Immersive Technologies in Healthcare
( Nurses are Getting Future Ready)

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Introduction

Immersive technologies, such as *virtual reality* (VR) and *augmented reality* (AR), are increasingly being used in healthcare across the Middle East and Africa region. These technologies **enable nurses to participate** in realistic simulations of medical procedures, practice communication and collaboration skills, and conduct virtual consultations with patients in remote or underserved areas.
Introduction

There are **ethical considerations** that must be addressed, such as informed consent, privacy and confidentiality, and bias and stereotyping.

**Providing nurses with the training and support** they need to use them effectively, so can ensure that nurses are future ready and equipped with the tools they need to provide high-quality care and transform healthcare delivery.
There are two major motivating elements behind the metaverse’s popularity:

1) The pandemic of COVID-19 has caused rapid change in the global healthcare sector, leading to adaptation and innovation of all technologies.

2) Emerging technical enablers have increased the likelihood of the metaverse, with 5G/6G communication systems enabling users to be visually and physically engaged in a virtual environment while using AR/VR and artificial intelligence.
Introduction

The **metaverse** is a virtual space where users can interact with 3D digital objects and 3D virtual avatars in a complex manner.

**Artificial Intelligence** is an emerging technology that uses computers to simulate human intelligence and perform tasks such as decision-making, problem-solving, and learning.

The combination of the two unlocks a new degree of verisimilitude.
Metaverse (combination of AR, VR and MR technologies)
VIRTUAL REALITY (VR)

Fully immersive environment with only virtual elements involved. A separate experience from the real world. Controllers are used as reference and button interaction.

AUGMENTED REALITY (AR)

Augmented real-world environment with information and data represented by a device that uses references such as trackers, location, time, etc.

MIXED REALITY (MR)

A combination of both AR and VR. Virtual objects that react to the real environment. Glasses allow seeing the real environment and device might allow interaction with both real and virtual objects.

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Reshaping the Workforce Technologies

40% of the tasks performed by health care are “support occupations” can be automated, as can 33% of the tasks performed by health care “practitioners and technical occupations.”
Egypt Ranking 2022

89th  Egypt ranks 89th among the 132 economies featured in the GII 2022.

14th  Egypt ranks 14th among the 36 lower-middle-income group economies.

15th  Egypt ranks 15th among the 19 economies in Northern Africa and Western Asia.

Source: available at Global Innovation Index 2022 What is the future of innovation driven growth?
Rankings for Egypt (2020-2022)

<table>
<thead>
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<th>Year</th>
<th>GII</th>
<th>Innovation inputs</th>
<th>Innovation outputs</th>
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<td>104</td>
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<tr>
<td>2022</td>
<td>89</td>
<td>97</td>
<td>83</td>
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Egypt 2022 ranks position **is higher than** last two years.
Benefits of immersive technologies

1 | Improve productivity and efficiency.
2 | Expand job responsibilities.
3 | Improve performance.
4 | Simulated learning.
5 | Remote training.
6 | Patient education.
7 | Telehealth.
8 | Collaboration and research.
Several challenges may face implementation in Egypt

1. Limited infrastructure
2. Evidence of effectiveness
3. Resistance to change
4. Cost
5. Limited access
6. Data privacy and security
Examples of projects in Egypt
Partograph as Artificial Intelligence Nursing Tool

PAINT Model
Mti Student’s Nursing Project for AccuVein to facilitate peripheral intravenous placement in chemotherapy department - Baheya Hospital
several potential applications in healthcare
Potential Applications in Healthcare

- Virtual Counselling
- Medical Diagnosis
- Surgeries
- Patient Monitoring
- Vital Monitoring
- Medical Education
- Alert Response
- Holographic Imaging
- Nanobot Surgery
- Virtual Experiments
Revolutionize the Medical Education and Training
Examples of VR and AR tools that can be used for nursing education:
BioMarkers - Cognitive and Emotional State

Collecting and analyzing emotional and physical responses in VR

Virtual environments are used clinically to treat several important mental and behavioral health problems:

- Post-Traumatic Stress Disorder
- Generalized Anxiety Disorder
- Social Anxiety Disorder
- Depression
- Mild Cognitive Impairment
- Autism Spectrum Disorder
- ADHD

Support Mental Health
Surgeons using AR headsets to project visuals of the patient's internal anatomies

VR image of the exfoliation of the submandibular gland and vessel under the layers of connective tissue using two pean forceps
A. HoloAnatomy is being used to generate holographic images of different body systems.
B. Brain study being performed using HoloAnatomy.
C. Detailed anatomy of the heart is visualized using Microsoft HoloLens
A. The HoloLens is in use during the face transplant procedure.
B. Surgeons consult a 3D-printed stereolithographic model of the recipient's face during the transplantation procedure.

Application in Plastic Surgeries
A. 3D representation of a patient's anatomy by Doctor while wearing the HoloLens during preoperative planning to remove a malignant tumor (tumor shown in yellow).

B. 3D holographic picture developed with Microsoft HoloLens is presented on a monitor in the operating room during a liver tumor operation.
Map of the patient's veins projected onto the skin using AccuVein technology
Kind VR develops VR therapies to assist patients in coping with pain and stress
Metaverse used in distraction therapy for effective pain management

A pregnant woman using a VR headset to view a simulated beach area alleviates discomfort during the early stages of labor.
Recommendations for hospitals and healthcare systems

- **Strengthen systems** to disseminate lessons from early adoption and share examples of effective, evidence-based technological change programs.
- **Use validated frameworks** to implement technological solutions and ensure that staff are trained to use these.
- **Support collaborations** between the health system and the universities aimed at improving the skills and talent of health care staff.
Recommendations for HOSPITALS AND HEALTH SYSTEMS

• **Work with stakeholders** across the organization to **review the regulation and compliance requirements** for new digital health care technologies, including the provision of guidance and training on cybersecurity, data privacy and data anonymization.

• **Provide access to training resources** and educational programs in digital health care technologies to assess and build digital readiness of health care staff.
Recommendations for HEALTH CARE LEADERS

• Bring humanity to the machine-patient interface and focus on the essential human skills that AI and computers cannot achieve, such as collaboration, leadership, reflection, compassion and empathy.

• Involve staff in the co-design of transformation projects, particularly in identifying how digital health care technologies can help to improve both patient experience and staff productivity.
Reference

- DelveInsight is a Business Consulting and Market research company, providing expert business solutions for life science vertical and offering quintessential advisory services in the areas of R&D, Strategy Formulation, Operations, Competitive Intelligence, Competitive Landscaping, and Mergers & Acquisitions. DelveInsight Business Research LLP ©Apr 13, 2022 Metaverse in Healthcare - Key Applications, Challenges, and Companies (delveinsight.com)
- Global Innovation Index 2017 - Innovation feeding the world
- Global Innovation Index 2022 What is the future of innovation driven growth?
- Wiederhold, B. K., & Riva, G. (2020). ANNUAL REVIEW OF CYBERTHERAPY AND TELEMEDICINE.
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