending cutting-edge technology with strong ethical standards. Through offering thorough instructions on the use of smart glasses, video technology and innovative pedagogical techniques, the project enables healthcare professionals to enhance their skills constantly and provide superior patient care. Upholding ethical and legal standards guarantees that these advancements are made while upholding patient privacy and trust. As the project progresses, it establishes a new benchmark

for healthcare education, leading the way for a future where technology and healthcare collaborate to enhance outcomes for all.

References

- Akram, H., Abdelrady, A. H., Al-Adwan, A. S., & Ramzan, M. (2022). Teachers' Perceptions of Technology Integration in Teaching-Learning Practices: A Systematic Review. In *Frontiers in Psychology* (Vol. 13). Frontiers Media SA. <https://doi.org/10.3389/fpsyg.2022.920317>
- Alenezi, M. (2023). Digital Learning and Digital Institution in Higher Education. In *Education Sciences* (Vol. 13, Issue 1, p. 88). MDPI AG. <https://doi.org/10.3390/educsci13010088>
- Alkatout, I., Dhanawat, J., Ackermann, J., Freytag, D., Peters, G., Maass, N., Mettler, L., & Pape, J. M. (2021). Video Feedback and Video Modeling in Teaching Laparoscopic Surgery: A Visionary Concept from Kiel. In *Journal of Clinical Medicine* (Vol. 10, Issue 1, p. 163). MDPI AG. <https://doi.org/10.3390/jcm10010163>
- Barcala-Furelos, R., Aranda-García, S., Otero-Agra, M., Fernández-Méndez, F., Alonso-Calvete, A., Martínez-Isasi, S., Greif, R., & Rodríguez-Núñez, A. (2023). Are smart glasses feasible for dispatch prehospital assistance during on-boat cardiac arrest? A pilot simulation study with fishermen. *Internal and emergency medicine*, 18(5), 1551–1559. <https://doi.org/10.1007/s11739-023-03251-6>
- Berger, D. J., Gentner, R., Edmunds, T., Pai, D. K., & d'Avella, A. (2013). Differences in Adaptation Rates after Virtual Surgeries Provide Direct Evidence for Modularity. In *Journal of Neuroscience* (Vol. 33, Issue 30, pp. 12384–12394). Society for Neuroscience. <https://doi.org/10.1523/jneurosci.0122-13.2013>
- Brown, O., Power, N., & Conchie, S. M. (2020). Immersive simulations with extreme teams. In *Organizational Psychology Review* (Vol. 10, Issues 3–4, pp. 115–135). SAGE Publications. <https://doi.org/10.1177/2041386620926037>
- Carden, J., Jones, R. J., & Passmore, J. (2021). Defining Self-Awareness in the Context of Adult Development: A Systematic Literature Review. In *Journal of Management Education* (Vol. 46, Issue 1, pp. 140–177). SAGE Publications. <https://doi.org/10.1177/1052562921990065>
- Choe, A. Y. (2023). Ensuring effective interdisciplinary communication. In *Journal of Hospital Medicine* (Vol. 18, Issue 2, pp. 198–199). Wiley. <https://doi.org/10.1002/jhm.13043>
- de Kok, J. W. T. M., de la Hoz, M. Á. A., de Jong, Y., Brokke, V., Elbers, P. W. G., Thorald, P., Castillejo, A., Trenor, T., Castellano, J. M., Bronchalo, A. E., Merz, T. M., Faltys, M., Casares, C., Jiménez, A., Requejo, J., Gutiérrez, S., Curto, D., Rättsch, G., ... Peppink, J. M. (2023). A guide to sharing open healthcare data under the General Data Protection Regulation. In *Scientific Data* (Vol. 10, Issue 1). Springer Science and Business Media LLC. <https://doi.org/10.1038/s41597-023-02256-2>

Drill, R. B., & Bellini, S. (2021). Combining Readers Theater, Story Mapping and Video Self-Modeling Interventions to Improve Narrative Reading Comprehension in Children with Autism Spectrum Disorder. In *Journal of Autism and Developmental Disorders* (Vol. 52, Issue 1, pp. 1–15). Springer Science and Business Media LLC. <https://doi.org/10.1007/s10803-021-04908-x>

Enoch, L. C., Abraham, R. M., & Singaram, V. S. (2022). A comparative analysis of the impact of online, blended, and face-to-face learning on medical students' clinical competency in the affective, cognitive, and psychomotor domains. In *BMC Medical Education* (Vol. 22, Issue 1). Springer Science and Business Media LLC. <https://doi.org/10.1186/s12909-022-03777-x>

Fidan, M., & Gencil, N. (2022). Supporting the Instructional Videos With Chatbot and Peer Feedback Mechanisms in Online Learning: The Effects on Learning Performance and Intrinsic Motivation. In *Journal of Educational Computing Research* (Vol. 60, Issue 7, pp. 1716–1741). SAGE Publications. <https://doi.org/10.1177/07356331221077901>

Firat, M. (2023). Integrating AI Applications into Learning Management Systems to Enhance e-Learning. In *Öğretim Teknolojisi ve Hayat Boyu Öğrenme Dergisi - Instructional Technology and Lifelong Learning* (pp. 1–14). *Oğretim Teknolojisi ve Hayat Boyu Öğrenme Dergisi (ITALL)*. <https://doi.org/10.52911/itall.1244453>

Forde-Johnston, C., Butcher, D., & Aveyard, H. (2022). An integrative review exploring the impact of Electronic Health Records (EHR) on the quality of nurse–patient interactions and communication. In *Journal of Advanced Nursing* (Vol. 79, Issue 1, pp. 48–67). Wiley. <https://doi.org/10.1111/jan.15484>

Goh, L., Allen, N. E., Ahmadpour, N., Ehgoetz Martens, K. A., Song, J., Clemson, L., Lewis, S. J. G., MacDougall, H. G., & Canning, C. G. (2021). A Video Self-Modeling Intervention Using Virtual Reality Plus Physical Practice for Freezing of Gait in Parkinson Disease: Feasibility and Acceptability Study. In *JMIR Formative Research* (Vol. 5, Issue 11, p. e28315). JMIR Publications Inc. <https://doi.org/10.2196/28315>

Grill, J.-B., Strub, F., Altché, F., Tallec, C., Richemond, P. H., Buchatskaya, E., Doersch, C., Pires, B. A., Guo, Z. D., Azar, M. G., Piot, B., Kavukcuoglu, K., Munos, R., & Valko, M. (2020). Bootstrap your own latent: A new approach to self-supervised Learning (Version 3). arXiv. <https://doi.org/10.48550/ARXIV.2006.07733>

Guamán, D. S., Rodríguez, D., del Alamo, J. M., & Such, J. (2023). Automated GDPR compliance assessment for cross-border personal data transfers in android applications. In *Computers & Security* (Vol. 130, p. 103262). Elsevier BV. <https://doi.org/10.1016/j.cose.2023.103262>

Ismail, I. I., Abdelkarim, A., & Al-Hashel, J. Y. (2021). Physicians' attitude towards webinars and online education amid COVID-19 pandemic: When less is more. In I. Ashkenazi (Ed.), *PLOS ONE* (Vol. 16, Issue 4, p. e0250241). Public Library of Science (PLoS). <https://doi.org/10.1371/journal.pone.0250241>

Khalimov, G., Kotukh, Y., Didmanidze, I., & Khalimova, S. (2021). Encryption scheme based on small Ree groups. In 2021 7th International Conference on Computer Technology Applications. ICCTA 2021: 2021 7th International Conference on Computer Technology Applications. ACM. <https://doi.org/10.1145/3477911.3477917>

Kleinert, R., Heiermann, N., Plum, P. S., Wahba, R., Chang, D. H., Maus, M., Chon, S. H., Hoelscher, A. H., & Stippel, D. L. (2015). Web-Based Immersive Virtual Patient Simulators: Positive Effect on Clinical Reasoning in Medical Education. *Journal of medical Internet research*, 17(11), e263. <https://doi.org/10.2196/jmir.5035>

Lin, Y.-B., Sung, Y.-L., Lei, J., Bansal, M., & Bertasius, G. (2022). Vision Transformers are Parameter-Efficient Audio-Visual Learners (Version 2). arXiv. <https://doi.org/10.48550/ARXIV.2212.07983>

Liu, H. (2021). Moderating effects of task interdependence on interaction behaviours and creativity for nursing students on interdisciplinary teams. In *Journal of Advanced Nursing* (Vol. 78, Issue 1, pp. 131–141). Wiley. <https://doi.org/10.1111/jan.14961>

Long, Y., Li, C., & Dou, Q. (2022). Robotic Surgery Remote Mentoring via AR with 3D Scene Streaming and Hand Interaction (Version 2). arXiv. <https://doi.org/10.48550/ARXIV.2204.04377>

Longhini, J., Rossetini, G., & Palese, A. (2021). Massive open online courses for nurses' and healthcare professionals' continuous education: a scoping review. In *International Nursing Review* (Vol. 68, Issue 1, pp. 108–121). Wiley. <https://doi.org/10.1111/inr.12649>

McVey, L., Alvarado, N., Keen, J., Greenhalgh, J., Mamas, M., Gale, C., Doherty, P., Feltbower, R., Elshehaly, M., Dowding, D., & Randell, R. (2020). Institutional use of National Clinical Audits by healthcare providers. In *Journal of Evaluation in Clinical Practice* (Vol. 27, Issue 1, pp. 143–150). Wiley. <https://doi.org/10.1111/jep.13403>

Miguel-Alonso, I., Rodriguez-Garcia, B., Checa, D., & Bustillo, A. (2023). Countering the Novelty Effect: A Tutorial for Immersive Virtual Reality Learning Environments. In *Applied Sciences* (Vol. 13, Issue 1, p. 593). MDPI AG. <https://doi.org/10.3390/app13010593>

Moore, G. F., Audrey, S., Barker, M., Bond, L., Bonell, C., Hardeman, W., Moore, L., O'Cathain, A., Tinati, T., Wight, D., & Baird, J. (2015). Process evaluation of complex interventions: Medical Research Council guidance. *BMJ (Clinical research ed.)*, 350, h1258. <https://doi.org/10.1136/bmj.h1258>

Moskovtseva, L., Mitrofanova, O., & Zhuravleva, O. (2022). Features of Continuous Education of the Adult Population. In 2022 2nd International Conference on Technology Enhanced Learning in Higher Education (TELE). 2022 2nd International Conference on Technology Enhanced Learning in Higher Education (TELE). IEEE. <https://doi.org/10.1109/tele55498.2022.9801059>

- Parisi, G. I., Kemker, R., Part, J. L., Kanan, C., & Wermter, S. (2019). Continual lifelong learning with neural networks: A review. In *Neural Networks* (Vol. 113, pp. 54–71). Elsevier BV. <https://doi.org/10.1016/j.neunet.2019.01.012>
- Pino-James, N., Shernoff, D. J., Bressler, D. M., Larson, S. C., & Sinha, S. (2019). Instructional Interventions That Support Student Engagement: An International Perspective. In *Handbook of Student Engagement Interventions* (pp. 103–119). Elsevier. <https://doi.org/10.1016/b978-0-12-813413-9.00008-5>
- Rantamaa, H.-R., Kangas, J., Jordan, M., Mehtonen, H., Mäkelä, J., Ronkainen, K., Turunen, M., Sundqvist, O., Syrjä, I., Järnstedt, J., & Raisamo, R. (2022). Evaluation of voice commands for mode change in virtual reality implant planning procedure. In *International Journal of Computer Assisted Radiology and Surgery* (Vol. 17, Issue 11, pp. 1981–1989). Springer Science and Business Media LLC. <https://doi.org/10.1007/s11548-022-02685-1>
- Rassameethes, B., Phusavat, K., Pastuszak, Z., Hidayanto, A. N., & Majava, J. (2023). Constructive feedback and the perceived impacts on learning and development by the learners' genders. In *Human Systems Management* (Vol. 42, Issue 5, pp. 487–498). IOS Press. <https://doi.org/10.3233/hsm-220172>
- Rini, E. F. S., & Aldila, F. T. (2023). Practicum Activity: Analysis of Science Process Skills and Students' Critical Thinking Skills. In *Integrated Science Education Journal* (Vol. 4, Issue 2, pp. 54–61). Cahaya Ilmu Cendekia. <https://doi.org/10.37251/isej.v4i2.322>
- Roosan, D., Law, A. V., Karim, M., & Roosan, M. (2019). Improving Team-Based Decision Making Using Data Analytics and Informatics: Protocol for a Collaborative Decision Support Design. In *JMIR Research Protocols* (Vol. 8, Issue 11, p. e16047). JMIR Publications Inc. <https://doi.org/10.2196/16047>
- Sharma, P., Namasudra, S., Gonzalez Crespo, R., Parra-Fuente, J., & Chandra Trivedi, M. (2023). EHDHE: Enhancing security of healthcare documents in IoT-enabled digital healthcare ecosystems using blockchain. In *Information Sciences* (Vol. 629, pp. 703–718). Elsevier BV. <https://doi.org/10.1016/j.ins.2023.01.148>
- Taherdoost, H. (2018). A review of technology acceptance and adoption models and theories. In *Procedia Manufacturing* (Vol. 22, pp. 960–967). Elsevier BV. <https://doi.org/10.1016/j.promfg.2018.03.137>
- Wang, Z., Myles, P., & Tucker, A. (2021). Generating and evaluating cross-sectional synthetic electronic healthcare data: Preserving data utility and patient privacy. In *Computational Intelligence* (Vol. 37, Issue 2, pp. 819–851). Wiley. <https://doi.org/10.1111/coin.12427>
- Xu, P., & Patnao, J.L. (2023). Exploring the Impact of Interactive Multimedia Elements on the Effectiveness of Online Teaching in Higher Education: A Quality Evaluation Perspective. (2023). In *International Journal of Science and Engineering Applications*. Association of Technology and Science. <https://doi.org/10.7753/ijsea1212.1002>

Yang, Y., Lyu, J., Wang, R., Wen, Q., Zhao, L., Chen, W., Bi, S., Meng, J., Mao, K., Xiao, Y., Liang, Y., Zeng, D., Du, Z., Wu, Y., Cui, T., Liu, L., Lao, W. C., Li, X., Cheung, C. Y., ... Lin, H. (2022). A digital mask to safeguard patient privacy. In *Nature Medicine* (Vol. 28, Issue 9, pp. 1883–1892). Springer Science and Business Media LLC. <https://doi.org/10.1038/s41591-022-01966-1>

Appendix

Video Modelling and Video Self-Modelling Activity Checklist

Pre-Recording Phase

Define the Objectives

- Specify the skills or behaviours the video aims to capture
- Ensure objectives are specific, measurable, achievable, relevant, and time-bound (SMART)
- Tailor the content to the learners' level of expertise

Secure Consent

- Obtain informed consent from all participants
- Explain the purpose of the video and how it will be used
- Have all participants sign confidentiality agreements
- Document and securely store all consent forms

Plan the Environment

- Select a relevant setting for the recording
- Ensure the environment is quiet, well-lit, and free from distractions
- Prepare all recording equipment (*smart glasses, cameras, microphones, lighting*)
- Conduct a risk assessment to identify and mitigate potential safety hazards

Recording Phase

Conduct Rehearsals

- Rehearse with all participants to ensure comfort with their roles and the video flow
- Make necessary adjustments based on rehearsal feedback

Ensure Ethical Considerations

- Prioritize patient safety and dignity
- Ensure the recording adheres to all ethical guidelines and institutional policies

Minimize Distractions

- Limit unnecessary people or objects in the video frame
- Ensure the background is simple and free from distractions

Maintain Steady Focus

- Use stable camera work and clear communication
- Utilize visual aids or props if necessary

Post-Recording Phase

Review Footage

- Immediately review recorded footage for lighting, audio, or content issues
- Re-record any problematic segments (*if possible*)

Edit the Video

- Trim unnecessary parts and enhance video quality
- Anonymize sensitive information (blur faces, remove names, alter voices)
- Add annotations, captions, and subtitles for clarity and accessibility

Secure Final Approvals

- Have the video reviewed by subject matter experts
- Obtain final approvals from participants, educators, and administrators

Uploading and Sharing Phase

Choose the Platform

- Select an appropriate platform for hosting and sharing the video
- Ensure the platform is secure and user-friendly

Optimize Metadata

- Add descriptive titles, tags, and descriptions
- Ensure metadata accurately reflects the content and purpose

Set Access Permissions

- Configure access settings to ensure only authorized users can view the video
- Use role-based access controls

Monitor and Evaluate

- Collect feedback from learners
- Use feedback to refine future videos
- Continuously monitor the video's usage and impact

This checklist is designed to be printed out and used by healthcare professionals preparing a video modelling or video self-modelling activity.

It ensures that all necessary steps are followed, from planning and recording to editing and sharing, maintaining high standards of quality and ethical compliance throughout the process.



ClinicalModelling