

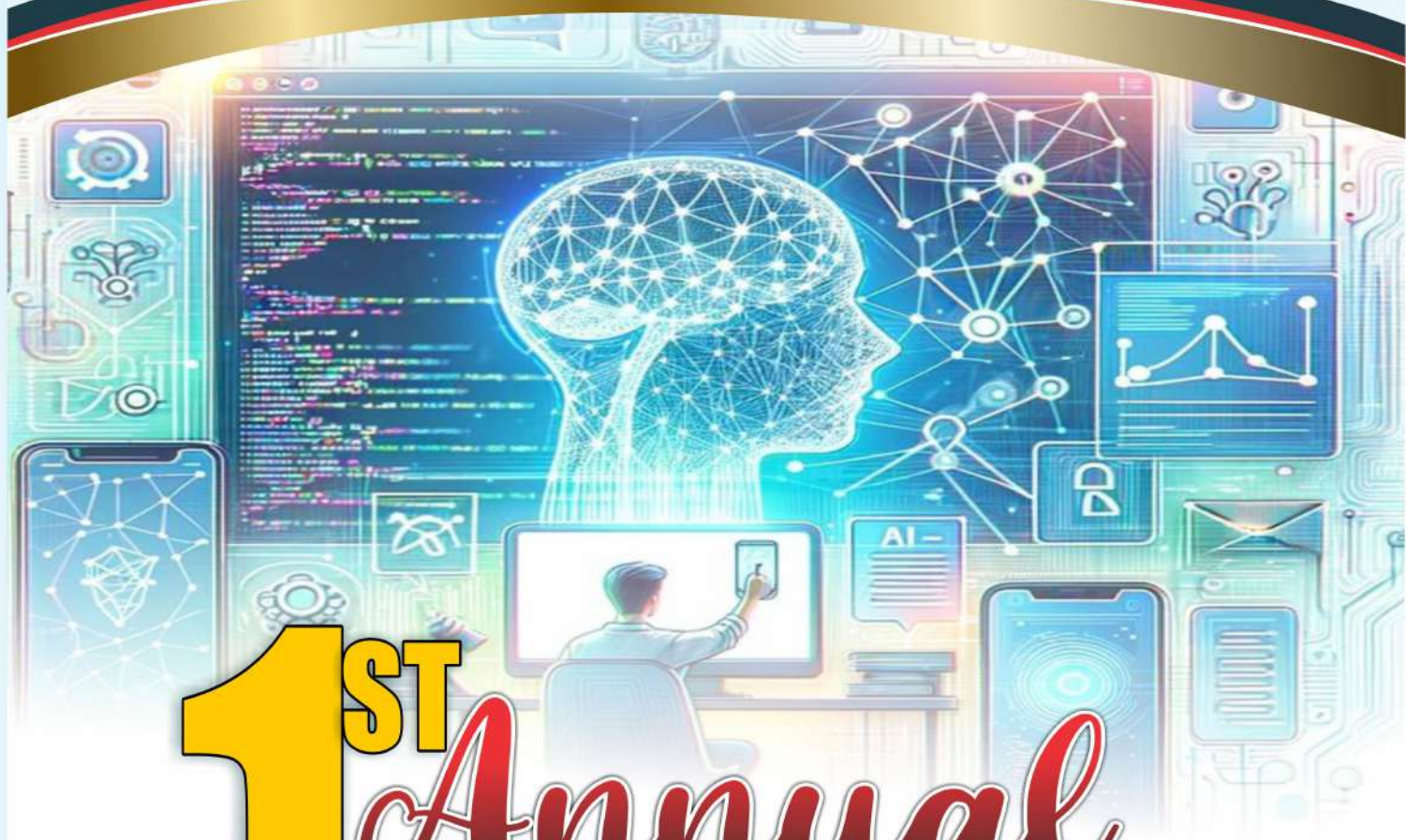


ASSOCIATION OF SCIENCE EDUCATORS ANAMBRA (ASEA)

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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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10- 12th July, 2025**

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 5

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

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Abstract

The study investigated physical and health education and digital literacy in the 21st century. Two research questions and two hypotheses were formulated to guide the study. The survey research design was utilized, the population of the study comprised of (320) three hundred and twenty secondary school teachers in Calabar Municipality Local Government Area, Cross River State. The sample size was made up of sixty four (64) respondents which represent (20%) of the population. The method adopted in selecting the sample size was the simple random sampling technique. The main instrument used for data collection was structured questionnaire titled "Physical and Human Education Digital Literacy Questionnaire" (PHEDLQ). The instrument was face validated by two experts in Human Kinetics and Sports Science and one other from Department of Measurement and Evaluation Unit, University of Calabar. The reliability of instrument was established using split-half method and PR which yielded a correlation coefficient of 0.82. Data collected were analysed at .05 level of significance. Finding revealed that technological integration and teachers digital competence have significant relationship with physical and health education teachers in secondary schools in Calabar Municipality Local Government Area. Based on the findings, it was recommended amongst others that regular, comprehensive training program on digital tools and pedagogical integration strategies should be mandatory for physical and health education teachers.

Keyword: Physical health Education, digital literacy, 21st Century

Introduction

Physical and health education (PHE) plays a vital role in promoting student physical, emotional and social wellbeing. Physical and education programs aim to equip students with the knowledge, skills and attitudes necessary to lead healthy and active lives. However, the rapid advancement of technology has created new opportunities and challenges for physical and health education programs. On the one hand, technology can enhance PHE instruction, increase student engagement and provide new opportunities for physical activity. Furthermore, excessive screen time and sedentary behaviour associated with technology use can have negative effects on students physical and mental health.

According to Bailey (2016), physical and health education must transcend traditional notions of physicality to embrace cognitive, effective, and technological dimensions, preparing students for dynamic modern societies. Similarly, Armour and Auincombe (2020) asserted that integrating digital literacy into physical and health education does not undermine physical skills development rather, it enriches learning by offering more opportunities for reflection, self-assessment, and autonomous fitness management.

Physical education plays a vital role in promoting physical activity, motor skill and overall health among children and adolescents. The quality of physical and health education programs is crucial in determining their effectiveness in achieving these goals. (Anam and Ahueansebhor 2017) physical activity such as exercise, sports, games, fitness etc, should occur throughout a lifespan. A combination of strength and cardiovascular activity is great for health and disease prevention. Cardiovascular activity is optimal when at moderate to vigorous intensities for at least 20-60 minutes more days than not. There are specific recommendations for different ages. Then physical education is a subject in school where students are taught a curriculum developed to support students in growing as physical literate people. (O'Neill, Ahueansebhor and Ogabor 2015) physical literacy on the other hand are individuals who are physically literacy, more with competence and confidence in a wide variety of physical activities in multiple environments that benefit the healthy development of the whole person.

Attributes of physically literate individuals,

- Physically literate individuals consistently develop the motivation and ability to understand, communicate, apply and analyze different forms of movement.
- They are able to demonstrate a variety of movements confidently, competently, creatively and strategically across a wide range of health-related physical activities.
- These skills enable individuals to make healthy, active choices that are both beneficial to and respectful of their whole self, others and their environment.

In the 21st century, the world has witnessed a significant shift in the way people live, learn, and interact with one another. Technology has become an integral part of daily life, and its impacts on various aspects of human life. Including education, health and physical activity cannot be overstated. As a result, there is a growing recognition of the need to integrate digital literacy skills into various aspects of education including physical and health education (Odok, Ahueansebhor and Osaji Odey 2023).

The 21st century has ushered in an era of rapid technological advancement, fundamentally altering how education is delivered across all disciplines, including physical and health education (PHE). Traditionally view as a practical, hands-on field, PHE now incorporates digital technologies to enhance learning outcomes. Promote engagement and foster lifelong fitness and health literacy (Cubbone, Rukarvina & Silverman, 2020).

The integration of digital literacy- the ability to use information and communication technologies effectively into physical and health education has become crucial. This utilization addresses modern education demands, encourages innovative teaching methods, and supports students in becoming health-conscious, digitally literate citizens. (Eshiet, 2018).

Digital literacy refers to the ability to effectively and responsibly use digital technologies to access evaluate and communicate information has become an essential skill in modern pedagogy. The use of digital tools in PHE presents both opportunities and challenges, influencing how students engage with physical activity, health education, and wellness tracking. Digital literacy has also become an essential skills for success in todays digital age. It encompasses a range of skills including the ability to navigate and evaluate online information, use digital tools to communicate and collaborate and critically evaluate digital media.

The advent of technology has introduced numerous innovations into physical and health education ranging from mobile health apps, online fitness platforms, exergaming (exercise through video

games) and wearable fitness trackers. Studies have shown that such tools provides real-time, feedback, promote personalized fitness regimes and make health education and more interactive (Casey, Goodyear & Amour, 2019). For example, wearable device like fitbits allow students to monitor their heart rates, steps and calories burned, fostering a personal connection to physical activity. Virtual reality (VR) tools are being employed to simulate environments for skills practice, offering immersive learning experience that were previous unattainable (Dyson, 2018). According to Duncombe (2020), technological integration in physical and health education involves the use of digital tools to support, enhance and transform traditional practices of physical education and health promotion. This integration can take various forms: mobile applications, fitness trackers, virtual reality (VR), argumented reality (AR), online fitness programs, and even artificial intelligence-based coaching systems.

Similarly, Baek (2018) argued that technology offers the possibility of personalization of PHE, enabling students to engage with physical activity at their own pace, track their individual progress, and receive tailored feedback. Fitness apps such as Nike training club and my-Fitnesspal help students set goals, monitor nutrition and follow exercise routines outside of class setting.

Chen (2020) noted that exergaming technologies games that combine exercise with gameplay (e.g dance-dance revolution, will sports) are powerful tools for engaging students who might not otherwise participate enthusiastically in traditionally sports. These technologies make physical activity accessible, enjoyable and goal-oriented. The integrating of pedometers and wearable activity trackers in school-based program led to statistically significant increase in students daily physical activity levels. Moreover, wearable tech provides instant feedback, encouraging students to self-regulate their activities thus fostering autonomy (Jared & Kidd 2019). However, Ennis (2017) cautioned that without pedagogical coherence, merely inserting technology in physical and health education classes risks creating “technology for technology’s sake” successful technological integration requires careful curriculum alignment, clear learning outcomes, and an understanding of how digital tools support skill acquisition and health knowledge. Kirk (2020) advocate for a new model of physical and health education moving away from competitive sports model towards lifelong engagement in physical activity, health maintenance and wellbeing- which technology can help facilitate by offering diversified, individualized fitness opportunities beyond team sports. The effectiveness of technological integration is contingent on adequate access to resource and a curriculum that supports digital methodologies.

Teaching digital literacy in physical and health education (PHE) should be and can be incorporate often. physical and health education are critical aspects of a wholistic elementary education and support the acquisition of real-world competencies to be used throughout their lives to live well. The Canadian competencies for physical and health education lists digital literacy as part of the foundational elements to creating a wholistic physical and health education curriculum (LaMaster 2025; Akah, Osaji Ahueansebhor & Akpa,2022a). research show that individuals engaging in high quality and wholistic health and wellbeing education are more likely to be actives users of digital technologies, and able to engage in information seeking. Whether for socialization, searching for health information or school work (Schiercher, 2020).

According to keengive Jared and Kidd (2010); Ahueansebhor, Osaji, Odok (2022), it is generally recognized that acquiring basic digital literacy skills is no longer a matter of choice but an absolute necessity for the survival of individuals and community development. Whether at work, at schools or at home, the internet has become a dominant platform through which major information and

services are provided. It is difficult to conceive a modern society that completely depends on tradition. Teachers competent and digital literacy communication and means of services. Teachers are the linchpins of successful digital integration in education. According to Koehler and Mishra (2019) Technological Pedagogical Content Knowledge, (TPACK) framework, teachers must understand not just the content and pedagogy but also how to integrate technology effectively.

Questions such as how educational technology impacts teaching and learning, which is the best tools or technology to prompt engagement and collaboration between the students and how to promote higher order thinking skills have concerned the educational realm, particularly when discussing the efficacy of pre-service teacher education programs educators to infuse the use of technologies in their practice (Odok, Ahueansebhor, Apie, Ogabor Osaji, Shantali, 2024). According to Smerdon (2020) the sense of preparedness is strongly related to what the teachers receive. Research shows that in-service training and the use of the internet for instructional purposes are related to teacher s confidence and feelings of being prepared to integrate technology in the classroom. In addition, teachers ability to use a full ranger of digital learning tools contributes to students engagement and achievement in the learning process. Thus, the students are likely to show positive attitudes towards technology after experiencing the use of them (LaMaster, 2015). Preparing educators to use different technologies or tools is not the only element to support teachers to integrate Information and Communication Technologies (ICT) in the classroom, several factors should be considered when deciding which tools to include in the design to the lesson. One of the major problem is that tend to use technology just because it is available without considering the design principles that will work to support and meet the learning expectation. (Jonassen, 2018). The sue of tools without a clear purpose could become distractive and could impede learning. Technology should be used to facilitate cognitive processing and engage students is critical higher order thinking about the content to support interactive, collaborative and students-center classroom (Ahueansebhor, Emeribe & Odok, 2023).

Disciplines such as physical education are not free from these challenges. It might seem that the gymnasium would be the last place where technology would have a strongly influence in curriculum and instruction. This is certainly not the case technologies are widely used as educational tools in area of sports, physical activity and health, but pre-service physical educators do not feel fluent or confident to integrate technology in their teaching career (Bechtel & Pamela 2018, Dundell, 2020) physical education teachers must have an understanding about how computers and other technological devices that is, heart rate monitors, motion sensors, pedometers, body compositions analyzers, computer-based, health-management systems etc, contribute to the collection of data for the development of better teaching methods to the analysis of sport skills to the assessment of students learning and to the evaluation of health related physical fitness

Odok, Ahueansebhor and Osaji (2022) a similar it is important for teacher education program to prepare physical education teachers to infuse technology in a way that that will support the pedagogical strategies used in those setting. Ahueansebhor, Ogabor and Apie (2015) opined that teachers need to learn and practice teaching skills in a context as similar as possible to the one they will teach in later. Physical education teachers are expected to know how computers and other technological devices can contribute to data collection for the analysis of sport skills, assessment of student learning, evaluation of health-related physical fitness. This includes using exercise equipment to assess physical activity (e.g) accelerometers, heart rate monitors, predometers

interactive dance machines) body composition (e.g bioelectrical impedance devices electronic skin-fold calipers).

Statement of the Problem

Despite the evident benefits, using the (ICT), many educational institutions face challenges in seamlessly integrating digital literacy into PHE curriculum. Factors such as lack of infrastructure, limited teacher training, curriculum rigidity, teacher preparedness limits the effectiveness of PHE in promoting lifelong health and fitness and unequal access to technology contribute to this problem. Furthermore, a traditional mindset that views PHE solely as a physical rather than cognitive or digital endeavour impedes progress and students over exposure to digital devices has raised concerns about sedentary lifestyles, necessitating a balanced approach to digital integration in physical and health education. This study seeks to address the gap between digital literacy and PHE by examining how technology can be effectively utilized to enhance physical and health education to meet the demands of the 21st century learners.

Purpose of the Study

The main purpose of the study was to investigate physical and health education and digital literacy in 21st century. Specifically, the study sought to:

1. find out if technological integration relate with physical and health education teachers in secondary school in Calabar Municipality Local government Area.
2. determine whether teacher digital competency relate with physical and health education teachers in secondary school in Calabar municipality local Government Area.

Research Questions

The following research questions were raised to guide the study;

1. How does technological integration relate with physical and health education teachers in secondary School in Calabar Municipality Local Government Area?
2. How does teachers digital competency relate with physical and health education teachers in Calabar Municipality Local Government Area?

Hypotheses

The following research hypotheses were formulated to guide the study:

1. There is no significant relationship between technological integration and physical and health education teacher in secondary schools in Calabar municipality Local Government Area, Cross River State.
2. There is no significant relationship between teachers digital competency and physical and health education teachers in Calabar municipality Local Government Area, Cross River State

Methodology

The study adopted descriptive survey research design which led to the utilization of structured questionnaire that provided primary data that were analyzed statistically. The population of the study comprised of (320) three hundred and twenty secondary school teachers in Calabar Municipality Local Government Area, Cross River States. The study sample made up of sixty four (64) respondents which represent (20%) of the population. The method adopted in selecting the sample size was the simple random sampling techniques. The main instrument used for data collection was a structured questionnaire designed by the researchers. The questionnaire title

“Physical and Health education Digital Literacy questionnaire (PHEDLQ)”. The instrument was sub-divided into two sections. Section A and B. section A measured the demographic data of the respondents while section B measured arranged in four-point rating scale consisted of 10 items, five of the items measured each of the two variables utilized for the investigation. The instrument was validated by two experts in Human Kinetics and Sports Science and one other from Department of Measurement and evaluation Unit, University of Calabar. While the reliability was established through a trial test using Cronbach Alpha method. The coefficient obtained ranged from 76 to 82, which confirms that the instrument was reliable in achieving the objectives of the study. Data collection was done in the secondary schools with the sampled respondents by the researchers and data collected were analyzed using Pearson product Moment correlation analysis and tested at .05 level of significance.

Result

Research Question 1: How does technological integration relate with physical and health education teachers in secondary schools in Calabar Municipality Local Government Area?

Table 1: Mean and standard deviation score for technological integration and physical and health education teachers in Calabar Municipality Local Government Area (N=64)

\bar{X}	SD	Decision
18.68	3.44	Agree

The result in Table 1 shows that the mean technological integration score 18.68 with standard deviation score of 3.44. This implies that there is a significant relationship between technological integration and physical and health education teachers in secondary school in Calabar Municipality Local Government Area.

Research Question 2: How does teachers digital competence relate with physical and health education teachers in secondary school in Calabar Municipality Local Government Area?

Table 2: Mean and standard deviation score of teachers digital competence and physical and health education teachers in Calabar Municipality Local Government Area

\bar{X}	SD	Decision
32.46	4.88	Agree

Table 2 revealed the mean teachers digital competence score 32.46 with standard deviation score of 4.88. This implies that there is a significant relationship between teachers digital competence and physical and health education teachers in secondary school in Calabar Municipality Local Government Area.

H₀₁: There is no significant relationship between technological integration and physical and health education teachers in secondary school in Calabar Municipality Local Government Area.

Table 3: Pearson product moment correlation analysis of relationship between technological integration and physical and health education teachers in secondary school in Calabar Municipality Local Government Area

Variables	$\sum x$ $\sum y$	$\sum x^2$ $\sum y^2$	$\sum xy$	Cal -r	P-value
Technological integration.	3356	4416	47988	0.482	0.000
Physical health education teachers	2986	3898			

*significant at .05, df =62

The result of analysis of data presented in Table 3 revealed that the calculated r-value of 0.482 is higher than the p-value of 0.000 at .05 level significance with 62 degree of freedom. This implies that the null hypothesis was rejected and the alternate hypothesis accepted. As a result, there is a significant relationship between technological integration and physical and health education teachers in secondary school in Calabar Municipality Local Government Area, Cross River State.

H02: There is no significant relation between teachers digital competency and physical and health education teachers in school in Calabar municipality Local Government Area.

Table 4: Pearson product moment correlation analysis of relationship between teacher digital competency and physical and health education teachers in secondary school in Calabar Municipality Local Government Area

Variables	$\sum x$ $\sum y$	$\sum x^2$ $\sum y^2$	$\sum xy$	Cal -r	P-value
Teachers digital competency	3642	4624	48668	0.524	0.000
Physical health education teachers	3184	3996			

*significant at .05, df =62

Data presented in Table 4 shows that the calculated r-value of 0.524 is higher than the p-value of 0.000 at .05 level of significance with 62 degree of freedom, it means the null hypothesis was rejected and the alternate hypothesis upheld. This implies that there is a significant relationship between teachers digital competency and physical and health education teachers in secondary schools in Calabar Municipality Local Government Area of Cross River State.

Discussion

The finding obtained from analysis of data and testify of hypothesis one is the study revealed that the null hypothesis was reflected. The implication of this finding is that there was a significant relationship between technological integration and physical and health education teachers in secondary schools in Calabar Municipality Local Government Area of Cross River State. The reason for this finding could be that teachers in the secondary school are wanting to align with the present age of digitalization and there is need for them to integrate with the changing tide so as not to be left with the old/archaic approach to teaching and that there is need for technological integration. The guiding is in consonance with that of Casey et al 2019) the scholars asserted that the advent of technology has introduced numerous innovations in PHE, ranging from mobile health apps, online fitness platform, exergaming, (exercise through video games) and wearable fitness trackers. Study have shown that such tools provide real-time, feedback, promote personalized fitness, regimes, and make health-education and more interactive. For example, wearable device like fitbits allow students to monitor their heart rates, steps and calories burned, fostering a personal connection to physical activity. Virtual reality (VR) tools are being employed to simulate environments for skills practice, offering immersive learning experiences that were previously unattainable.

In support of this finding Duncombe (2020) also stated that technological integration in PHE involves the use of digital tools to support enhance and transform traditional practice of physical

education and health promotion. This integration can take various forms: mobile applications, fitness trackers, virtual reality (VR) augmented reality (AR), online fitness programs and even artificial intelligence based coaching system. This finding is also in agreement with that of Baek (2018) who argued that technology offers the possibility of personalization of PHE, enabling students to engaging with physical activity at their own pace, track their individual progress and receive tailored feedback. Fitness apps such as Nike training club and my-fitness pal help students set goals, monitor nutrition and follow exercise routines outside of class settings.

The findings obtained from analysis of data and testing of hypothesis two in the study revealed that the null hypothesis was rejected. The implication of this finding is that there was a significant relationship between teachers digital competence and physical and health education teachers in Calabar Municipality Local Government Area of Cross River State.

The reason for this finding could be that are aware of the last impact of technology on the teaching of PHE to the students and as such. There is this need to acquire digital knowledge in order to be updated with recent findings and new information about the subject matter. This finding is in line with the position of Smerdom (2020) who asserted that the sense of preparedness is strongly related to what the teachers receive. Research shows that in-service training and the use of the internet for instructional purpose are related to teachers' confidence and feelings of being prepared to integrate technology in the classroom. In addition, teachers ability to use a full range of digital learning tools contribute to students engagement and achievement in the learning process. This, the students are likely to show positive attitudes towards technology after experiencing the use of them (LaMaster, 2015).

The guiding of this study agrees with the views of Dundell (2020) who opined that physical education teachers must have an understanding about how computers and other technological devices (that is, heart rate monitors, motion sensors, pedometers, body composition analyzers, computer-based, health management systems etc) contributes to the collection of data for the development of better teaching methods to the analysis of better teaching methods to the analysis of sports skills to the assessment of students. Learning and to the evaluation of health related physical fitness.

In the same vein, Ahueansebhor, Ogabor & Apie (2015) opined that teachers need to learn and practice teaching skills in a context as similar as possible to the one they will teach in later. Physical education teachers are expected to know how computers and other technological devices can contribute to data collection for the analysis of sport skills, assessment of students learning, evaluation of health-related physical fitness.

Conclusion

Physical and health education in the 21st century cannot afford to remain isolated from the digital revolution shaping other educational disciplines. Digital literacy is now essential for effective PHE instruction, providing innovation pathways for teaching, learning assessment and personal health management, the integration of technology, the digital competence of teachers, and the use of engaging digital platforms are pivotal factors that can revolutionize PHE. However, challenges remain in ensuring equitable access, comprehensive teacher training, teacher preparedness, equitable access, appropriate curriculum design and screen time management must be addressed. A balanced approach that leverages digital tools while promoting active lifestyles is for the future of Physical and health education.

Recommendations

Based on the findings of the study, the following recommendations were made;

1. Regular, comprehensive training programs on digital tools and pedagogical integration strategies should be mandatory for Physical and health education teacher.
2. Physical and health education curricular should be updated to incorporate digital literacy skills explicit, aligning physical activities with technological applications.
3. Educators should design lessons that combine digital tracking with physical movement, educators should design Physical and health education activities that combine digital non-digital experience to prevent sedentary behaviour

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