



Integrating Social-Emotional Education (SEL) into Steam Education to Develop Empathy in 5-6 Years Old Preschool Children

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ABSTRACT: The rapid development of artificial intelligence and digital transformation is placing new demands on early childhood education; the goal of early childhood education is not only to develop cognitive abilities but also to comprehensively develop humanistic qualities and competencies in children, in which empathy is considered a core component of socio-emotional competence. However, in reality, the development of these competencies in early childhood education still faces many limitations and lacks systematic and effective integrated approaches. This article aims to analyze the theoretical basis and clarify the mechanism for developing empathy in 5-6 years old preschool children through the integration of socio-emotional education (SEL) in STEAM education. The study uses a method of analyzing and synthesizing literature from the fields of developmental psychology, socio-emotional education, and STEAM education to build an integrated theoretical framework. The research results show that empathy can be effectively formed and developed through three main mechanisms: experiential learning, social interaction, and human-centered problem-solving in STEAM activities. Simultaneously, the research also points to the strong link between SEL and STEAM in the holistic development of children's abilities. This paper contributes to supplementing the theoretical basis for integrating SEL into STEAM education and proposes directions for organizing activities to enhance the effectiveness of empathy development in preschool children in the current educational context.

KEYWORDS: SEL, empathy, STEAM, early childhood education, socio-emotional competence

INTRODUCTION

In the context of the Fourth Industrial Revolution, the rapid development of artificial intelligence (AI) and digital technology is profoundly changing the structure of the workforce and the demands on human resources. Many technical tasks, information processing, and even decision-making are gradually being automated, creating an urgent need for education to shift from a knowledge-based approach to holistic human development. In this context, socio-emotional competencies such as self-awareness, emotional management, cooperation, and especially empathy are considered core competencies that technology can hardly replace (OECD, 2018; UNESCO, 2023).

Social-Emotional Learning (SEL) is therefore increasingly being considered a crucial direction in modern education. According to the Collaborative for Academic, Social, and Emotional Learning (2020), SEL encompasses competency groups such as self-awareness, self-management, social awareness, relational skills, and responsible decision-making. Numerous studies have shown that developing SEL not only contributes to improved positive social behavior but also enhances learning outcomes and the holistic development of learners (Durlak et al., 2011).

Simultaneously, STEAM (Science, Technology, Engineering, Arts, Mathematics) education has been widely implemented as an interdisciplinary integrated education model to develop creative thinking, problem-solving skills, and the ability to adapt to the challenges of the 21st century. However, some studies show that the implementation of STEAM in practice still tends to focus on cognitive and technical skills, failing to fully exploit the potential of this model in developing socio-emotional skills (Henriksen et al., 2017).

Meanwhile, empathy is identified as one of the core components of socio-emotional skills, playing a fundamental role in the formation of altruistic behavior, cooperation abilities, and personality development in children (Eisenberg et al., 2006; Decety, 2010). For preschool children aged 5–6, this is a crucial stage in forming the initial expressions of empathy through experiences, social interactions, and purposeful educational activities (Hoffman, 2000).

In Vietnam, the orientation towards developing children's competencies and qualities has been reflected in the preschool education program, which emphasizes the formation of age-appropriate social behaviors and skills (Ministry of



Education and Training, 2021). However, the integration of socio-emotional education into modern educational models such as STEAM has not yet been systematically studied, especially in the context of preschool education.

From the above analysis, it can be seen that integrating socio-emotional education into STEAM education to develop empathy in preschool children is not only significant from a theoretical standpoint but also has profound practical value. However, research gaps still exist due to the lack of theoretical frameworks for integration and specific guidelines for organizing activities. Therefore, this article focuses on clarifying the theoretical basis of integrating SEL into STEAM education to develop empathy in 5-6 year old preschool children, contributing to supplementing the scientific foundation for innovation and improving the quality of preschool education today.

RESEARCH METHODS

This article uses theoretical research combined with document analysis to systematize the scientific basis of socio-emotional education (SEL), STEAM education, and empathy development in preschool children.

Data sources were collected from domestic and international scientific works, including articles in academic databases (Scopus, Web of Science), documents from international educational organizations, and research in Vietnam related to SEL, STEAM, and empathy in preschool children.

The documents were selected according to the following criteria: (1) clear origin, (2) published in reputable scientific journals or publishers, and (3) directly related to the research content. Data was analyzed through content analysis and theoretical synthesis to build a theoretical framework integrating SEL in STEAM education to develop empathy in preschool children.

RESULT

Empathy in the socio-emotional education competency framework

Social-Emotional Learning (SEL) is considered one of the core orientations of modern education, aiming to develop well-rounded individuals alongside cognitive abilities. According to the Collaborative for Academic, Social, and Emotional Learning (2020), SEL comprises five main competency groups: (1) self-awareness, (2) self-management, (3) social awareness, (4) relationship skills, and (5) responsible decision-making. Of these, social awareness is the central competency directly related to the development of empathy.

Empathy is understood as the ability to recognize, understand, and share the emotions of others, and to respond appropriately in social situations. According to Jean Decety (2010), empathy includes two basic components: (i) affective empathy – the ability to share the emotional state of others; and (ii) cognitive empathy – the ability to understand the perspectives and psychological states of others. These two components develop in parallel and interact closely during the development of young children.

In addition, Nancy Eisenberg et al. (2006) asserted that empathy is the foundation of prosocial behavior, including behaviors such as helping, sharing, and cooperating. The meta-analysis by Denham et al. (2012) also showed that children with high levels of empathy tend to have better emotional regulation and a tendency to establish positive social relationships.

In the context of Vietnamese education, the content of developing socio-emotional competence for children has been addressed in educational guidelines. The preschool education program emphasizes the formation of initial life qualities and skills appropriate to the child's age (Ministry of Education and Training, 2021). At the same time, domestic studies also show that the emotional development of preschool children is strongly influenced by the educational environment and daily social interactions (Nguyen Anh Tuyet, 2016).

In addition, life values and life skills education is considered one of the approaches closely related to socio-emotional education in Vietnam, contributing to the formation of qualities such as sharing, cooperation, and respect for others in children (Nguyen Thi My Loc, 2016). However, compared to developed countries, the implementation of SEL in Vietnam is still integrated, lacking a unified theoretical system and assessment tools, requiring further research and improvement in the future. This shows that researching and building integrated SEL models in preschool education, especially through STEAM educational activities, is necessary both theoretically and practically.



Characteristics of empathy development in 5-6 years old preschool children.

The age range of 5–6 years is considered a crucial period in the development of socio-emotional skills, especially empathy. According to developmental psychology studies, this is the stage where children begin to transition from instinctive emotional responses to conscious understanding of others' emotions.

According to Martin L. Hoffman (2000), older preschool children are capable of practicing “beyond egocentric empathy,” meaning they can understand that others have different emotions and needs than themselves. This marks a significant development from emotional empathy to cognitive empathy.

Preschool children aged 5–6 begin to develop the ability to explain the causes of emotions and predict the reactions of others in social situations. According to Denham (2012), this ability is closely related to the development of language and communication skills, helping children to understand and respond more appropriately in social relationships.

According to Nguyen Anh Tuyet (2016), the emotional development of preschool children is strongly influenced by the educational environment and social relationships, especially the interaction between children and teachers and peers. At the same time, the orientations in the Vietnamese Preschool Education Program also emphasize organizing experiential, communicative, and cooperative activities to develop social and emotional skills for children (Ministry of Education and Training, 2021).

These characteristics show that the 5-6 age range is a favorable time to organize purposeful educational activities to develop empathy, through enhanced experiences, interactions, and meaningful social situations for children. This provides an important psychological-educational basis for selecting appropriate methods and forms of activity organization to develop empathy in preschool education.

STEAM education from the perspective of developing socio-emotional skills.

STEAM education is considered an interdisciplinary, integrated educational model aimed at developing creative thinking, problem-solving skills, and innovative abilities. However, in recent years, many studies have emphasized that STEAM education goes beyond simply developing cognitive abilities and also has great potential in developing learners' socio-emotional skills.

According to research by Henriksen et al. (2017), integrating arts into STEM enhances learners' emotional expression, social sensitivity, and creative thinking. This expands the role of STEAM from a purely technical educational model to a learning environment rich in experiential and humanistic values, where learners have the opportunity to develop competencies such as empathy and collaboration. Meanwhile, research by Durlak et al. (2011) indicated that integrated SEL educational programs have a positive impact on learners' social behavior, attitudes, and learning outcomes. When applied in the context of STEAM, activities such as teamwork, discussion, and problem-solving not only help develop thinking but also facilitate learners' practice of social skills, thereby forming and strengthening socio-emotional competence.

A new approach in modern education is "human-centered STEAM," which emphasizes designing learning activities linked to practical human and community problems. This approach is closely related to design thinking, in which empathy is considered the starting point of the problem-solving process (Brown, 2008). By putting themselves in others' shoes to understand their needs and emotions, learners have the opportunity to develop empathy and a sense of social responsibility.

In Vietnam, STEAM education is gradually being implemented in preschools in line with the innovative teaching methods, focusing on developing children's competencies and qualities (Ministry of Education and Training, 2021). Simultaneously, UNESCO guidelines (2023) also recommend integrating socio-emotional development activities into the learning environment to support the holistic development of young children.

However, in practice, the integration of SEL into STEAM education in Vietnam remains spontaneous, lacking specific theoretical models and clear practical guidance. This necessitates the development of appropriate theoretical frameworks and activity organization models to enhance the effectiveness of STEAM in developing socio-emotional competencies, especially empathy, in preschool children.

Mechanisms for developing empathy in children through STEAM education activities.

The development of empathy in children in STEAM education does not occur spontaneously but is formed through specific psychological and educational mechanisms. Based on a synthesis of research in the field of developmental and educational psychology, three core mechanisms can be identified that play a role in promoting the formation and development of this capacity in preschool children.



(1) Experiential Learning

According to David A. Kolb (1984), knowledge is formed through a cycle of concrete experience, reflection, generalization, and application. When participating in practical STEAM activities, children not only acquire knowledge but also directly experience emotional states in the process of exploration and problem-solving. These experiences enable children to identify their own emotions and those of others, thereby developing important components of socio-emotional competence, especially empathy.

(2) Social Interaction

According to Lev Vygotsky (1978), children's cognitive and emotional development occurs through meaningful social interactions. In a STEAM educational environment, children frequently participate in group activities such as exchanging ideas, cooperating, and solving problems together. This process not only helps children develop communication skills but also creates opportunities for them to learn how to listen, share, and respond to the emotions of others, thereby forming and strengthening empathy. This is also consistent with the view of Durlak et al. (2011) when emphasizing the role of interactive learning environments in the development of socio-emotional competence.

(3) Human-centered problem solving

An important characteristic of modern STEAM education is its orientation towards solving problems related to practical contexts and human needs. This approach is closely related to design thinking, where empathy is considered the starting point of the problem-solving process. According to Tim Brown (2008), understanding the needs, emotions, and experiences of the "user" is fundamental to proposing appropriate solutions. When applied in early childhood education, this approach encourages children to put themselves in others' shoes, thereby developing empathy through finding and implementing solutions to simple social problems.

The Vietnamese early childhood education reform guidelines also emphasize the role of organizing experiential, interactive, and collaborative activities to develop children's holistic abilities (Ministry of Education and Training, 2021). This shows the similarity between international theoretical foundations and domestic educational orientations, and affirms the feasibility of applying these mechanisms in organizing STEAM educational activities to develop empathy in preschool children. These three mechanisms do not exist in isolation but interact with each other, forming the foundation for designing STEAM educational activities that systematically and effectively develop socio-emotional competencies.

Integrating Socio-Emotional Education into STEAM Educational Activities

In recent years, international organizations such as UNESCO have developed many guidelines on socio-emotional education (SEL) for early childhood education, emphasizing the creation of a positive learning environment, increased interaction, and support for the holistic development of children (UNESCO, 2023). These guidelines are consistent with current educational innovation trends, especially in the context of focusing on developing learners' competencies and qualities.

In Vietnam, socio-emotional education (SEL) has not been implemented as a standalone program but is mainly integrated into educational and childcare activities as guided by the Early Childhood Education Program (Ministry of Education and Training, 2021). This shows that integrating SEL into modern educational models such as STEAM is a suitable approach; however, specific and systematic guidelines are still needed to improve its effectiveness in practice.

To effectively develop empathy in children, the integration of SEL into STEAM education needs to be done purposefully, through the following basic guidelines:

First, integrate SEL goals into the goals of STEAM activities, clearly defining the manifestations of empathy competence such as the ability to recognize emotions, understand the needs of others, and demonstrate appropriate supportive behavior.

Secondly, design learning scenarios that are emotionally engaging and relevant to real-world contexts, such as issues related to helping others, protecting the environment, or sharing with friends. These scenarios help children connect cognitive and emotional aspects in the learning process.

Thirdly, enhance group interaction activities to create opportunities for children to exchange ideas, cooperate, and learn from each other. According to Durlak et al. (2011), a positive and interactive learning environment plays a crucial role in promoting socio-emotional development.

Fourthly, focus on activities. Reflection helps children recognize and regulate their own emotions. This is a crucial step in transforming experiences into competencies, contributing to the development of SEL components.



Finally, the role of the teacher is considered key in organizing and coordinating educational activities. According to Jennings and Greenberg (2009), the socio-emotional competence of teachers directly influences the classroom environment and the emotional development of children. Therefore, fostering SEL competence in preschool teachers is a necessary condition for effectively implementing STEAM activities oriented towards developing empathy.

DISCUSSION

The analysis results show that integrating socio-emotional education into STEAM is an approach consistent with modern educational trends, thereby contributing to the holistic development of learners. Unlike traditional STEAM models that focus on developing cognitive abilities, this approach expands the role of STEAM to include the development of humanistic values.

Compared to previous studies, this paper clarifies the mechanism of STEAM's impact on empathy development through mediating factors such as experience and social interaction. This aligns with Durlak et al.'s (2011) view on the role of a positive learning environment in SEL development.

Furthermore, emphasizing the "human-centered" approach in STEAM activities also contributes to reorienting educational goals in the context of artificial intelligence. As technology can replace many skills and techniques, competencies such as empathy, cooperation, and social ethics are becoming increasingly important.

However, the integration of SEL into STEAM still faces many challenges, particularly regarding teacher capacity and organizational conditions. Therefore, empirical studies are needed to verify the effectiveness of proposed models.

CONCLUSION

This article clarifies the theoretical basis and mechanisms for developing empathy in 5-6 years old preschool children through the integration of socio-emotional education (SEL) in STEAM education. Based on a synthesis of domestic and international research, the study indicates that empathy is effectively formed and developed through three core mechanisms: experiential learning, social interaction, and human-centered problem-solving.

The research results contribute to supplementing the theoretical basis for integrating SEL in STEAM education, while affirming the potential of this approach in developing socio-emotional competence, especially empathy, in preschool children. In the context of modern education strongly influenced by artificial intelligence, emphasizing humanistic values such as empathy, cooperation, and social responsibility is more necessary than ever.

However, the research is still at the theoretical stage; therefore, future empirical studies are needed to verify the effectiveness of the proposed model in specific educational contexts. This will contribute to refining the scientific basis and enhancing the feasibility of integrating SEL into STEAM education in Vietnam.

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