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Technological Innovations in Opticianry Practice and Education in Nigeria

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Abstract

Technological innovation is reshaping opticianry practice, offering new pathways for delivering high-quality and accessible eye care as well as in opticians' education. This paper explores the transformative role of modern technology and digital health solutions in opticians' education and practice, emphasizing their contribution to synergising with other eye care professionals. Virtual try-on systems, AI-driven solutions, telemedicine, and the integration of smart technologies into eyewear are revolutionising how opticians serve patients. These innovations not only enhance opticains' education and patient experience but also promote efficiency and inclusivity in eye care delivery. The World Health Organisation's Global Strategy on Digital Health advocates for the integration of information technology into healthcare, reinforcing the global shift toward digital transformation in eye care. Artificial intelligence, in customising lens solutions and optimising business processes in the optical industry. However, its adoption is not without challenges, including concerns around data reliability and privacy. Additionally, the automation of contact lens manufacturing, through robotic pick and place operations, highlights the potential of technological innovations such as robotics in improving production hygiene and reducing labour dependency. By embracing these innovations, opticians can not only improve service delivery but also foster interdisciplinary collaboration within the broader eye care ecosystem. Ultimately, the integration of advanced technologies in opticianry highlights the need for updated educational curricula, enhanced professional training, and strategic policy support to ensure sustainable and inclusive eyes care solutions in a rapidly evolving digital era.

Keywords: Technology, Innovation, Artificial Intelligence, Opticianry, Eye Care.

Introduction

Information technology is a part of our everyday life, and it has tremendous potential to improve people's health if applied in the health sector. The Global Strategy on Digital Health, adopted in 2020 by the World Health Assembly, supports the strengthening of digital health services to improve health outcomes. There is also growing consensus that using cutting-edge digital innovations and technologies will enable more people to benefit from universal health coverage [1].

Global eye health is defined as the degree to which vision, ocular health, and function are maximised worldwide, thereby optimising overall wellbeing and quality of life. Improving eye health is a global priority as a key to unlocking human potential by reducing the morbidity burden of disease, increasing productivity, and supporting access to education. Although extraordinary progress fueled by global eye health initiatives has been made over the last decade, substantial challenges remain impeding further progress.

The accelerated development of digital health and artificial intelligence (AI) applications provides an opportunity to transform eye health, from facilitating and increasing access to eye care to supporting clinical decision making with an objective, data-driven approach [2].

As artificial intelligence (AI) continues to penetrate nearly every industry and aspect of our everyday lives, eye care professionals (ECPS) and optical retailers are taking a hard look at the technology, and appear to be in various stages of implementing it into their business models and strategies. It also appears that AI is ready to permeate the optical industry as well, with the prom-

ise of more efficient processes that can benefit both providers and patients/consumers alike [3].

While AI is proliferating across many industries, many C-suite executives are moving forward cautiously with its adoption. Some cite security concerns, and others point to the unreliability of AI systems that can generate wildly inaccurate information. A recent example that made headlines is Google's experimental AI Overviews search tool that the company withdrew for further development after it advised some users to use glue to make cheese stick to pizza better and said geologists recommend people eat a rock every day [3].

Impact of Modern Technologies in Eyewear Dispensing

Emerging technologies such as virtual try-on systems and telemedicine are enhancing the field of eyewear dispensing. The eyewear dispensing industry is undergoing a significant transformation driven by rapid advancements in technology.

Virtual Try-On Technology

Online shopping has continued to grow in popularity, and the advances of internet technology have enhanced customers' experiences. One technology online retailer have been using to increase sales is virtual try-on (VTO) [4]. This technology allows customers to see how different frames will look on their faces without physically trying them on. Using augmented reality (AR), virtual try-on applications create a realistic representation of how eyewear will fit and appear, enhancing the shopping experience and increasing customer satisfaction [5].

Telemedicine and Remote Care

Before the onset of the COVID-19 pandemic, telemedicine had been underutilised due to challenges with limited access, low reimbursement, interstate licensing, privacy issues, workflow integration, and concerns regarding efficacy. However, it has been recognised that telemedicine can improve access to healthcare, lower costs, reduce travel and wait times, facilitate evaluations of patients with limited mobility or communicable diseases, and provide quality care comparable to in-person visits [6]. In the practice of opticianry, opticians can attend to patients and get their glasses fitted and delivered without the patient actually visiting the optical outfit.

Integration of Smart Technologies in Eyewear

Smart technologies are increasingly integrated into eyewear, offering additional functionalities beyond vision correction. Smart glasses, equipped with sensors and connectivity features, can monitor health metrics, provide navigation assistance, and connect with digital devices [5].

Automation of Pick and Place Operation in Contact Lens Manufacturing

The lens pick and place robot has successfully helped to automate the process in contact lens manufacturing. It is designed so that it replaces operators to pick and place contact lenses from a cassette to the PS-48 tray automatically. The microcontroller used in this project is Arduino Uno. SolidWorks is a software used to create the design before fabrication. Actuators used in this project are stepper motors due to their high precision in calculating steps to move the overall system. C programming is used along with the Arduino Integrated Development Environment (IDE) in programming the movement of the robot. For this process, the robot is controlled by pressing the start and stop buttons. The automated lens pick and place robot is way better compared to humans since it is capable of reducing cycle time to complete the process by picking seven (7) lenses simultaneously. Moreover, the lens pick and place robot tends to reduce the number of labourers and improve the hygiene in contact lenses production [7].

Optician's Education

With the development of technology and communications tools, e-learning platforms are becoming more common in the learning process of students. In the context of using an integrated learning process, it is necessary to identify students' perceptions about the use of e-learning platforms. While one may argue that the adoption of technology in Opticians' education in Nigeria has been a slow process, the importance cannot be denied. It is also worthy of note that the Optometrists and Dispensing Opticians Registration Board of Nigeria (ODORBN), through the Head of Education department, in 2020, encouraged institutions offering programmes in Dispensing Opticianry, to adopt E-learning due to the COVID-19 outbreak at the time. This proved to be a huge success during the MOP-UP programme embarked upon by the board in 2019 through 2020. The potential of e-learning in educating student opticians cannot be overemphasised [8, 9].

Conclusion

Technology is changing how eye care is delivered, making services more efficient, accurate, and accessible. Tools like virtual try-on systems and artificial intelligence are helping eye care professionals provide better and more personalised care. Innovations such as telemedicine and smart eyewear have also made it easier for people to get the help they need, even from a distance. These advancements not only improve the quality of care but also reduce waiting times and make eye care more convenient for everyone. As the field continues to grow, eye care professionals need to work together, learn new skills, and embrace these modern tools. This will ensure that more people can benefit from innovative and effective vision care solutions. W-learning holds a huge potential as a tool for opticians' education. This means that distance is no longer a barrier to content delivery as the need for the services of opticians continue to grow [10, 11].

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