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ARTICLE

Interdisciplinary Learning Using Coding Dance Party to Enhance Creativity and Computational Thinking

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Abstract

This study proposes the Coding Dance Party as an innovative pedagogical intervention to facilitate interdisciplinary learning by enhancing creativity and computational thinking among students enrolled in a Primary School Teacher Education program. The approach adopts an experiential, embodied learning framework by integrating dance-based activities with foundational computer programming concepts, thereby promoting active engagement and multimodal cognition. A quantitative research design was employed using a one-group pretest–posttest model. The sample consisted of 60 participants who underwent structured instruction through the Coding Dance Party intervention. Data were collected using standardized creativity tests and computational thinking assessments, both of which were previously validated for reliability and construct validity. Statistical analysis was conducted using paired-sample t-tests to evaluate differences in student performance before and after the intervention. The findings demonstrate a substantial improvement in students' creativity, with mean scores increasing from 65.3 to 82.7. Similarly, computational thinking skills showed a marked enhancement, rising from a mean score of 62.8 to 85.4 following the intervention. These results indicate that the Coding Dance Party method is effective in stimulating creative capacities and strengthening computational thinking competencies. The study contributes to the expanding body of research on innovative instructional strategies by providing empirical evidence for the effectiveness of integrating arts-based approaches into computational learning contexts. The findings suggest that such interdisciplinary methods offer a more engaging, holistic, and pedagogically robust learning experience, with potential applicability across diverse educational settings.

Keywords: Artistic Creativity; Coding Dance Party; Computational Thinking; Interdisciplinary Learning.

1. Introduction

The demands of the digital era necessitate a fundamental transformation in pedagogical approaches, requiring educators to adopt innovative instructional strategies that extend beyond the development

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of purely cognitive skills. Contemporary education must also cultivate higher-order competencies, particularly creativity and computational thinking, which are essential for navigating complex, technology-mediated environments. In this context, interdisciplinary education has emerged as a critical framework for integrating diverse domains, notably the arts, technology, and pedagogy, to support more holistic and adaptive learning processes [1]. In this context, the integration of dance with computer programming through Coding Dance Party presents a novel approach to developing creativity and digital literacy in prospective primary school teachers. This integration-based learning also supports the STEAM education paradigm, which emphasises the importance of the role of art in humanising technology and fostering creativity in scientific thinking [2].

21st-century education requires prospective teachers to have 8C skills, namely critical thinking, creativity, collaboration, communication, computational thinking, compassion, citizenship, and connectivity [3]. These eight skills shape the profile of educators who are able to adapt to global changes and digital technology. In the context of Primary School Teacher Education (PGSD), these abilities are very important because prospective teachers act as facilitators of creative, communicative, and problem-solving-oriented learning. Therefore, learning strategies in higher education need to be designed to foster the 8C skills in an integrated manner, not just partially or separately between fields of study.

Recent developments in digital technology have increasingly shaped the competencies required of future primary school teachers [4] [5]. However, several studies report that undergraduate teacher education students often experience difficulties in integrating creative artistic expression with computational and algorithmic thinking, particularly in non-technology-oriented courses such as arts education [6] [7] [8]. This gap is further intensified by the limited exposure of teacher education students to creative coding practices within arts-based learning contexts. Consequently, there is a pressing need for empirically grounded instructional models that meaningfully integrate artistic creativity and computational thinking in teacher education.

In practice, arts and technology education continue to be delivered as largely discrete domains within most teacher education institutions. The arts are typically positioned as an expressive field emphasizing aesthetics and affective engagement, whereas technology is more commonly associated with logic, algorithmic processes, and systematic modes of thinking. Consequently, students in Primary School Teacher Education (PGSD) programs often encounter difficulties in establishing meaningful connections between artistic creativity and computational thinking competencies. However, these domains are inherently complementary: creativity facilitates the generation of novel and original ideas, while computational thinking supports the development of structured, efficient, and scalable solutions [9] [10]. This persistent dichotomy underscores the critical need for an interdisciplinary pedagogical approach that meaningfully integrates art and technology within a cohesive learning framework.

In this study, the word creativity is utilised in a specific sense. This is not the general creativity, but the artistic creativity. Artistic creativity is conceived as the ability to create new expressive and meaningful ideas through artistic forms. That is, things like beauty, movement, symbolic or gestural expression of thought. This view of creativity is in line with dance-based learning where creativity is not just in problem solving or abstract thinking but also in creating choreography, experiencing rhythm and moving expressively. This study links the concept of creativity directly to the nature of dance instruction by emphasising artistic originality, and also combines it with computational thinking.

An interdisciplinary approach is really effective at connecting academic fields that used to feel totally separate from each other. Learning across disciplines helps students grasp concepts more deeply and meaningfully, since they're working with real-world situations. Within teacher education, such

an approach broadens students' perspectives by demonstrating that technology can function as a medium for artistic expression, while the arts can serve as a vehicle for developing logical and structured thinking. More fundamentally, interdisciplinary learning fosters the holistic development of the 8Cs competencies: it cultivates critical thinking and creativity through artistic exploration, enhances computational thinking through engagement with programming activities, and promotes collaboration, communication, and connectivity through the implementation of collaborative digital projects.

One such medium that embodies such interdisciplinary learning is Coding Dance Party, a Code.org-based platform that merges dance and computer programming. In this activity, students will be introduced to the concepts of algorithms and programming logic and will arrange digital dance movements using visual code blocks. The activity combines aesthetics, technology, and cognition into one creative and fun experience of learning. Studies [11] suggest that coding through art activities such as this can enhance students' motivation to learn, creativity, collaboration, and computational thinking through meaningful interaction. Therefore, the integration of Coding Dance Party in dance education for PGSD students is a concrete form of interdisciplinary education innovation which is in accordance with the demands of 21st-century 8C skills [12] [13] [14].

This medium not only fosters creative and computational thinking skills but also hones empathy (compassion), digital participation (citizenship), and global connectivity (connectivity) through cross-disciplinary collaboration. This approach opens up new opportunities for teacher education to produce adaptive, innovative, and humanistic educators. Despite the growing interest in interdisciplinary and STEAM-based learning, several important gaps remain in the literature. First, most previous studies have investigated computational thinking through coding activities independently from arts-based learning environments. Second, studies focusing on creativity development through arts education rarely integrate computational thinking as an explicit learning outcome. Third, although creative coding activities have been implemented in various educational contexts, empirical studies involving dance-based coding interventions in primary school teacher education (PGSD) are still very limited. Existing studies also tend to examine either creativity or computational thinking separately rather than investigating their simultaneous development within a single instructional design.

Furthermore, previous instructional approaches often treat arts and technology as separate disciplines, limiting opportunities for prospective teachers to experience how artistic expression and computational reasoning can be integrated meaningfully. Such separation may hinder the development of holistic 21st-century competencies required in contemporary teacher education. Therefore, there is a need for an interdisciplinary instructional model that intentionally combines dance and coding activities to simultaneously foster artistic creativity and computational thinking among future primary school teachers.

Most previous studies focus either on computational thinking development through coding activities or on creativity enhancement through arts-based learning, but rarely address both constructs in an integrated instructional design [12] [15]. This study addresses this gap by implementing Coding Dance Party as an interdisciplinary learning model that integrates dance and block-based programming, applies validated instruments to measure both artistic creativity and computational thinking, and evaluates their simultaneous development within a teacher education context [16]. Therefore, this research is important to examine the effectiveness of Coding Dance Party in simultaneously enhancing the artistic creativity and computational thinking of PGSD students.

Recent international studies have increasingly highlighted the potential of integrating arts-based activities with computational thinking development in educational settings. Research on creative coding, embodied learning, and STEAM-based instruction demonstrates that combining artistic ex-

pression with programming can enhance learners' engagement, creativity, and higher-order thinking skills [17] [18] [19]. In teacher education, several studies emphasise the importance of preparing future teachers to integrate creativity and digital competencies through interdisciplinary pedagogical designs [20] [21]. However, empirical evidence focusing specifically on dance-based coding activities and their simultaneous impact on artistic creativity and computational thinking in primary school teacher education remains limited. This study contributes to the current research landscape by addressing this gap through a structured interdisciplinary learning intervention.

Existing approaches are inadequate for three reasons. First, conventional arts education primarily emphasizes aesthetic appreciation and artistic expression without explicitly developing algorithmic and computational reasoning skills. Second, technology-based learning in teacher education often prioritizes technical proficiency while overlooking creative and embodied forms of learning. Third, fragmented instructional practices prevent prospective teachers from understanding how creativity and computational thinking can be integrated within authentic classroom contexts. Consequently, future teachers may encounter difficulties in designing interdisciplinary learning experiences that respond to the demands of 21st-century education.

Based on the identified research gap, the objectives of this study are: (1) to examine the effectiveness of Coding Dance Party as an interdisciplinary learning medium in enhancing artistic creativity among PGSD students; (2) to analyse its effectiveness in improving students' computational thinking skills; and (3) to investigate the simultaneous development of artistic creativity and computational thinking through an integrated dance–coding learning design.

2. Methods

This study was conducted within a single teacher education institution, as the Coding Dance Party intervention was embedded in a specific course curriculum available exclusively within this program. Implementing the intervention in a single institutional context enabled greater consistency in instructional delivery, participant characteristics, and learning conditions during this preliminary investigation.

Furthermore, a control group was not incorporated, as the study was designed as an exploratory evaluation of a newly introduced pedagogical innovation in an authentic classroom setting. Prior research in educational interventions suggests that one-group pretest–post-test designs are appropriate for generating initial empirical evidence on instructional effectiveness, particularly in the early stages before more rigorous, large-scale experimental studies are undertaken.

Accordingly, this study adopted a quantitative approach employing a quasi-experimental one-group pretest–posttest design. This design facilitated the examination of changes in students' competencies before and after participation in the Coding Dance Party learning program, especially given its first-time implementation within the course. Although experimental designs typically include control or comparison groups, the one-group pretest–posttest approach is widely regarded as suitable for exploratory and preliminary evaluations of innovative pedagogical interventions. It enables the identification of learning trends and potential instructional impact within an ecologically valid classroom context. Therefore, this design was considered adequate to provide initial empirical evidence regarding the effectiveness of the Coding Dance Party intervention in enhancing students' artistic creativity and computational thinking skills.

The participant group consisted of 60 PGSD students, comprising 46 female students (76.7%) and 14 male students (23.3%), reflecting the typical gender distribution in primary teacher education programmes. Regarding prior coding experience, most participants reported having no formal background in computer programming, with only basic exposure to digital technology through general

educational applications. This relatively homogeneous background minimised potential bias related to prior coding skills and allowed the observed learning outcomes to be primarily attributed to the Coding Dance Party intervention. The sample was selected using purposive sampling with the following criteria: (1) attending all learning sessions; (2) completing pre- and post-learning tests; and (3) giving consent to participate in the research.

The instruments used in this study included two main tests: (1) A creativity test adapted from the Torrance Tests of Creative Thinking (TTCT) [**ttct**], figural version to measure four indicators, namely fluency, flexibility, originality, and elaboration. (2) A Computational Thinking test adapted from the instrument [**ct_instrument**], consisting of five indicators: decomposition, pattern recognition, abstraction, algorithmic thinking, and generalisation. Both instruments have been tested for validity by three experts, and their reliability was obtained with Cronbach's Alpha coefficients of $\alpha = 0.82$ for creativity and $\alpha = 0.85$ for Computational Thinking.

The creativity and computational thinking instruments were adapted to suit the instructional context and participant characteristics. Both instruments were evaluated for content validity by three experts in arts education, educational technology, and educational assessment. The experts examined the relevance, clarity, and alignment of each item with the intended constructs of artistic creativity and computational thinking. Revisions were made based on their feedback before the administration of the instruments. Reliability testing yielded Cronbach's Alpha coefficients of $\alpha = 0.82$ for creativity and $\alpha = 0.85$ for Computational Thinking. The adaptation process focused onlanguage clarity and contextual relevance to dance education, without altering the core constructs of the original instruments. All test items were translated and reviewed to ensure alignment with the learning activities and students' academic level. Scoring procedures followed the original guidelines of each instrument, using standardised rubrics to ensure consistency and objectivity across pretest and posttest assessments.

To provide greater transparency, examples of instrument items are described as follows. Creativity test items required students to design original digital dance movements, modify movement sequences, and elaborate choreographic ideas using block-based coding. Computational Thinking test items involved identifying movement patterns, decomposing dance sequences into programmable steps, and constructing logical algorithms to control digital dancers' actions. These tasks directly reflected the competencies targeted in the Coding Dance Party learning activities.

The learning procedure was carried out in six meetings (equivalent to 12 face-to-face hours). The stages of the activity included: (1) orientation and pretest; (2) introduction to the basics of block coding on Code.org; (3) exploration of digital dance art through Dance Party; (4) collaborative group activities in creating digital choreography; (5) reflection on the results of the work and revision; and (6) posttest and presentation of results. Each group consisted of four to five students to facilitate collaboration, communication, and interactive social learning.

The data were analysed quantitatively using a paired t-test to measure the significance of the difference between the pretest and posttest results. In addition, the Normalised Gain (N-Gain) value was also calculated to determine the level of intervention effectiveness using Hake's (1998) formula:

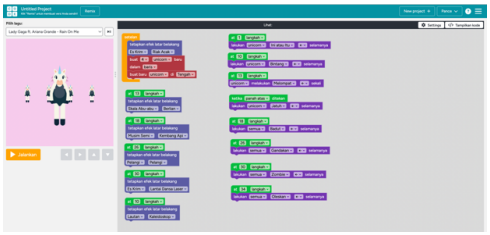
$$\text{N-Gain} = \frac{\text{Posttest} - \text{Pretest}}{100 - \text{Pretest}} \tag{1}$$

3. Results and Discussion

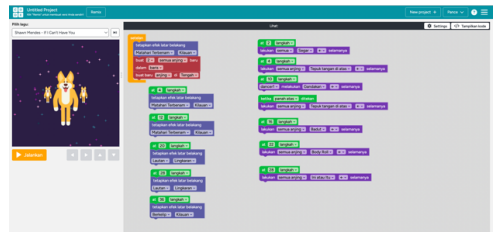
3.1 Results

The Coding Dance Party, developed by Code.org, is an interactive learning platform that employs digital dance-based activities to introduce fundamental programming concepts. Within this environment, users manipulate the movements of virtual characters synchronized to musical rhythms block-based programming (block coding). Each code block corresponds to a specific command, such as movement, tempo, direction, or the integration of visual and artistic effects.

Beyond introducing core computational concepts—including algorithmic logic, loops, and event-driven processes—this approach enables students to express creative ideas through an engaging digital medium. As such, Coding Dance Party represents a pedagogically relevant tool for supporting interdisciplinary learning and fostering the development of 21st-century competencies in teacher education. By integrating artistic expression with computational processes, it simultaneously stimulates creativity, collaboration, and computational thinking skills.



(a) Activity 1



(b) Activity 2

Figure 1. Coding Dance Party

The results of the study indicate that the implementation of the Coding Dance Party has a significant positive impact on improving the creativity and computational thinking skills of PGSD students. Based on the results of the paired t-test, both variables show a significant difference between the pretest and posttest scores. The average creativity score of students increased from 65.3 to 82.7 with a value of $t = 5.81$ and $p < 0.001$, while computational thinking skills increased from 62.8 to 85.4 with a value of $t = 6.14$ and $p < 0.001$. The N-Gain value for creativity was 0.50 and for Computational Thinking was 0.61, both of which were in the moderate category. This increase indicates that the Coding Dance Party-based learning intervention had pedagogically meaningful effectiveness, even though it was only conducted in six meetings.

These findings are presented in Table 1, which shows a comparison of the average scores before and after the intervention. The table shows a notable increase in both variables. The higher increase in Computational Thinking indicates that coding dance activities are more effective in stimulating students' logical, algorithmic, and systematic skills than conventional learning based solely on dance theory.

Table 1. Comparison of Pretest and Posttest Scores

Variable	Pretest	Posttest	t-value	p-value	N-Gain
Creativity	65.3	82.7	5.81	< 0.001	0.50
Computational Thinking	62.8	85.4	6.14	< 0.001	0.61

This improvement can be seen in Figure 2, which displays a bar chart comparing the average values of both variables. The graph shows that the post-test scores are consistently higher, indicating that

interactive learning based on the integration of art and technology is capable of creating a more meaningful learning experience.

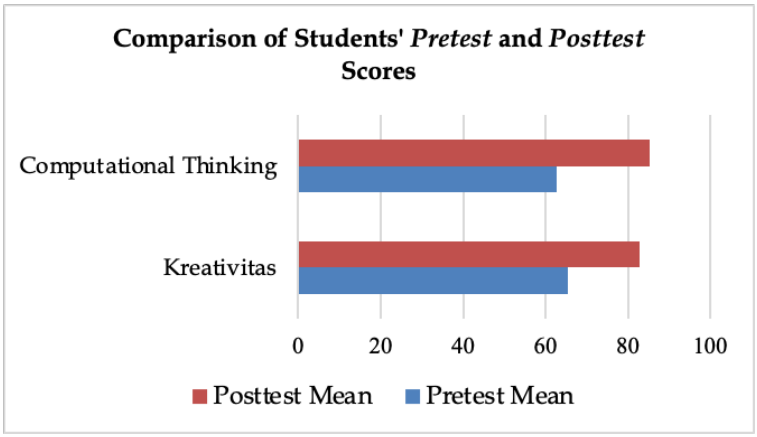


Figure 2. Bar Chart Comparison of Pre-test and Post-test Scores of PGSD Students

With respect to creativity, the findings indicate that all measured indicators demonstrated improvement, as presented in Table 1. The fluency indicator exhibited the most substantial gain, increasing by 28.2%, followed closely by elaboration at 27.5%. These results suggest that students became more proficient in generating ideas and more capable of developing those ideas into increasingly complex and refined outputs. Iterative activities—such as repeated coding, testing digital dance sequences, and revising choreography—appear to have facilitated the emergence of more mature and contextually grounded ideas.

The flexibility indicator, reflecting students' ability to adapt and modify their ideas in response to contextual changes and peer input, increased by 21.5%. Meanwhile, originality improved by 20.4%, indicating a heightened capacity to produce ideas that diverge from provided examples and demonstrate greater uniqueness. Collectively, these findings underscore the effectiveness of the intervention in enhancing multiple dimensions of creative performance.

Table 2. Increase in Creativity of PGSD Students

Indicator	Pre-test	Post-test	Improvement (%)
Fluency	58.7	75.3	28.2
Flexibility	64.1	77.9	21.5
Originality	69.4	83.6	20.4
Elaboration	60.4	77.0	27.5

The Coding Dance Party activity's features, which emphasise open exploration (creative play) and iterative learning, can account for the increasing trend in the fluency and elaboration aspects. Students are allowed to experiment with different musical and movement combinations using visual coding language. They get instant feedback in the form of digital motion visualisation each time they execute the code, which inevitably promotes introspection and iterative development. This is what Brennan and Resnick (2023) call a "creative feedback loop," a learning cycle that uses code-based creative exploration to develop divergent thinking abilities. A bar chart illustrating the rise in inventiveness is shown below.

In the dimension of Computational Thinking, the results of the study show that all indicators in-

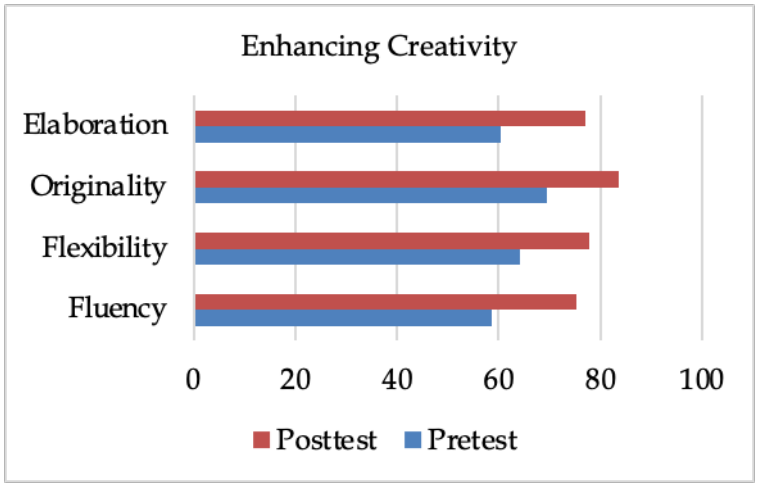


Figure 3. Bar Chart Increase in Creativity among PGSD Students

creased significantly, as presented in Table 3.

Table 3. Improvement in Computational Thinking among PGSD Students

Indicator	Pre-test	Post-test	Improvement (%)
Decomposition	61.2	78.5	28.3
Pattern Recognition	59.8	82.8	38.2
Abstraction	58.9	81.5	38.4
Algorithmic Thinking	66.0	84.2	27.6
Generalization	68.9	86.1	25.0

The indicators of pattern recognition (38.2%) and abstraction (38.4%) exhibited the most pronounced gains. These findings suggest that students significantly improved their ability to identify recurring movement patterns and to isolate essential information relevant to the construction of digital choreography algorithms.

Furthermore, decomposition increased by 28.3%, indicating that students became more adept at breaking down complex problems into smaller, manageable components. Algorithmic thinking also improved by 27.6%, reflecting enhanced capacity to design coherent and logical sequences of steps. In addition, the generalization indicator rose by 25.0%, suggesting that students were increasingly able to transfer and adapt programming patterns across varied dance movement contexts.

Collectively, these results demonstrate substantial development across multiple dimensions of computational thinking, highlighting the effectiveness of the intervention in strengthening students' analytical and problem-solving capabilities.

All Computational Thinking markers have clearly improved overall, as seen in Figure **??**. Given that students had to trace movements using symbols and code blocks, it seems that the Coding Dance Party activity successfully engaged both logical and visual thinking processes at the same time. Grover and Pea's (2023) idea, according to which visual representations and art-based activities might enhance computational thinking abilities through multimodal experiences, is supported by this exercise [22] [23] [24]. In this situation, students may comprehend algorithmic abstractions and cause-and-effect interactions in programming through the concrete medium of digital dancing

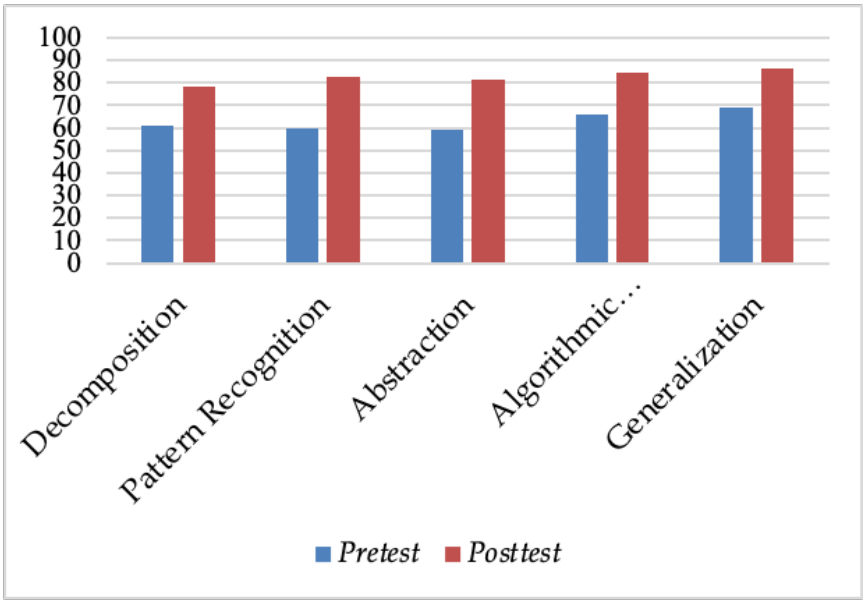


Figure 4. Bar Chart Improvement in Computational Thinking among PGSD Students

motions.

This study shows learning dynamics that enhance 21st-century skills in addition to numerical results. Collaborative activities foster group-based communication and cooperation, while the exploration of ideas strengthens creative capacities. Critical thinking is stimulated through the processes of testing code and evaluating outcomes, and computational thinking is directly enhanced through the programming of movement sequences within the Coding Dance Party environment. When students work together morally, respect one another's opinions, and produce work that adheres to social standards and cultural values, the qualities of compassion and citizenship also become apparent. These findings provide empirical support for the conceptualization of holistic 8C competency development within teacher education, indicating that integrated instructional approaches can effectively cultivate a broad spectrum of essential 21st-century skills.

A conceptual overview of the integration of art and technology in this study is shown in Figure 4.

Figure 5 depicts how the two major disciplines of Art (Dance) and Technology (Coding) meet in the field of interdisciplinary learning. Increased creativity and computational thinking abilities are the two primary results of the Coding Dance Party exercise, which arises from this intersection. The foundation of STEAM (Science, Technology, Engineering, Arts, and Mathematics) oriented learning is represented by this paradigm, which strikes a balance between logical thinking frameworks and artistic expression.

Students' passion and active participation in the learning process are also evident in the documentation of their activities. In order to produce engaging digital choreography, students are observed collaborating in small groups, debating, and evaluating the outcomes of their code. The students' intrinsic motivation was bolstered by this enjoyable and cooperative learning environment, which also encouraged self-assurance in their capacity to combine art and technology.

Overall, the study's findings support the notion that the Coding Dance Party is both a cutting-edge digital learning platform and a successful teaching tool for fostering higher-order thinking abilities.

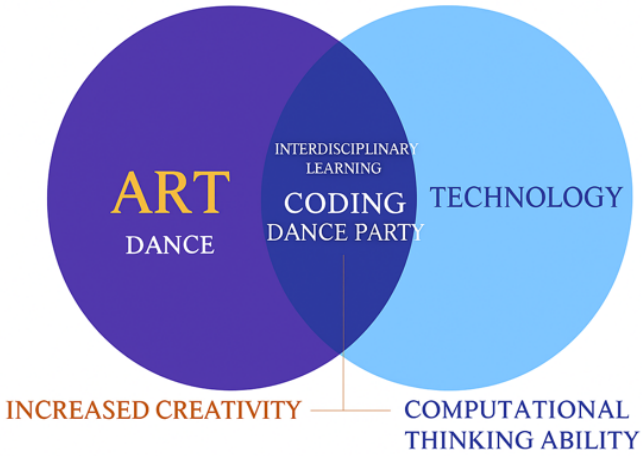


Figure 5. Conceptual Image of the Integration of Art and Technology

Students can learn through significant aesthetic experiences in this project, which enjoyably combines creativity and logic. Therefore, Coding Dance Party is a suitable interdisciplinary learning model for teacher preparation in the twenty-first century.

3.2 Discussion

A pedagogical innovation that combines artistic expression with digital literacy in the context of 21st-century education is learning dance through Coding Dance Party [9]. Students are encouraged to use the Code.org platform to not only express themselves through music, rhythm, and movement, but also to comprehend the reasoning behind each movement sequence they produce using visual coding language (block coding) [23]. In this exercise, students take on the roles of choreographers and algorithm designers, arranging code blocks based on fundamental programming concepts like sequence, loop, and event to control the movement of each virtual dancer [24]. Because it integrates aesthetic, cognitive, and technological elements into a single integrated activity, this method offers a distinctive educational experience [25].

This method is an actual application of multidisciplinary education that links technology and art. Computational thinking notions that emphasize logic, structure, and systematics are mixed with dance, which has long been associated with physical expression, emotion, and rhythm [16] [26]. Through Coding Dance Party, students learn that art is not only about the beauty of movement, but also about how that movement can be conceptualised, designed, and executed algorithmically [27]. This activity encourages students to think divergently when designing choreography, generating many creative ideas, while thinking convergently when compiling code blocks to produce movements that match the design.

From a pedagogical perspective, this learning is designed based on project-based learning, where students work in small groups to design, programme, and present their digital dance works [28]. This process teaches collaboration, communication, and leadership, as well as providing space for critical reflection on the process of creating art in the digital age [29]. Students are not merely users of technology, but also creators who are able to utilise technology as an artistic medium. Coding

Dance Party is an interactive, fun, and meaningful learning platform because it combines emotional, logical, and creative aspects in one activity [23] [30].

The integration of Coding Dance Party in dance education also supports the achievement of 21st Century Skills, particularly in the development of 8C: critical thinking, creativity, collaboration, communication, computational thinking, compassion, citizenship, and connectivity [8] [31] [32]. Students are required to think critically when designing movement algorithms, communicate effectively in teamwork, and be innovative in creating digital choreography. Through this technology-based interaction, students learn to understand that technology can be a humanistic medium for expressing human values, culture, and beauty [33] [5].

Coding Dance Party also functions conceptually as a bridge between arts-based learning and science-technology education. Through this activity, abstract programming concepts become easier to understand because they are visualised in the form of concrete digital dance movements. Students learn that algorithms do not only exist in lines of code, but can also be realised in musical rhythms and rhythmic movement patterns. This makes learning not only cognitive, but also affective and psychomotor, in line with a holistic approach to arts education. Thus, Coding Dance Party can be considered a concrete form of STEAM education (Science, Technology, Engineering, Arts, Mathematics) that is relevant and contextual for prospective primary school teachers [33].

The significant increase in students' creativity and computational thinking abilities after the intervention with Coding Dance Party can be understood through several mutually supportive theoretical frameworks. First, the theory of constructionism proposed by Seymour Papert asserts that learning occurs deeply when participants actively create something that is visually and operationally meaningful, in this case, students designing code blocks for digital dance movements. This theory emphasises that coding is not only logical processing, but also creative expression through media. The popularisation of the term "computational thinking" emphasises that computational thinking includes the abilities of decomposition, pattern recognition, abstraction, and algorithms [24].

Interdisciplinary approaches such as those applied through Coding Dance Party fit within the framework of STEAM education (Science, Technology, Engineering, Arts, Mathematics). Recent studies suggest that integrating the arts into STEM enriches students' creativity and critical thinking [2]. Thus, activities that combine dance and programming create a context in which students are at the intersection of both fields, providing space for aesthetic expression and algorithmic problem solving.

Furthermore, the development of creativity, as seen in the high increase in the indicators of fluency and elaboration, can be framed by creativity theory, which emphasises the cycle of exploration, feedback, and revision. The iterative process of coding dance activities, namely ("create code $\rightarrow$ run $\rightarrow$ revise choreography") creates a creative feedback loop that encourages new ideas and deepens ideas (fluency, elaboration) while increasing the flexibility and originality of ideas. This theoretical basis also reinforces that creativity and computational thinking are not separate abilities, but can be developed simultaneously. This is in line with the findings of studies that map the relationship between creativity and CT positively [34].

The significant improvement in the indicators of pattern recognition and abstraction in CT shows that students are becoming more proficient at recognising movement patterns and filtering important elements to be arranged in digital choreography algorithms. This is in line with the latest framework that presents CT as a holistic skill involving cognitive, metacognitive, and data literacy processes [3] [35]. Visual-kinesthetic activities, such as becoming a code choreographer, allow students to internalise patterns, abstractions, and algorithms concretely, not just through abstractions alone. Project-based learning theory is also relevant: students work in small groups to design, programme, and present their digital dance works.

A systematic review study shows that PjBL is highly effective for developing CT in higher education [36]. In this context, the Coding Dance Party activity is not just about increasing quantitative scores, but creating a collaborative, reflective, and integrative learning environment, all of which are important components in the 8C framework (critical thinking, creativity, collaboration, communication, Computational Thinking, compassion, citizenship, connectivity) [37].

There are a number of limitations to this study that should be noted. First, the study used a one-group pretest–posttest design without a control group, which makes it more difficult to credit the intervention alone for the benefits that were seen. Second, the results may not be as broadly applicable as they may be due to the small sample size and single teacher education school. Third, the intervention was conducted over a rather little period of six meetings, which might not well represent the long-term growth of computational thinking abilities and artistic creativity. Lastly, when evaluating the findings, it is important to take into account the particular educational and cultural context in which the study was carried out. It is advised that future studies use comparative or experimental designs, use bigger and more varied sample sizes, and look at long-term learning results.

4. Conclusion

Based on the findings, several practical implications can be articulated. Teacher education institutions should systematically integrate interdisciplinary learning activities that intentionally combine the arts and digital technologies within teacher preparation programs. Educators are encouraged to adopt Coding Dance Party or comparable creative coding platforms to support the concurrent development of artistic creativity and computational thinking competencies.

Furthermore, curriculum developers should consider embedding STEAM-oriented interdisciplinary learning experiences across multiple courses to enhance prospective teachers' mastery of 21st-century skills. Effective implementation also requires sustained institutional support, particularly in the provision of adequate digital infrastructure and the continuous professional development of lecturers to ensure pedagogical readiness and instructional quality.

The implementation of Coding Dance Party greatly enhances the creativity and computational thinking abilities of PGSD students, according to the findings of quantitative analysis and observation of the learning process. Through interactive, cooperative, and reflective learning experiences, this exercise enables students to combine programming logic with artistic creativity. Fluency and elaboration are the most advanced creativity measures, whereas pattern recognition and abstraction show the biggest increases in computational thinking. This demonstrates how coding dance exercises can simultaneously promote divergent and convergent thought.

These results have significant ramifications for teacher preparation in the digital era. Particularly when it comes to fusing art and technology, Coding Dance Party is a useful interdisciplinary teaching method for 8C skills development. Additionally, this approach can be modified to enhance the digital literacy and creativity of aspiring teachers in a variety of STEAM-based PGSD courses.

By offering empirical data on the integration of artistic creativity and computational thinking within teacher education, the study's findings theoretically contribute to the literature on interdisciplinary learning and STEAM education. By showing how dance-based coding exercises can act as an educational link between artistic expression and computational processes, this study expands on previous approaches. In practical terms, the study provides teacher educators with an instructional model that they may use to create innovative, technology-integrated learning experiences. Coding Dance Party offers a practical and entertaining method for training aspiring elementary school teachers to incorporate technology and art into their lesson plans, promoting the development of 21st-century

skills.

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