INTEGRATING UNPLUGGED AND PLUGGED CODING IN EARLY CHILDHOOD EDUCATION: TEACHER PERSPECTIVES AND CLASSROOM PRACTICES

CI 677
Marshall University
Curriculum and Instruction
by
Amber Lynn Myers

Research Questions

- How do early childhood educators integrate unplugged coding into classroom projects?
- In what ways do unplugged coding activities align with early learning standards and developmental milestones?
- How do teachers scaffold unplugged coding experiences to support problem-solving and computational thinking in young learners?
- How do students respond to unplugged coding activities compared to plugged coding experiences regarding engagement and skill development?

Argument

Despite the growing emphasis on STEM education, coding remains an overlooked component of early childhood instruction. Many assume that programming is too advanced for young learners; however, research and classroom experiences show that unplugged coding—coding activities without screens—provides a crucial foundation for problem-solving, logical thinking, and mathematical reasoning. Because we want to prepare students for a future driven by technology and computational thinking, coding should not be an afterthought but an intentional part of early learning curricula.

Claim of Significance

Unplugged coding is an essential yet underutilized approach in early childhood education that fosters foundational problem-solving, logical reasoning, and communication skills. By integrating coding concepts without digital devices, educators can scaffold learning experiences that align with early learning standards, support cognitive development, and serve as a gateway to future digital literacy. Understanding how teachers effectively implement unplugged coding can enhance pedagogical strategies and student outcomes in Pre-K and Kindergarten classrooms.

Methodology

Research Design- This study utilized a quantitative descriptive survey design to investigate how early childhood educators integrate unplugged coding into their instructional practices. The survey aimed to address four research questions related to integration, alignment with standards, scaffolding strategies, and how students respond to unplugged versus plugged coding activities.

Participants- A total of 19 early childhood educators participated in the study. Respondents represented diverse educational settings, including Pre-K through 2nd grade classrooms, and a range of years of teaching experience. The sample included both general education and specialized educators.

Survey Instrument- The survey was designed to collect structured responses and did not include open-ended items. It consisted of multiple-choice questions, frequency scales (e.g., “Never,” “Occasionally,” “Frequently”), checklists (e.g., types of coding activities used), and comparative rating items (e.g., student engagement in unplugged vs. plugged coding). The items were grouped around the following constructs:

1. Integration of unplugged coding into classroom projects
2. Alignment with early learning standards and developmental milestones
3. Instructional scaffolding strategies used during unplugged coding
4. Perceived student engagement and skill development

Each item was directly aligned to one or more research questions to ensure construct validity.

Summary

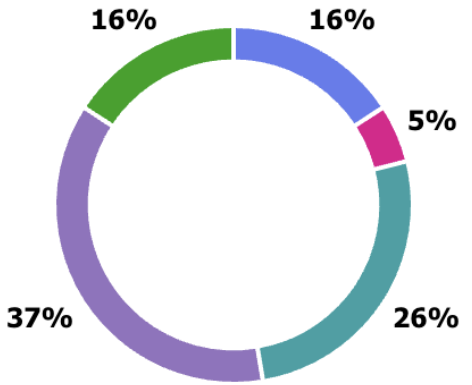
Nineteen early childhood educators completed a structured survey exploring how unplugged coding activities are used in early childhood classrooms. The survey examined integration into classroom projects, alignment with standards, and instructional scaffolding. Results are summarized in the following slides by key research question.

How do early childhood educators integrate unplugged coding into classroom projects?

- Frequency of Use:
  - The majority of educators (63%) reported using unplugged coding activities “occasionally,” while 21% used them “frequently.”
  - A small percentage (16%) reported “rarely” or “never” using unplugged coding.
- Integration Types:
  - Most unplugged coding activities were integrated into literacy (68%) and math (58%) centers, followed by STEM projects (47%).
  - Common activities included directional games, sequencing stories, and logic puzzles.
- Grade-Level Trends:
  - Pre-K and Kindergarten teachers reported the highest frequency of unplugged coding integration.
  - First and second-grade teachers were more likely to use plugged coding tools in addition to unplugged activities.

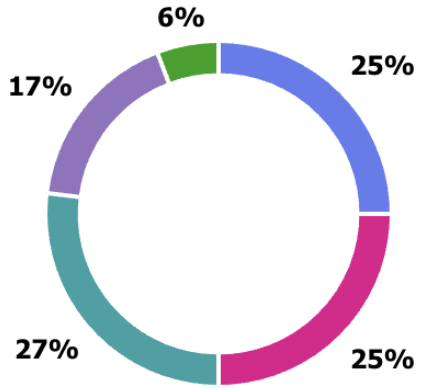
How often to teachers incorporate unplugged coding in the classrooms?

Never	3
Rarely (1-2 times per year)	1
Occasionally (monthly)	5
Frequently (weekly)	7
Regularly (daily)	3



What types of unplugged coding activities do you use?

Sequencing games (e.g., ordering picture cards)	13
Directional movement (e.g., stepping forward/backward to follow commands)	13
Pattern recognition activities	14
Story-based coding (e.g., storytelling with coding logic)	9
Other	3

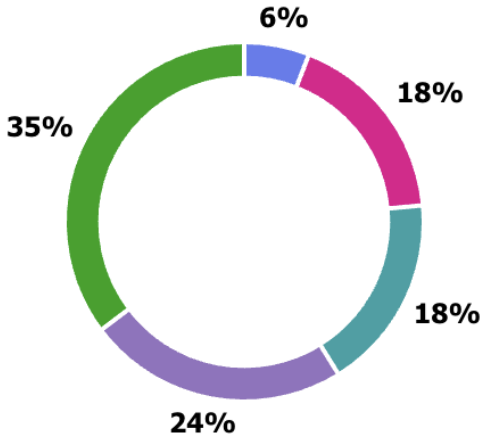


In what ways do unplugged coding activities align with early learning standards and developmental milestones?

- Alignment Perceptions:
  - 74% of participants agreed or strongly agreed that unplugged coding supports problem-solving, sequencing, and language development, which are key early learning domains.
- Domains of Alignment:
  - Most alignment was reported in:
    - Mathematics (79%) – particularly in patterning and directional concepts
    - Language & Literacy (63%) – through storytelling, retelling, and sequence-based play
    - Social-Emotional Development (42%) – such as turn-taking and collaboration

To what extent do you align unplugged coding activities with early learning standards?

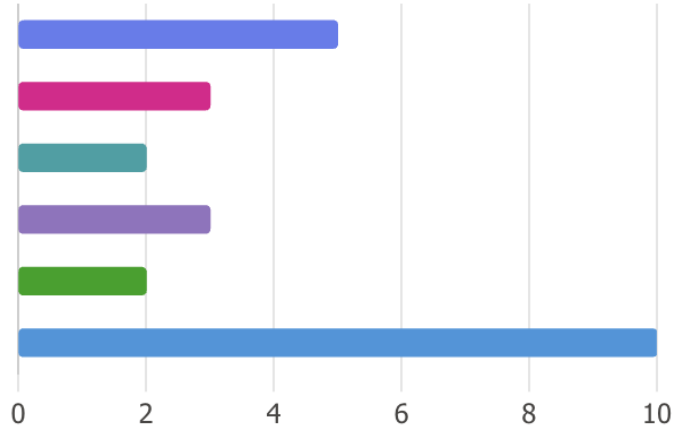
Not at all	1
Slightly aligned	3
Somewhat aligned	3
Mostly aligned	4
Completely aligned	6



Do you use plugged coding activities (e.g., coding apps, programmable robots) in your classroom?

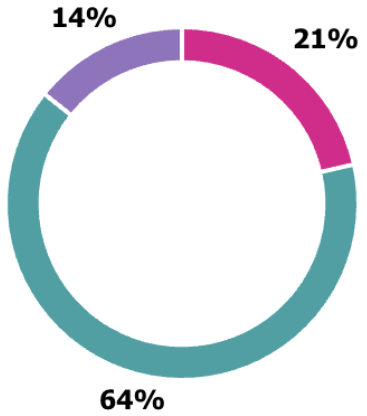
Which plugged coding tools or devices do you use? (Select all that apply)

Bee-Bot or Code & Go Mouse	5
Scratch Jr or Kodable	3
Osmo Coding	2
Dash & Dot or Sphero	3
Indi Coding Robot	2
I do not use plugged coding tools	10



How would you rate students' engagement with plugged coding tools compared to unplugged coding activities?

More engaged with plugged coding	0
More engaged with unplugged coding	3
Engaged equally in both	9
Neither is highly engaging	2



How do teachers scaffold unplugged coding experiences to support problem-solving and computational thinking?

- Scaffolding Strategies Used:
  - The most commonly reported strategies included:
    - Modeling (84%)
    - Guided questioning (68%)
    - Think-alouds (53%)
    - Pairing or peer collaboration (47%)
- Differentiation:
  - Several educators reported adapting activities based on student needs using visuals, physical manipulatives, or step-by-step instructions.
- Experience Influence:
  - Teachers with more than 10 years of experience were more likely to report intentionally scaffolding unplugged coding experiences, especially in multi-sensory ways.

How do students respond to unplugged coding activities compared to plugged coding experiences regarding engagement and skill development?

- Student Engagement:
  - 79% of respondents rated student engagement with unplugged coding as high or very high.
  - Comparatively, 58% rated plugged coding engagement similarly, though 26% noted increased distraction or tech-related challenges with plugged tools.
- Skill Development:
  - Educators perceived unplugged activities to be most effective for:
    - Problem-solving (89%)
    - Sequencing and logical reasoning (74%)
    - Collaboration and communication (58%)
  - Plugged coding was perceived as more effective for fine motor skills and technology familiarity.

Conclusion

Educators generally view unplugged coding as a developmentally appropriate, flexible, and engaging way to introduce computational thinking.

Integration is strongest in Pre-K and Kindergarten, especially within language and math projects.

Scaffolding is intentional and often includes modeling, questioning, and peer support.

Students tend to engage more consistently and positively with unplugged coding compared to plugged experiences, particularly in social and cognitive domains.