Examining Efficacy of Basic Design in the Implementation of 21st Century Curriculum in Basic Schools

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ABSTRACT

In the evolving landscape of education, the 21st-century curriculum emphasizes critical thinking, creativity, collaboration, communication, and digital literacy. This paper explores the significance of Basic design as an indispensable component in implementing the 21st-century curriculum in basic schools in Ghana. Basic design fosters spatial reasoning, visual communication, and problem-solving skills, which are essential in preparing learners for future careers in science, technology, engineering, and mathematics (STEM). Despite its relevance, Basic Design is often underemphasized at the basic level of education. This study advocates for its integration into the curriculum as a foundational subject that bridges theoretical concepts with practical application. The research design employed was qualitative, utilizing discourse analysis as the primary methodological framework. This approach allows for an in-depth examination of Basic Design as an indispensable component in implementing the 21st-century curriculum in basic schools in Ghana. A purposive sampling strategy was employed to ensure representation and diversity within the selected participants. In all twenty (20) participants took part in the study. Aligning Basic Design with the competencies outlined in Ghana's Standards-Based Curriculum, the study highlights how it can enhance learners' creativity, precision, and design thinking skills. The paper concludes by recommending strategies for curriculum developers, policymakers, and educators to reposition Basic Design as a core subject that empowers students with 21st-century skills essential for national development and global competitiveness. Experiential Learning Theory (ELT) propounded by David A. Kolb in 1984 underpinned the investigation.

Keywords: Basic School Education, 21st Century Curriculum, Efficacy, STEM, Basic Design.

Public Interest Statement

In an era driven by innovation, technology, and creative problem-solving, the relevance of Basic Design in basic education cannot be overstated. As Ghana and other nations adopt the 21st Century Competency-Based Curriculum, there is a pressing need to equip learners with practical skills that bridge theory and real-world application. Basic Design, as a subject, fosters critical thinking, spatial awareness, precision, and design thinking — foundational competencies required for Science, Technology, Engineering, Arts, and Mathematics (STEAM) fields. The efficacy of Basic Design as an indispensable component of the basic school curriculum will not only inspire a new generation of architects, engineers, and innovators but also ensure that our educational system responds proactively to global demands.

Background to the study

In the evolving landscape of global education, the 21st century curriculum emphasizes critical thinking, creativity, problem-solving, digital literacy, and practical skills development. At the heart of this transformation lies the need for subjects that blend theoretical knowledge with hands-on application. One such subject is Basic Design, a discipline that equips learners with the ability to visualize, design, and communicate ideas with precision and clarity. Despite being often overshadowed by more mainstream subjects, Basic Design holds immense potential in shaping learners who are not only academically proficient but also technically skilled and innovative. In the context of basic education, integrating the efficacy Basic Design into the 21st century curriculum is not merely a complementary addition—it is an indispensable tool for fostering

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spatial awareness, technological literacy, and design thinking from an early age. This paper examines the relevance, challenges, and prospects of Basic Design as a core subject in basic schools, and argues for its strategic inclusion in curriculum implementation to prepare learners for the demands of modern industries and future careers.

The global shift towards a knowledge-based and innovation-driven economy has significantly influenced educational reforms across nations. In response, many countries, including Ghana, have adopted the 21st century curriculum framework, which emphasizes learner-centered approaches, creativity, collaboration, and digital competence. This curriculum aims to produce well-rounded individuals who can thrive in a rapidly changing world driven by science, technology, engineering, arts, and mathematics (STEAM). However, the success of this vision heavily depends on the inclusion of practical subjects that nurture these competencies from the foundational level of education. It fosters essential cognitive and psychomotor skills such as precision, spatial reasoning, visual communication, and problem-solving—all of which align with the goals of the 21st century curriculum. Moreover, the introduction of digital tools and Computer-Aided Design (CAD) technologies has expanded the scope of Basic Design, making it more accessible and relevant to younger learners (Voogt & Roblin, 2012)

Despite its relevance, Basic Design is often underutilized or absent in many basic school curricula due to a lack of trained teachers, teaching materials, infrastructure, and awareness of its significance. This gap represents a missed opportunity to equip learners with foundational skills that support technological literacy and innovation. Therefore, a critical examination of the subject's role, implementation challenges, and prospects in basic schools is both timely and necessary (Akinola & Bello, 2019)

While the 21st century curriculum advocates for the development of critical thinking, creativity, and practical skills among learners, the practical implementation of this vision in basic schools remains inconsistent and incomplete. One key area of concern is the marginalization or total absence of Basic Design in the basic school curriculum. Despite its potential to significantly contribute to the development of spatial reasoning, design thinking, and technological awareness—skills that are essential in today’s rapidly evolving world—Basic Design is often overlooked at the foundational level of education.

This gap raises critical questions about the preparedness of basic school learners to engage with future academic and career pathways that demand technical competence and innovative thinking. Factors such as a lack of trained educators, inadequate teaching resources, limited policy support, and low prioritization by curriculum planners continue to hinder the inclusion and effective delivery of Basic Design in basic schools. Consequently, students are denied early exposure to a subject that could greatly enhance their understanding of STEAM disciplines and their readiness for future learning opportunities in technical and vocational fields. This study seeks to address this oversight by examining the efficacy of Basic Design in the implementation of the 21st century curriculum in basic schools, identifying the barriers to its integration, and proposing strategies for its effective incorporation to enrich basic education in Ghana and similar educational contexts.

The purpose of the study

1. the study seeks to assess how the curriculum's emphasis on creativity, critical thinking, digital literacy, and practical skills enhances students' understanding and application of Basic Design concepts.
2. the study aims to identify the challenges encountered by teachers and learners in implementing Basic Design under the new curriculum, and to evaluate whether the intended learning outcomes align with 21st-century skills development.

Research Questions

This study seeks to answer the following research question?

1. How effectively is Basic Design integrated into the 21st-century basic school curriculum?
2. What challenges do teachers and pupils face in the teaching and learning of Basic Design within the 21st-century curriculum framework?

Literature Review and Theoretical Framework

Experiential Learning Theory (ELT) by Kolb, (1984). Experiential Learning: Experience as the Source of Learning and Development. The theory emphasizes learning through experience and proposes a four-stage learning cycle: Concrete Experience (CE), Reflective Observation (RO), Abstract Conceptualization (AC), Active Experimentation (AE). Kolb's theory is also influenced by the works of earlier scholars like John Dewey, Kurt Lewin, and Jean Piaget, who emphasized learning as a process grounded in experience. This theory underpinned the study.

Basic Design as a creativity and innovation

The 21st-century curriculum emphasizes creativity, critical thinking, collaboration, communication, and digital literacy (Trilling & Fadel, 2009). Scholars argue that this paradigm shift requires pedagogical reform towards hands-on, skill-based, and problem-solving and innovation education (Voogt & Roblin, 2012). Consequently, subjects that develop spatial intelligence, design thinking, and technical literacy are increasingly seen as pivotal in grooming learners for the future workforce. Basic Design (BD) situated in vocational and technical education, has evolved into a cognitive tool essential for design thinking and innovation (Yisa, 2018). At the basic school level, BD serves as an introduction to spatial reasoning, visualization, and structured creativity—skills aligned with STEM/STEAM education models (Ogunmola & Ajayi, 2021). Research by Boateng and Essel (2020) suggests that integrating Basic Design enhances learners' problem-solving capacities and deepens understanding in science and mathematics through cross-disciplinary learning.

The incorporation of Basic Design into basic school curricula resonates with international educational standards that advocate for early exposure to technical and creative subjects (OECD, 2018). In Ghana, the revised Common Core Programme (CCP) and STEM policy frameworks advocate for the inclusion of technical skills in basic education (MoE Ghana, 2020). Scholars such as Ampadu and Danso (2022) emphasize that TD equips learners with foundational competencies in design and innovation, essential for careers in engineering, architecture, and industrial design.

Basic Design an inquiry-based pedagogy

Effective teaching of Basic Design at the basic level relies on inquiry-based learning, project-based assessment, and the use of computer-aided design (CAD) tools (Akinola & Bello, 2019). Studies indicate that learners engaged in Basic Design activities demonstrate higher engagement and improved critical thinking (Eze & Uche, 2020). Moreover, BD supports differentiated learning styles, particularly benefiting visual and kinesthetic learners.

Challenges in technical drawing implementation

Despite its importance, the implementation of Basic Design in basic schools faces challenges such as inadequate teaching materials, lack of trained teachers, and curriculum overload (Okonkwo, 2017). A study by Agyemang (2021) revealed that many public basic schools in Ghana lack the infrastructure and resources to support BD instruction, calling for policy attention and investment. Countries like Finland and Singapore have integrated technical and design education into early schooling with positive outcomes (Sahlberg, 2015). Drawing from such models, researchers recommend contextualizing TD for local needs—using familiar environments and indigenous materials to foster understanding and sustainability (Mensah & Yeboah, 2022).

The literature affirms that Basic Design has the efficacy in the implementation of a robust 21st-century curriculum at the basic school level. Its integration fosters the development of essential competencies, prepares learners for technologically driven futures. There is a need for targeted teacher training, curriculum reforms, and infrastructure development to maximize its impact.

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METHODOLOGY

This study employed a qualitative research design or approaches to provide a comprehensive understanding of the efficacy of Basic Design in the implementation of the 21st-century curriculum at the basic school level. The design was chosen to capture statistical free trend to bring in-depth insights from stakeholders in the education sector. The target population comprised basic school teachers, curriculum developers, headteachers, and education officers within Takoradi Municipality. A purposive sampling technique was used to select five basic schools implementing of the new curriculum, with a focus on those offering Basic design. A total of twenty (20) participants made up of; five (5) Basic school teachers four (4) Basic school Headteachers, three (3) District Education Officers and eight (8) pupils. Semi-structured interviews were conducted with headteachers, District Education Officers and teachers to provide deeper insights into the institutional support, monitoring and supervision and pedagogical practices surrounding the subject. Classroom observations were carried out during Basic design lessons using an observation checklist. This helped in assessing the instructional methods, learner engagement, availability of teaching resources, and alignment with 21st-century skills. The study reviewed curriculum guides, scheme of work, lesson plans, and student workbooks to assess the extent to which Basic Design supports critical thinking, problem-solving, creativity, innovation and other 21st-century competencies. Ethical approval was obtained from the local education authority. Participants were assured of confidentiality, anonymity, and the voluntary nature of their participation. Informed consent was obtained from all participants, and data were used solely for academic purposes.

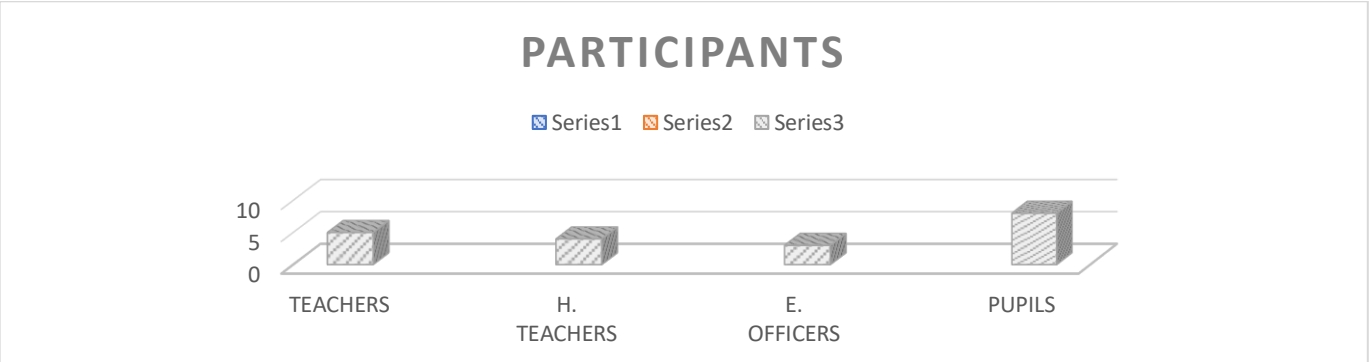
Table 1. Population size

Gender	Number
Male	10
Female	10
Total	20

The participants were male dominated because in the basic school teacher's male dominate.

Table 2. Distribution of sample of participants by school and their age bracket

SDA Basic school, Takorade Municipal M/A Basic school, Catholic Basic school, Anglican Basic school, Islamic Basic school.	Number of respondents	Age bracket
Teachers	05	42 - 463yrs
Headteachers	04	45 - 58yrs
Education Officers	03	48 - 51yrs
Pupils	08	12 - 15yrs
Total	20	-



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DISCUSSION/ ANALYSIS

As Ghana's education system shifts toward the 21st Century Competency-Based Curriculum (CBC), there is growing discourse on integrating practical, skill-based subjects to better prepare learners for a dynamic, technology-driven world. One such subject—Basic Design—has resurfaced as an essential tool for developing spatial reasoning, creativity, and problem-solving skills. In this feature, we engage headteachers from across the country to explore their perspectives on the importance, challenges, and future of Basic Design at the basic school level.

Comments of some of the headteachers during the interview. Headteacher:

"Basic Design is no longer just for future engineers or architects. It instills precision, discipline, and structured thinking—qualities that are critical in any 21st-century career. In our school, when we introduced elements of basic technical sketching into Creative Arts lessons, we saw improvements in students' confidence and attention to detail. The curriculum should intentionally integrate it, even at the primary level." Basic Design is a form of visual communication that conveys information through precise diagrams and plans. It involves the use of lines, symbols, and geometric shapes to represent objects, structures, and systems. In basic schools, it helps pupils understand spatial relationships, proportions, and design concepts.

Headteacher, "The CBC talks a lot about problem-solving, collaboration, and critical thinking. Basic Design naturally develops these. Children learn to plan, visualize, and execute ideas systematically. The challenge is the lack of trained teachers and resources. We need support with materials—T-squares, drawing boards, and curriculum guidelines—to make it work." The 21st-century curriculum emphasizes a skill set that goes beyond rote learning. Basic Design contributes to the development of several of these skills (Agyemang, 2021) Pupils analyze and interpret technical problems to develop accurate drawings or design solutions. Students learn to visualize and create designs for real-world applications.

Headteacher, "In the northern regions, Basic Design can be a game-changer. It connects with local crafts, carpentry, and building projects. When taught well, it makes STEM subjects more meaningful because it serves as foundation. But we must decentralize the support. Right now, only a few urban schools can afford the tools and training needed to teach it properly." Basic Design serves as a bridge between STEM education and Technical and Vocational Education and Training (TVET) Kolb, (1984). As countries like Ghana revise basic school curricula to incorporate pre-technical skills, Basic Design becomes vital in introducing students to engineering and technology careers early.

Curriculum Developer, GES: First Respondent, "The new curriculum places a strong emphasis on STEM education, creativity, and problem-solving. Basic Design isn't just a subject about lines and angles; it builds visual-spatial reasoning and introduces learners to design thinking—both of which are vital for innovation. If we are to genuinely equip our learners for the Fourth Industrial Revolution, then we must integrate disciplines that shape their technical and design mindset early." He stressed that while subjects like Science and ICT are emphasized, the foundational skills nurtured through Basic Design are often overlooked, despite their relevance in areas such as engineering, architecture, robotics, and vocational training.

Second respondent, "One of the key issues we face is a mismatch between school outputs and job market requirements. Basic Design fosters an appreciation for technical and vocational skills from a young age. By introducing it early, it provides learners with exposure that helps them make informed career choices later." She added that Basic Design has the efficacy to build critical foundational skills for TVET pathways, and its inclusion could help demystify STEM fields for both boys and girls.

Third respondent, "We acknowledge that there are challenges—chief among them being the lack of qualified teachers and teaching resources at the basic level. But these are not insurmountable. With targeted teacher training and partnerships with technical institutions, we can roll out Basic Design progressively." He also advocated for the use of simple drawing tools and digital platforms to make the subject engaging and modern.

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Teacher Perspectives on the Relevance of Basic Design; "Many students today are visually inclined. They learn better when they can draw, see, and model what is being taught. Basic Design offers that visual and spatial intelligence support," Teachers highlighted that Basic Design cultivates focus, detail orientation, and logical sequencing—skills useful not just in engineering or design, but in everyday problem-solving. They observed that students who engage in drawing exercises often perform better in tasks requiring planning and execution.

The curriculum now demands hands-on learning and learner-centered approaches. Teachers argue that, Basic Design provides an ideal bridge. One of the teachers stated that "When we teach topics like building construction or mechanical systems, Basic Design helps students understand components in three dimensions rather than just reading about them." Teachers believe that integrating drawing into science, mathematics, and vocational subjects can deepen student understanding, especially for abstract concepts.

Despite its benefits, several barriers exist. Many schools lack basic drawing tools such as T-squares, drawing boards, and compasses. "We often improvise or rely on verbal explanations because we don't have enough resources," lamented by all the teachers interviewed. Additionally, some teachers feel underprepared to teach the subject effectively. There is a call for regular in-service training, updated teaching materials, and better classroom infrastructure to support the teaching and learning of Basic Design.

RECOMMENDATIONS

1. Revise national curricula to formally integrate Basic Design from upper primary through junior high school levels.
2. The nation should Invest in pre-service and in-service training for educators with emphasis on technical pedagogies and digital drawing tools.
3. Equip schools with basic drawing instruments and ICT labs to support both manual and digital drawing.
4. Sensitize parents, teachers, and policymakers on the value of Basic Design in national development and job creation.
5. Encourage the use of real-world design challenges and cross-curricular projects to deepen learner engagement.

CONCLUSION

The conversation on the inclusion of Basic Design in basic schools is timely. As Ghana reimagines education for the future, rethinking subject offerings to include practical, skills-based disciplines like Basic Design will be crucial. It is not merely a drawing subject—it is a gateway to innovation, precision, and problem-solving in a fast-evolving world. Basic Design embodies the core tenets of the 21st-century curriculum—creativity, critical thinking, digital competence, and practical problem-solving. As an enabler of STEM education and a bridge to numerous career paths, its strategic integration into basic school education is not just necessary but urgent. Prioritizing Basic Design will help nurture a generation of innovative thinkers and makers ready for the future world of work. From the voices of teachers, it is evident that Basic Design holds great promise in preparing learners for future careers, fostering creativity, and enhancing practical understanding. As Ghana's basic school curriculum embraces 21st-century learning outcomes, Basic Design should no longer be optional or neglected. Rather, it must be empowered as a core tool in shaping competent, innovative, and technically skilled learners.

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