

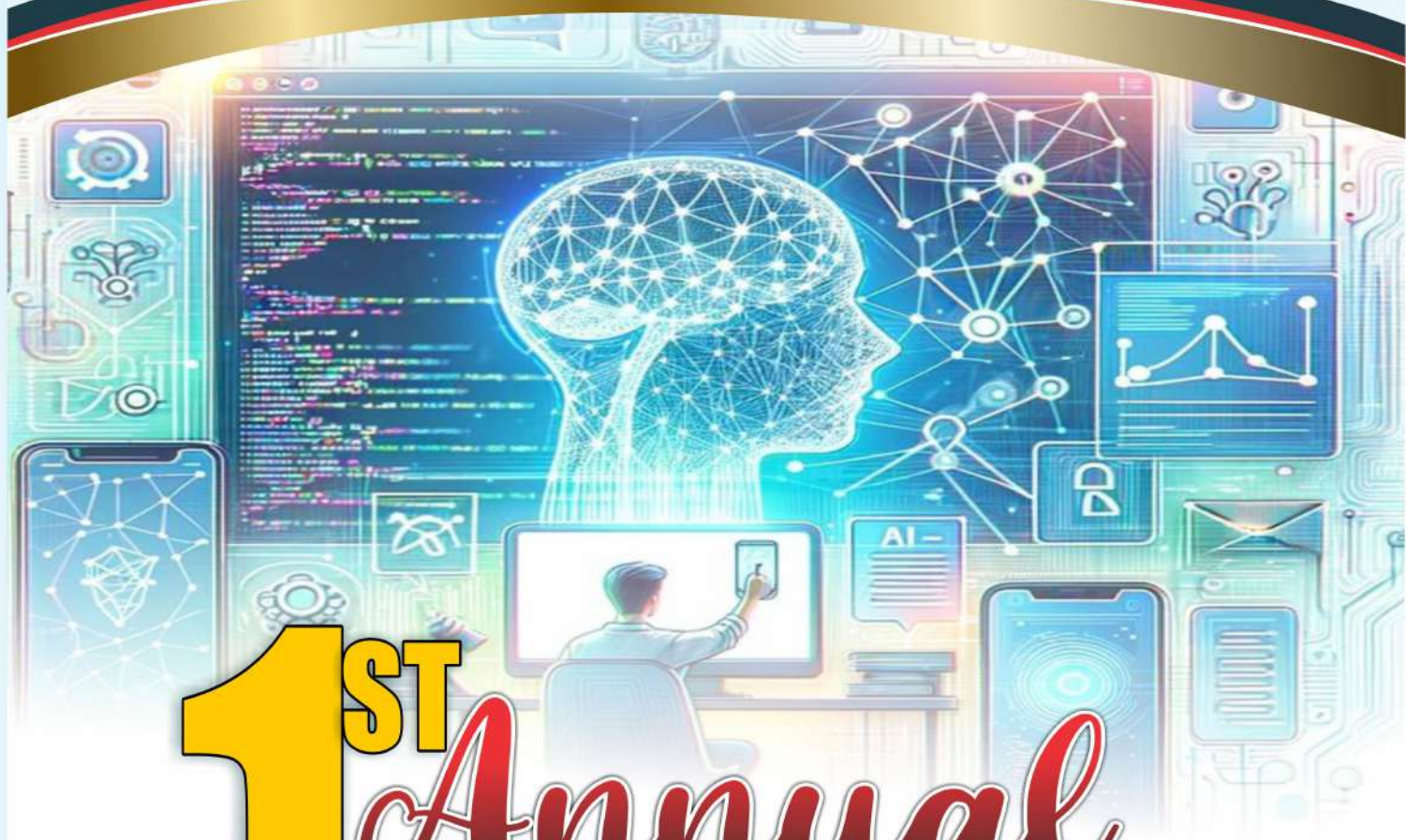


ASSOCIATION OF SCIENCE EDUCATORS ANAMBRA (ASEA)

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**SCIENCE EDUCATORS AND DIGITAL LITERACY
IN THE 21ST CENTURY**

SCIENCE EDUCATORS AND DIGITAL LITERACY IN THE 21ST CENTURY



1ST Annual CONFERENCE PROCEEDINGS 2025

Editor
Prof. Josephine N. Okoli

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ASSOCIATION OF SCIENCE EDUCATORS ANAMBRA (ASEA)

**THEME: SCIENCE EDUCATORS AND DIGITAL LITERACY IN THE 21ST
CENTURY
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Editor

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Ogbonna Marachi Samuel (Sec.)	Physical and Health Education Department Federal College of Education (Tech) Umuze, Anambra State, Nigeria
Usan Peter	Chemistry Department Federal Technical College, Awka, Anambra State, Nigeria

PROGRAMME OF EVENTS

- Opening Praying
- Chairman's Opening Remark
- Breaking of Kola nut
- Welcome Address by the acting President of the Association
- Keynote Presentation by Prof. Cecilia O. Ekwueme
- Lead Paper Presentation by Prof. Telima Adolphus
- About the Electronic Book / Unveiling of Book Chapter – E-Book launch
- Item 7
- Meritorious Award
- Paper Presentations

MERITORIOUS AWARD CITATION OF Dr SAMUEL ALFAYO BOH



It is my pleasure and singular honour to be called upon to read a citation on one of the eminent Doctor that the family of Alfayo has ever produced.

People are not chosen for their comfort, they most often to prepare for a life of self sacrifice and even sufferings on behalf of other. And most often their calling is not for privilege but for service. Whichever prism you use in view him, Dr Samuel Alfayo Boh a class teacher of high repute, a man of integrity and fear of God, sacrifices and service for the betterment and advisement of humanity.

May, 18, 1969 marked the beginning of the steadily progressive son of Boh colored mother and the Shongomite father. This account of this childhood and youth in Gombe State shows the prince he had to pay for such a birth. It did not take long before he was revealed as a man of vision and mission as every step he took in both early life and now was clogged with success, and a wide breath of accomplishment.

Dr.Samuel Alfayo Boh spends is early life in Boh with his parent. He attended Boh primary school from 1976 to1984 exposed his qualities as a gifted child enable him to proceed to Government Science Secondary School Kaltungo 1984 to 1987,Teachers College Gombe 1988 to 1990 the exceptional this qualities made way for him to enlist to College of Education Azare 1993 where he bagged National Certificate in Education (NCE) while in Azare, he was elected parliamentary student union 1994 to 1995 session and thereafter in the year 1987, he proceeded to famous University of Maiduguri Borno State and had a Bachelor of Education and passed with flying colours in 2000. Diploma in World Evangelism Mission Training Institute in Borno State in 1999. In 2001, the indefatigable Samuel was drafted in to the National youth service scheme in Tsafe, Zamfara State his service witnessed a continued story of one success after another like the Nehemiah of the Holy Bible. As a man who fully understand what benefits education could bring his way when tapped. Dr Samuel did not hesitate to define where he was headed for in that direction. In 2004, he gain admission to University of Maiduguri, Borno States as an intelligent

student, he graduated in 2008 with Master of Education in Curriculum and Instruction (M.ED). Diploma and Certificate in computer 2009. In the year between 2013 to 2016 he bagged Masters in Guidance and Counseling in Theological Seminary College Kaltungo in Gombe State. Moreover, the influence this celebrated academia exerted on him equipped him to master the techniques of research, the canons of interpretation and reconstruction of academic research, the craft and skills involved and teacher – students relationship in 2010 he proceeded to one of the best University in Nigeria University of Nigeria Nsukka in Enugu State and come out with Doctor of philosophy (Ph.D) in Curriculum and Instruction.

A man with a formidable profile charismatic personality, Dr Samuel is indeed an achieve per excellence he has not only carved a niche for himself, but has also made name and reputation in Nigeria. He has always impacted positively in the lives of everyone he meets. He has also shown high sense of professionalism and dedication to the service of humanity. On several occasion Samuel has interrupted his travels to attend to civilian, accident victims and he has truly saved a lot of lives.

Dr. Samuel Alfayo Boh started his civil service career as a classroom teacher; he had a little starting with the noble teaching profession. In 1996 he took appointment with Boh primary school, Labeke primary school in 1997, Kulishin primary school 1999, Pivotal Teachers Training Programme Lapan in 1999. In 2000 He moved to Government Day Secondary School Boh. In 2000 Tutor Senator T.U. Wada Educational Emancipation Scheme. Presently, lecturer with Federal University Kashere, in the Department of Educational Foundations

Dr. Samuel is a versatile personality of note and a man of many parts. He is fondly referred to as sport, Author and a born teacher of good repute. In his romance with great academics, he has received more than twenty awards, member of many associations, he has presented more than thirty academic papers in both international and national journals, he has published Ninety journals, sixteen book chapters, he has written eight books, presently chairman board of governors Jim Collis Kufai, fellow members of more than seven associations, former permanent commissioner sports commission Gombe State, chairman and secretary of many association, He is happily married to Mrs. Abigail Samuel and blessed with many children.

Having described himself as an enterprising person who has excellence attached to his name, Dr Samuel Alfayo Boh evinces a friendly disposition towards his students. He is a strong advocate of treating students with understanding and affection, Dr. Samuel incontestably mentors, counsels, reprimands, sympathizes and assists his young and old alike. Some of his students describe him as a luminous teacher whose passion for academic scholarship is infectious and whose pedagogical principle skills and friendly disposition are so admirable and endearing that attendance at his lectures is always high and far outstrips most others.

Ladies and gentlemen, Dr. Samuel Alfayo Boh is a small figure on the physical appearance. It is my great honour and privilege to call on this academic repute, erudite, scholar, indefatigable and inspirational mentor, community lover, and motivator ardent love of Shongomite culture and humanist to graciously joint the chairman and other for the formal presentation of this fabulous awards to acknowledge to celebrate his hard word, disciplines, kindness, humanness and commendable role he is playing in the academic careers and character-building

FOREWORD

It is with profound pride and optimism that I write this foreword to the maiden Book of Conference Proceedings of the Association of Science Educators Anambra State a timely and significant academic documentation that captures the robust engagements, research contributions, and transformative ideas presented at the 1st Annual Conference of the Association, scheduled for July 10, 2025, in Awka, Anambra State, Nigeria.

The conference, with the theme “Science Educators and Digital Literacy in the 21st Century,” could not have come at a more opportune moment. In an age where digital transformation is rapidly redefining education, economy, and society, the role of science educators in equipping learners with not only scientific knowledge but also digital competencies has become more critical than ever. The conference offered a strategic platform for scholars, researchers, policy makers, and practitioners to interrogate, share, and shape new pedagogical paradigms that incorporate digital literacy into the fabric of science education.

In his address of welcome, the Acting President of ASEA, Dr. Johnbosco O.C. Okekeokosisi, delivered a compelling call to action. He set the tone by acknowledging the historical importance of the event and the noble mission of ASEA to champion science education across Anambra State and beyond. His words reflected a clear vision of collective progress, innovation, and institutional synergy. Most notably, Dr. Okekeokosisi emphasized that digital literacy in science education is not merely about embracing technological tools but about empowering both educators and learners to critically engage, create, and transform scientific knowledge for societal advancement.

This compilation of conference proceedings is more than a record of presentations—it is a testimony to the enduring commitment of Nigerian science educators to adapt to global educational trends. With insightful keynote and lead paper presentations by eminent scholars such as Prof. Cecilia O. Ekwueme and Prof. Telima Adolphus, participants were exposed to a breadth of ideas, models, and classroom innovations. These contributions are now immortalized in this volume, accessible to researchers, policymakers, and education stakeholders worldwide. The articles by contributors are of quality standard and intimately related to the conference theme.

The proceedings are also a celebration of collective effort. Dr. Okekeokosisi rightly acknowledged the contributions of past leaders of STAN, the Executive Principal of Igwebuike Grammar School, the Local Organizing Committee, and institutional partners who ensured the success of this pioneering event. Their efforts reflect a shared belief in the transformative power of science education when driven by vision, collaboration, and strategic digital integration.

This book also symbolizes the maturity and forward-thinking disposition of ASEA. With its proceedings published online in the Association’s official website (www.jisepublications.org), ASEA is setting a benchmark for academic visibility, accessibility, and global relevance. The initiative aligns perfectly with the conference theme—leveraging digital platforms for knowledge dissemination.

As readers engage with the rich content within this publication, it is my hope that they find not only knowledge but also inspiration to further the cause of digital transformation in science education. May this volume serve as a resource, a reference, and a rallying point for continued innovation, research, and excellence in digital literacy, science teaching and learning.

Prof. Marcellinus C. Anaekwe
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National Open University of Nigeria,
Abuja.

PREFACE

Digital literacy in the 21st century is crucial for science educators to effectively teach and prepare students for a rapidly evolving scientific and technological world. Science educators must embrace digital tools and resources to enhance their teaching methods and foster students' scientific literacy, critical thinking and problem-solving skills. This includes leveraging online platforms, using educational technologies and digital content to create engaging and meaningful learning experiences.

In this conference proceedings efforts has been made towards promoting the use of digital tools in science education.

Prof. Josephine N. Okoli

Science Education Department

Nnamdi Azikiwe University, Awka,

Anambra State, Nigeriascience

ADDRESS OF THE ACTING PRESIDENT OF ASSOCIATION OF SCIENCE EDUCATORS ANAMBRA (ASEA), DR. JOHNBOSCO O.C. OKEKEOKOSISI, AT THE OPENING CEREMONY OF THE 1ST ANNUAL CONFERENCE HELD IN AWKA, ANAMBRA STATE, NIGERIA ON 10TH JULY, 2025

Theme: “Science Educators and Digital Literacy in the 21st Century”

Distinguished Guests,

Mother of the Day, and Executive Provost of the Federal College of Education (Technical),
Umunze, Prof. Tessy O. Okoli

Past and Immediate Past Chairmen of the Anambra State Chapter of the Science Teachers

Association of Nigeria (STAN), Prof. C.V. Nnaka, Dr. Christiana U. Ezenduka Past

and Immediate Past Secretary of the Anambra State Chapter of the Science Teachers Association
of Nigeria (STAN), Dr. Chinwe B. Njelita, Mr. Kingsley N.C. Ezeokeke

The Executive Principal of Igwebuikwe Grammar School, Awka, Mrs. Amaka Ifebili

Our Esteemed Keynote and Lead Paper Presenters, Profs: Cecilia O. Ekwueme, Telima
Adolphus

Meritorious Awardee, Dr. Samuel Alfayo Boh

Representatives of Educational Institutions, Pharm. Adauzoh C. Joe-Obasi

The Conference Planning Committee

The Local Organizing Committee (LOC),

My Fellow Science Educators,

Ladies and Gentlemen.

It is with deep humility and immense pleasure that I stand before you today as the Acting President of the Association of Science Educators Anambra (ASEA), to welcome you all to this historic gathering — the **1st Annual Conference** of our noble Association, taking place here in the vibrant capital city of Awka, Anambra State.

This moment marks a milestone in the life of our Association and in the educational landscape of our dear state. Today, we have gathered not just to deliberate on academic issues, but to collectively reflect on and shape the role of science educators in a rapidly changing digital world. The presence of each one of you here is a testament to your dedication to the advancement of science education in Nigeria, and in particular, in Anambra State.

Let me begin by extending heartfelt gratitude to our **Mother of the Day**, the erudite and distinguished **Executive Provost of the Federal College of Education (Technical), Umunze**, for honoring our invitation. Your presence is a great source of inspiration, and we are immensely grateful for your unwavering support towards science and technical education in the state. The Host and Board of Directors, Prof. Josephine N. Okoli, Prof. Isaac N. Nwankwo, Prof. M.C. Anaekwe

Chairman of the occasion Ass. Prof. Peter I.I. Ikokwu

To the **Past Chairman and Immediate Past Chairman of Anambra State STAN**, we salute you. You laid the foundation for excellence and integrity in science education upon which ASEA continues to build. We are proud to carry forward the torch of progress you lit. Your legacies continue to motivate and guide our mission as science educators.

We also sincerely appreciate the **Executive Principal of Igwebuike Grammar School, Awka**, for the enormous and selfless support towards the successful hosting of this conference. Your generosity and logistical assistance have played a crucial role in bringing this vision to reality. We are proud to host this conference within your institution, and we thank you for embracing the ASEA family.

Special thanks also go to our **Keynote and Lead Paper Presenters**, whose scholarship and insight will surely enrich our understanding of the conference theme: *“Science Educators and Digital Literacy in the 21st Century.”* You are the thought leaders that will help us navigate this complex but exciting intersection between pedagogy and technology.

Meritorious Awardee, **Dr. Samuel Alfayo Boh**, whose contributions to teaching and learning in tertiary institutions lead to the foundation of our members.

The **representatives of educational institutions**, both public and private, we acknowledge your partnership and presence. Your contributions, ideas, and institutional support are essential in sustaining quality science education. Together, we can foster a generation of scientifically literate citizens equipped for the demands of the 21st century.

Let me also specially recognize the tireless efforts of the **Local Organizing Committee (LOC)**. You have worked round the clock, attending to logistics, communications, hospitality, and a host of behind-the-scenes responsibilities. This conference would not be possible without your selfless commitment. I say, “Well done!”

This conference has its theme **“Science Educators and Digital Literacy in the 21st Century”**. The theme is very apt considering the fact that we are in the digital age. Thus, the committee on conference looked inward to provide this conference theme for science educators to understand, educate, re-educate, write and deliberate on the effective use of digital tools – technologies in our present time for effective instructional delivery. Participants will be taken through hands-on and minds-on activities in various sessions and they will find the conference package very rewarding. I invite you to pay attention during keynote address to be presented by Prof. Cecilia O. Ekwueme, the Dean Faculty of Science Education, University of Calabar, Cross-River State, Nigeria. Your continuous attention is also needed during the lead paper presentation of Prof. Telima Adolphus of Rivers State University, PortHarcourt, Nigeria.

To all **participants** – educators, researchers, students, policy makers – thank you for making out time to be here. Your presence signifies hope for the future of science education. I urge you to make the most of this gathering by networking, exchanging ideas, and exploring new strategies to embed digital literacy in science classrooms and curricula.

As we delve into this conference theme, let us remember that digital literacy is not just about the use of devices or softwares. It is about empowering both teachers and learners to navigate, create, and critically evaluate digital content. It is about transforming science education into an interactive, engaging, and accessible experience that prepares our students for global competitiveness. We must rise to this responsibility with courage, collaboration and innovation.

As we officially declare this conference open, let us do so with a shared sense of purpose and vision. Let us reflect deeply, discuss intelligently and leave this gathering better equipped to build a technologically savvy and scientifically vibrant society.

Ladies and Gentlemen, it may interest us to note that this young growing association has an online Journal, Electronic Book (e-book) and Conference Proceedings. The E-Book and Conference Proceedings were hosted online at the association's website (jisepublications.org) for its visibility. It is obvious that this association has come to stay. To God be the glory.

Once again, I welcome you all to the 1st Annual Conference of the Association of Science Educators Anambra (ASEA). May our deliberations be fruitful, and may the bonds we forge here today grow stronger for the benefit of science education in our state and beyond.

Thank you, and God bless you all.

Dr. Johnbosco O.C. Okekeokosisi

Federal College of Education (Tech) Asaba,
Delta State, Nigeria
Acting President, ASEA
10th July, 2025

PAPER 16

PHYSICAL AND HEALTH EDUCATION AND DIGITAL LITERACY IN THE 21ST CENTURY

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Abstract

The paper discussed Physical and Health Education and Digital literacy in the 21st century. Physical and health educators are professionals who work to improve the health of individuals and community through the process of education. These educators try to inculcate these knowledge through digitalization in the 21st century. Digital Literacy encourages a range of skills from basic computer use to advanced problem-solving in digital environment. According to this paper, the digital literacy skills include creativity, critical thinking, collaboration and communication. The paper explains deeply digital literacy on the 21st century as used by physical and health educators, roles of physical and health educators in the 21st century, relevance of digital literacy, digitalization and its challenges for physical and health educators. Ways of leveraging such challenges were stated and way forward for physical and health educators in the promotion of digital literacy in physical and health education curricula were also stated.

Keywords: Physical and Health Education, Digital Literacy, 21st Century

Introduction

There has been relative lack of interest in future studies among students and physical and health educators, this is somewhat paradoxical. On the other hand given the colourful and dramatic history of the field in schools and colleges. Physical and health educators play vital role in promoting the physical, emotional and social well being of students in the 21st century. As described by Kretchmar (2020), and Deschesnes (2020), these educators are responsible for designing and delivering high quality physical and health education programs that cater to the diverse needs of students in the 21st century.

In this 21st century, physical and health educators are characterized by technological savvy. As described by Kerner (2020), these educators should be proficient in using digital technologies such as wearable devices, mobile apps, online platforms among others to enhance students' learning and engagement. Supporting Kerner's view, the researcher deems it right that physical and health educators should be evidence-based practitioners. These educators should stay up-to-date with the latest research in their field and ensure evidence-based practices to ensure effectiveness and relevance in their teaching. More also, physical and health educators should adopt culturally responsive teachings, practices that acknowledge and respect students diverse backgrounds, experiences and perspectives as acknowledged by Fitzpatrick (2020). Physical and health educators according to Nutbeam (2020), should adopt holistic approach that addresses both physical, emotional and social well being of students to improve digital literacy.

Digital literacy is the ability of individuals and communities to understand and use digital technologies for meaningful actions within life situations. It is the ability to access the

computer/mobile internet for our day-to-day activities and as well being connected with others through the internet. Digital literacy as opined by Wicasono and Sundawan (2023), encompasses the skills and knowledge necessary to effectively use digital technologies to access, evaluate and create information. Digital literacy manifests as both cognitive and technical skills. In the 21st century, digital literacy equips individuals with the skills to discern credible sources from unreliable ones, identify bias and misinformation and as well make informed decisions based on evidence. It empowers individual educators in the 21st century to question and verify information, ensuring that they are not swayed by false narratives or manipulate contents as guided by physical and health educators.

Physical and health educators are people who work to improve individual and community health through education, promoting healthy lifestyles and providing resources for physical activity and wellness. These educators design and implement programs that encourage healthy behaviours such as exercise, healthy eating and avoiding harmful substances (Nutbeam, 2020). Physical and health educators can help improve students digital literacy skills, through any of the followings; online research, digital tools usage, media literacy, creating awareness for algorithms. Coursera (2025), explained physical and health educators as trained professionals who work with groups in community settings or with individuals to help them understand how to live a healthy lifestyle. These educators have skills of problem solving, critical thinking, teaching, patience and empathy, organization, cultural and diversity awareness (Sallis, 2020).

Statement of the Problem

Advance of technology in 21st century increases, physical and health educators are faced with dynamic challenges which are affecting the health sectors, educators and students towards integrating digital literacy into practice. To meet the 21st century advancement, researchers seek to bring the gap needed by physical and health educators to develop digital literacy skills to effectively integrate technology into their practices.

Purpose of the Study

The following objectives guide the study and tend to;

1. find out the roles of physical and health educators in the 21st century.
2. ascertain the relevance of digital literacy for physical and health educators in the 21st century.
3. find out the challenges of digital literacy for physical and health educators in the 21st century.
4. establish ways of leveraging digital literacy by physical and health educators in the 21st century.

Roles of Physical and Health Educators in the 21st Century

The 21st century is about giving people (students) the skills needed to succeed in the new world and as well helping them grow the confidence to practice those skills (Ofordum, Olofin & Okereke, 2023). 21st century education is one that responds to the economical, technological and societal shifts that are happening at an ever-increasing pace. It is an education that sets people up to succeed in a world where more than half of the jobs to be gotten over the carriers do not exist yet and must be carried out by those who have the digital skills. According to Maxine (2021), 21st century digital skills focus more on making sense of that information, sharing and using it in smart ways.

Below are the roles and responsibilities of Physical and Health Educators in the 21st century as stated by Weare (2019): Promotion of physical literacy, integration of technology, promotion of healthy habits and attitudes towards physical activities, instruct students in physical fitness, sports

and other physical activities, coach and advise school sport teams, educate individuals, families and communities about health-related topics, provision of health information and resources, develop and implement health education programs that addresses specific health needs and promotion of healthy behaviours.

Relevance of Digital Literacy for Physical and Health Educators in the 21st Century

Some key reasons highlighting the importance of digital literacy for physical and health educators according to Maxine (2021), include the enhancement of students' engagement. This means that digital literacy allows educators to create interactive and immerse learning experiences, increasing student engagement and motivation. Technology also enables educators to tailor instruction to individual students' needs, abilities and learning styles thus leading to personalised learning.

Secondly, Digital literacy provides educators with a vast array of educational resources which include online tutorials, videos and interactive simulations. Digital tools facilitate efficient assessment and feedback process enabling educators to track students' progress and adjust instruction accordingly, and as well enables educators to stay current with the latest research, trend and best practices in physical and health education this making them develop professionally.

Digitalization and its Challenges for Physical and Health Educators in the 21st Century

In the 21st century, physical and health educators face the challenges of integrating digital literacy into their practice to effectively engage students and promote healthy lifestyles (Hastie, 2019 & Kretchmar, 2020). There are numerous challenges that affect the effectiveness and relevance of digital literacy for physical and health educator in this era, such as adapting to changing students' needs. These educators struggle to engage students with diverse background, interest and abilities. The traditional multi-activity, sport technique-based approach may not cater to individual needs thereby leading to disinterest and disengagement. Physical and health education may be culturally obsolete as it has not kept pace with changes in physical culture such as professionalization, commercialization and technological of sports. It promotes internal motivation and educators need to foster internal motivation among students rather than relying on external factor. This therefore requires innovative approaches that prioritize student's autonomy, perceived competence and motivation.

Embracing radical reform, the existing physical education model may not be sustainable in the long term. Therefore, educators must consider radical reforms such as adopting models-based approaches to ensure the subject's future relevance. More also, in addressing health and wellness, physical and health educators face challenges in promoting healthy behaviours, addressing mental health issues and providing students with the skills and knowledge necessary to make informed choices.

In leveraging technology, these educators can harness technology to enhance students' learning and engagement but this requires staying up-to-day with the latest tools and methodologies which makes them stay current with research and best practices. Educators need to stay informed about the latest research, trends and evidence-based practices to ensure their teaching is effective and relevant.

Ways of Leveraging Digital Literacy by Physical and Health Educators in the 21st Century

To overcome the challenges encountered by digitalization, physical and Health Educators can explore innovative approaches such as; using wearable devices and mobile apps, creating online

learning modules, utilizing social media, incorporating gamification, collaboration and partnerships as well as technology integration among others.

Conclusion

In the 21st century, digital skills are crucial for navigating the increasingly tech-driven world. The ability to use digital tools effectively, handle information and engage in online transactions safely and responsibly are essential and should be specific. Digital literacy is crucial for physical and health educators especially in this 21st century by enabling them to effectively integrate technology into their teaching practices and promote students' learning. These educators play crucial role in promoting both individual and community health lifestyles and active living. So by developing digital literacy skills, physical and health educators can create more effectiveness and personalized learning experiences for their students.

Suggestions/Way Forward

To effectively promote digital literacy among physical and health educators, the focus should be on the following points below;

1. Integration of digital literacy into physical and health education curricula.
2. Provision of professional development for educators
3. Utilizing technology to enhance health promotion and improve access to health information
4. Fostering a culture of digital citizenship and critical thinking about online health information.

References

- Coursera, S. (2025). What is health educator. <http://www.whatishealtheu.coursera.org>. updated March 14, 2025.
- Deschesnes, M. (2020). Health education in the 21st century: Challenges and opportunities. *Health education journal* 79 (1):3-12.
- Fitzpatrick, K. (2020). Inclusive physical education: A review of the Literature. *Journal of teaching on physical education* 39(2): 123-136.
- Hastie, P.A. (2019). Technology in physical education: A review of the Literature. *Journal of teaching in physical and health education* 38(2): 149-165.
- Kerner, C. (2020). Using mobile apps to promote physical activity: A systematic review. *Journal of Sports Sciences* 38 (12): 1343-1353.
- Kretchmar, R.S. (2020). Physical education in the 21st century: Challenges and Opportunities. *Quest* 72(1): 34-48.
- Kretchmar, R.S. (2020). Digital technology in physical education. A review of the Literature. *Quest* 72(1): 44-48.
- Maxine, D. (2021). The value of 21st century education. <http://www.thinkstrategicforschool.s.com>.
- Nutbeam, D. (2020). Health literacy: A critical concept for public health. *Journal of epidemiology community health* 74(5):439-444.
- Oforidun, M.C., Olofin, A.O. and Okereke, C.I. (2023). Education an instrument for mentoring quality leadership in the 21st century. *Trends in science, technical and vocational educations*. Erimoore digital publishers, Nigeria.
- Sallies, J.F. (2020). Evidence-based physical education: A review of the literature. *Journal of teaching physical education*. 39(1):1-12.

- Weare, K. (2019). Mental health promotion in schools: A review of the Literature. *Journal of educational psychology* 111(3): 431-444.
- Wicasono, I. and Sundawan, S.W. (2023). Digital literacy in physical education: A literature review. *International journal of physical education, sports and health*. DOI:<https://doi.org/10.22271/khe/journal2023.10.ibd.3165>.