

AMIDST STEM AND STEAM TRANSITION: CHILD ART AS AN INSTRUCTIONAL TOOL IN EARLY CHILDHOOD CARE EDUCATION AND DEVELOPMENT

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Abstract

The process of educating a child in the early years demands the utilization of child-friendly approaches and initiatives of professional teachers. Meanwhile, the use of traditional methods of teaching adjudged to be popular up till the 20th century when teachers dominance in the teaching and learning process was very obvious is still affecting the child who should be gaining experiences through the learner-centred approaches in the growing millennium. Therefore, in order to curtail the extremity of teacher-centred approach, and promote child-involvement in their education, this paper explored child art as an instructional tool in early childhood care education and development amidst STEM and STEAM transition. The authors reviewed relevant literature on child art with emphasis on the numerous benefits of incorporating art into early childhood education vis-à-vis the five main developmental stages in child art worth of note for this pedagogical approach not to fail and for effective learning among early learners. Similarly, the emerging challenges affecting the implementation of child art within STEAM in early childhood care education and development were appraised with the implication for educators and policy makers. It is submitted among others that the integration of child art into the curriculum practices in early childhood education is very essential as the values of child art as an instructional tool in children education is worth embracing for effective education in their early years in life.

KEYWORDS: CHILD ART EDUCATION, EARLY CHILDHOOD CARE, STEM, STEAM.

Introduction

Early childhood education remains the foundation for lifelong learning of children upon which they build on further experiences through practice. In this respect, the methodologies

adopted in early years can facilitate cognitive and socio-emotional development of children. Thus, one of the instructional approaches often sloganized in the contemporary times amidst the clamour for transition from Science, Technology, Engineering, and Mathematics (STEM) to Science, Technology, Engineering, Arts, and Mathematics (STEAM) learning becomes experimental engagement, where observation, initiation and imitation play central roles in cognitive development.

However, in the traditional sense, STEM education places emphasis on numerical and technological skills while neglecting artistic and creative skills (Liao, 2016). This development has subsequently led to researchers advocating for a transition from STEM to STEAM, to incorporate art into science and mathematics-based instructional delivery for effective learning. This mainly because, child art serves as an essential tool for facilitating and enabling creativity, problem solving skills and emotional expression. As an integrative approach, child art in this context fosters innovative and creative learning experiences. Child art serves as a potent learning and teaching tool within Early Childhood Care and Development Education.

In fact, the clamour for the transition of STEM approach to STEAM and the progressive development made till date in the field of education has been as a result of the significant place of art in a participative and collaborative educational enterprise. The continuous effort to further propagate the move towards transiting to a more holistic STEAM-based educational framework, through the significant need for the application of child art as a tool in the process of educating the African child informed this paper.

In the educational literature, child art has value of expression, and it promotes creativity, self-expression, and skill development of children in instructional process and in children's learning experiences where the children are guided appropriately with an experienced tutor. Although, there is opportunity for educational development of learners across all specialisations in the science, technology, engineering, and mathematics fields (STEM), an instructional process that involve the use of child art approach. in this case, STEAM, has the following activities being demonstrated as scholars in the field have observed over the years.: children express their feelings, ideas, and experiences in a non-verbal way; children demonstrate imagination and explore different perspectives through the construction of their own knowledge; boost confidence. self-esteem, and creativity; they develop fine motor skills, problem-solving abilities. hand-eye coordination, social skills and critical thinking ability among others.

The potential benefits of incorporating art into STEM education is further supported by a wide body of research, emphasising how art facilitates problem-solving, cognitive flexibility, scientific enquiry and problem-solving in young learners. Before the transitioning of STEM to STEAM, its origins can be traced back to the 20th century (Martín-Páez, Aguilera, Perales-Palacios & Vílchez-González, 2019). According to Azam, Qureshi, Abate MSLS^b, Yosipovitch^c, Adami, and Friedman (2019), STEM education benefits local communities and schools as it has been linked with better outcomes and a positive impact on teachers, leaders, students and community members. STEAM refers to teaching and learning in the fields of science, technology, engineering, art and mathematics (Gonzales & Kuenzi, 2014). The term STEAM, thus originated from STEM, which encourages

children to build knowledge about the world around them thorough investigation, observation and asking questions (Ata-Akturk, & Demircan 2017). Thus, with such learning, it has been proved that students will be more active and able to think critically in knowledge building (Tippet & Milford, 2017). As a result the addition of child art to STEAM, will create an educational environment where children are able to describe STEM concepts in creative and imaginative ways from a very young age (Radziwill, Benton, & Moellers, 2015; Siantajani, 2018)..

Literature Review

Studies have highlighted the numerous benefits of incorporating art into early childhood education. Art allows children to express very complex ideas which may not be clearly and freely expressed verbally (Wright, 2018). In the context of Early Childhood Development (ECD) art activities such as painting and drawing, can enhance spatial awareness and fine motor skills (Althouse et al., 2020). Art also encourages children to think critically and explore new ideas that are essential skills for STEM education. Therefore, the transition from STEM to STEAM education is a reflection of the growing recognition of the importance of innovation and creativity in education. Yakman and Lee (2019) argue that art provides a unique perspective through which young children can explore and approach mathematical and scientific concepts. Additionally, early childhood learning literature highlights how creative activities enhance conceptual thinking and observational skills in children (Eisner, 2002). Studies have also gone further to provide evidence of how children who engage in art-based STEM activities, demonstrate improved understanding of symmetry, spatial reasoning, and cause and effect relationships (Peppler, 2014)

Though Rogers (2008) and Petroski (2003), had for long observed that STEAM in early childhood education is an area which has not received adequate attention in research despite the fact that young children are naturally scientists due to their explorative and inquisitive nature, thereafter their observation amidst stem and steam transition, the significant place of child art as an instructional tool in early childhood care and development education remains one of the grey areas in the educational discourse with a view to preparing children for a functional future career.

Child art approach to instructional delivery in the process of implementing childhood education curriculum has basis in the constructivist philosophy of learning which emphasize hands-on, experiential learning approaches (Liao, 2016). As a result, art is a tool for enhancing cognitive and problem-solving abilities of children. Art based learning facilitates hands on and practical experience with scientific concepts, which allows children to visualise abstract ideas through drawing painting and modelling (Peppler, Powell, Thompson & Caterall, 2014). Therefore, incorporating art into STEM education sharpens children's minds, and leads to better outcomes in their cognitive development Art brings out the expressive side of children as activities like painting makes children to experiment with colours and patterns, which is key to laying foundations in the understanding of mathematical relationships.

Further, available evidences have also revealed that constructing models and sculpting, promotes spatial reasoning and engineering principles. With such evidences, the use of art as a tool in the instructional process of early childhood education would enhance the

actualization of the curriculum of early childhood education. Cinquemani and Kraeche (2020) argue that child art offers opportunities for young learners to develop imagination, creativity and flexibility in thinking, which enables them to communicate, express feelings, thoughts and perceptions. Adequate cognitive development is critical to problem solving capabilities in young children, and the use of Art as a learning tool plays a significant role in stimulating cognitive development in children (Eckhoff, 2007). This is particularly important in the context of STEM education, where spatial reasoning and visualization are critical skills. For example, when children draw geometric shapes or create patterns, they are not only developing fine motor skills but also gaining a deeper understanding of mathematical concepts such as symmetry, proportion, and spatial relationships. Thus, using art as a tool in such instructional process becomes important as art fosters creativity, a key component that fosters divergent thinking which encourages multiple perspectives and approaches to complex problems in mathematics and science.

It becomes imperative to always look for innovative means of integrating child art instructional approach to the curriculum delivery of early childhood care development and education with a view to promoting education for the total child.. Liao (2016) highlighted how children who participated in art-based activities were better positioned in dealing with mathematical and scientific problems from multiples perspectives, leading to a better and well-suited solution. For example, in the study, children were asked to develop a bridge using art materials. The results revealed that children explored different structural designs and materials, which demonstrated their understanding of engineering principles. Additionally, these activities also demonstrated the children's memory and attention span. Malchiodi (2020) also observed how the process of art requires children to focus on details, recall things and follow sequences, all of which improves cognitive abilities and problem solving. For example, when children are asked to paint a landscape, they are required to remember the shapes and colours of surrounding natural elements and thereby improving their memory and observational skills.

STEAM Education within which child art is subsumed, remains an access point and opportunity to guide children inquiry, dialogue, and critical thinking, all to promote practical and functional learning outcomes. In Observational Learning and Scientific Inquiry which plays a crucial role in early childhood development, art activities require children to observe their surroundings, replicate patterns, and engage with various materials, thereby strengthening their critical thinking skills. By drawing images of nature, young learners can study biological elements, such as plant growth and animal behaviour, reinforcing basic scientific principles (Britsch, 2013). The findings suggest that children who engage in art-driven instructional delivery, exhibit higher levels of creativity and adaptability. Further perspectives obviously reiterated that, artistic expression fosters an inclusive learning environment, catering for diverse learning styles and abilities (Robinson, 2016).

Education in the 21st century, which has entered disruption and the 4.0 digital era, must continue to innovate (Yakman & Lee, 2012). Early childhood education, as one of the basic education institutions, must also be prepared to answer the challenges of this era (Draper & Wood, 2017) by making changes in both the curriculum and learning. Children who study in such education programmes must develop various kinds of skills to be able to adapt to the

changes taking place around them. The skills that need to be taught include critical thinking, creative thinking, cooperation, communication, physical knowledge, logical mathematics, and social interaction. These skills must be integrated into the learning process, and child art approach in the progressive transition from STEM to STEAM would be much valuable.

In collaborative Learning and Social Development, the use of art as a pedagogical tool in early childhood education is a key that fosters collaborative learning in STEM education. Essential communication is developed when children work together on art related tasks, mirroring the STEM world, where innovation is often born out of collaboration. Art activities also foster designing and building skills with environmentally friendly materials leading to greater awareness among children from an early age. Such experiences can instil an appreciation for sustainability and creative problem solving (Winner, Goldstein & Vincent-Lancrin, 2013). Also, art in interdisciplinary learning, enables children to make connections between seemingly unrelated concepts. Thus, a transition from STEM to STEAM becomes even more important at an early age.. Guyotte et al., (2020) argue that art provides a unique lens through which children can explore scientific and mathematical ideas. For example, creating models of illustrating the water cycle, allows children to understand complex scientific processes in an engaging and tangible manner. Another example of interdisciplinary learning is when children use art to learn geometry. When children create symmetrical patterns, they are not only engaging in artistic expression, but also learning mathematical principals like symmetry and transformation. Althouse et al. (2020) found that children who participated in such activities demonstrated a deeper understanding of geometry concepts compared to those who learned using traditional methods.

The use of child art also enhances scientific enquiry, and thereby justifies the greater need of transition from STEM to STEAM. When children paint nature, observe or draw, they develop and sharpen their observational skills and their ability to pay attention to detail, a skill that is important to scientific related investigations. Henriksen (2017) found that children, who engaged in art-based activities such as drawing, were more likely to ask questions and explore hypotheses, demonstrating a stronger scientific mindset. On emotional development, art therapy techniques such as drawing and sculpting, allow children to communicate complex emotions such as joy, fear or sadness that may be difficult to verbally articulate (Malchiodi, 2020). Thus, the use of art provides a safe and nonverbal medium for children to express their emotions, which is particularly important in early childhood when verbal communication may still be developing. This is particularly important for mental health and wellbeing as it helps children to process their feelings and develop emotional resilience.

In the same vein, in art projects where social skills are expected to be demonstrated, children learn to share ideas, negotiate roles and appreciate differing perspectives. Wright (2018) highlights how such collaborative activities promote a sense of community and belonging which are essential for emotional development. For example, a study involving pre-schoolers, creating a group moral, found that children developed stronger interpersonal skills and a greater sense of empathy towards their peers. The use of art also helps children in developing emotional regulation skills as engaging in art activities requires focus, patience and the ability to manage frustrations when things do not go as planned. Most of these skills are transferable to problem solving tasks and are applicable to social living of learners.

Alnasuan (2016) considered the developmental review on child art and the best representation of child art. According to him, Child art drawings and paintings shows the progress of the child as they grow. He enumerated the five main developmental stages in child art viz:

The first developmental stage is scribbling. At this stage, the child finds satisfaction in moving crayons and drawing lines and curves just to make a mark on a surface within 14 months of age. The pre-schematic stage or the pre-symbolism stage is the second stage when the child is about three to four years of age. At this stage, a child uses representational symbols like squares and circles as well as lines to draw objects such as human and animal images because they have not developed schema – the visual. The third stage is the **schematic stage** which is observed when the child is five years or six years of age. At this stage, the child uses schema which is the use of repeated symbols to draw symbols that represent the objects in the world they live in. specifically. **The realism stage is stage four which is between** the ages of nine and ten years when the child develops a greater understanding of the environment, now having a well-developed schema since they become conscious of the details in the objects they tend to scheme out, sketch or draw. At this stage the art has developed and so has the child, and they are now looking to produce adult-like art (Alnasuan,2016).At the **pseudo-realistic stage, which is stage five,children** have grown and now understand what an image depict even in abstract terms and can easily continue drawing using symbols to express what they feel with different meanings to each of them. Any image or drawing representation they send denotes a message understandable to them and the receiver of the message.

Amidst STEM to STEAM transition therefore,, the debate and efforts have been taking root over the past several years and is surging forward as a positive mode of action to truly improve the instructional delivery in early childhood care education. The STEM approach cannot do it alone, there is the need for child art which educators can employ with reasonable amount of up skilling on their part for effective children education. In effect, children would thrive well now in the present and in the rapidly approaching future in instructional classroom engagement.

Challenges in Implementing Child Art within STEAM in Early Childhood Care and Development

Despite having many benefits of integrating art into STEM for a complete transition to STEAM, several challenges still remain in implementing STEAM methodologies. One of the primary challenges is the lack of adequate training for Early Childhood Care and Development educators when it comes to the integration of art into STEM (Henricksen, 2017). Many early childhood educators are not equipped with the requisite skills or knowledge to effectively integrate art into STEM education, leading to obvious overreliance on traditional methods of instructional delivery. Early childhood teachers are supposed to be skilled, competent, flexible and confident when engaging with learners as they are responsible for laying the foundations for all future learning endeavours, which bears an eternal mark in their education journey (Mathwasa & Sibanda (2021).

Additionally, lack of resources and funding for effective implementation of art-based activities in early childhood settings is not uncommon.. This unfortunate development has, limited the ability of educators to provide meaningful and engaging experiences to early

childhood learners'. By implication, early childhood teachers, many a time have the feeling of under-preparedness due to inadequate resources and funding. The lack of professional training, misconceptions on the role of art in STEM and limited availability of resources are proving to be a major hindrance to the full adoption and use of art as an effective pedagogical tool in early childhood care development education. Learners could only be developed to become imaginative, insightful and creative when they are led and directed by well-trained individuals who allow them the freedom to express their ideas, imaginations and initiatives in the instructional process.

Implications for Educators and Policymakers

In order to fully realise the full potential and transition to STEAM in Early Childhood Care Development and Education,, all educators are supposed to be equipped with skills and resources on how they can properly integrate art into their classroom instructional practices. Therefore, there is a great need for an overhaul in the professional development programmes and the curriculum to support the implementation of child art instructional approach and principles.and also enable a smooth transition to STEAM and its full implementation. To achieve this, all policy makers and relevant stakeholders need to prioritise funding for the procurement of art resources at early childhood education level. Increasing of funding for the proper integration of child art in education is essential as it ensures that children are given equal access to participate and collaborate in instructional process as a fundamental right to constructive education and in the scheme of child-centred learning. By investing in the integration of art approach to children education, they would be fully prepared with the necessary foundational precepts for further future learning.

Conclusion

Child art remains an interactive way that can be used in classroom instructional delivery, and it is almost natural for every child.It helps children develop effective motor skills, problem-solving skills, teamwork, discipline, patience, collaborations and innovative imaginations to express and understand their emotions, enhances communication skills, teamwork and prepares them for future careers.

This paper has therefore explored the place of child art amidst STEM and STEAM, a step which recognises the value that art brings into early childhood education. With the right support and implementation strategies, art can serve as a powerful tool in fostering curiosity, innovation, and lifelong learning in young children. The transformative potential of integrating art into early childhood education, particularly in the context of STEAM, thus, becomes very significant. By fostering creativity, critical thinking, and emotional well-being, and giving children the participative roles in the classroom with appropriate guide in the use of child art approach, art can play a vital role in promoting holistic development in young learners.

However, to fully realize the potential of child art, educators and policymakers must address any emerging challenges some of which are appraised in this paper. This includes providing professional development opportunities for educators, increase in funding for art-based activities, and conducting further research to support evidence-based practices. While there is growing recognition of the benefits of STEAM education, empirical evidences on the best

ways to integrate child art approach in the classroom instruction of early childhood education in line with best global practices are still meagre. This gap in research can make it difficult for educators and policymakers to justify the allocation of resources to art-based initiatives. As a result, evidence-based practices to support the integration of child art into the curriculum practices in early childhood education are very essential. In sum, the values of child art as an instructional tool in children education are worth embracing for holistic development of learners' right from their early years.

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