

# MANAGING COMPUTATIONAL SKILLS TRANSFER AND TEACHERS SELF-EFFICACY IN THE 21ST CENTURY: A STUDY OF STUDENTS WITH DISABILITY IN OYO SPECIAL SCHOOLS

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## ABSTRACT

The 21st century has been characterized by rapid technological advancement, digital transformation, and increased reliance on computational knowledge across various sectors of society. These skills are increasingly recognized as fundamental literacy for learners in modern societies. The effective transfer and acquisition of these skills among students with disabilities remain a major challenge in many developing countries, including Nigeria. That is why this study investigated managing computational skills transfer and teachers' self-efficacy in the 21st century: a study of students with disability in Oyo special schools. A descriptive survey design was used for the study. The population for the study comprised of all secondary school teachers in Oyo township of Oyo state. Purposive random sampling technique was used to select two special schools for the study. Ten teachers and twenty students each were selected from the two schools to form twenty teachers and forty students for the study. A self-developed Teacher's self-efficacy and computational thinking transfer questionnaire were used to collect data for this study. The demographic data were described using frequency count and percentage while Pearson Product Moment Correlation (PPMC) was used to test the hypotheses at 0.05 level of significance. The result shows a strong positive correlation between teachers' self-efficacy and computational skills transfer among teachers in the study area. The result also indicated a significant relationship between students' acquisition of computational skills and teachers' self-efficacy. The study therefore, concluded that to effectively managing computational skills transfer among students with disabilities, teachers' self-efficacy, knowledge of the computational skills and confident in the instruction delivery were major requirement for the teachers. It was also recommended in the study that Schools should organize continuous training, workshop and seminal for teachers to improve their computational thinking skills and self-efficacy in order to transfer same to the students especially students with disabilities

**Key Words:** Computational thinking skill, self-efficacy, 21st century, disability

## **INTRODUCTION**

The 21st century has been characterized by rapid technological advancement, digital transformation, and increased reliance on computational knowledge across various sectors of society. Consequently, education systems around the world are under pressure to equip learners with computational skills necessary for participation in a technology driven global economy (Wing, 2017; Grover & Pea, 2013). Computational skills encompass a range of competencies including algorithmic thinking, logical reasoning, problem decomposition, data representation, and the ability to apply computer-based tools to solve problems (Barr & Stephenson, 2011). These skills are increasingly recognized as fundamental literacy for learners in modern societies. However, the effective transfer and acquisition of these skills among students with disabilities remain a major challenge in many developing countries, including Nigeria.

Despite the growing global emphasis on digital inclusion, students with disabilities in many developing regions still experience limited access to technology based education. In Nigeria, special schools often face challenges such as inadequate infrastructure, lack of assistive devices, insufficient teacher training in information and communication technology (ICT), and limited funding (Ajuwon, 2016). These constraints can hinder the effective teaching and learning of computational skills, thereby limiting the opportunities for students with disabilities to develop digital competencies required for social and economic participation in the modern world. However, it has been established that CT allows students to build and cultivate creative thinking and problem-solving skills. This skill allows the students to efficiently deal with more complex problems (Kong, 2020). CT involves critical thinking that strengthening their problem-solving skills through continuous practicing. With programming students can develop and cultivate CT skills, because this involves concepts such as decomposition, pattern recognition, and abstraction, all of which teach students to problem solving skills (Lye & Koh, 2014).

According Doleck et al. (2017) CT is defined as an umbrella term related to cognitive skills involved in computational tasks, such as abstraction, algorithmic thinking, cooperativity, creativity, critical thinking, decomposition, reasoning, and problem-solving. CT can be impacted on the students through a serious game which can be a helpful alternative in the teaching learning for children, especially for children with special needs, such as hearing impairment. Most of these disabled children have a visual spatial perceptual deficit in which the acquisition of reading, writing and social development skills is delayed (Pagliaro & Kritzer, 2013). They have low scores in evaluations such as problem-solving, logical thinking and reasoning especially in the area of interaction with physical objects (Topal, Budak, & Geçer, 2017).

Students with disabilities often face multiple barriers in accessing quality education and technological learning opportunities. Disabilities may include visual impairment, hearing impairment, intellectual disability, physical disability, or learning disabilities that can affect the students' capacity to engage with conventional instructional approaches (UNESCO, 2020). In special education contexts, teachers play a critical role in mediating the learning experiences of students with disabilities, particularly in teaching complex skills such as computational thinking and digital literacy. The ability of teachers to effectively transfer computational skills to learners depends not only on the availability of resources but also on their pedagogical competence, instructional strategies, and personal belief in their teaching capabilities.

One important psychological construct influencing teachers' instructional effectiveness is teacher self-efficacy. Teacher self-efficacy refers to teachers' belief in their ability to organize and execute actions required to successfully accomplish specific teaching tasks (Bandura, 2012). Teachers with high self-efficacy are more likely to adopt innovative teaching strategies, persist in the face of difficulties, and demonstrate greater commitment to students' learning outcomes. In the context of special education, teacher self-efficacy becomes even more critical because teachers must often adapt teaching methods, use

assistive technologies, and employ differentiated instruction to meet the diverse needs of learners with disabilities.

The transfer of computational skills in special education settings requires effective management of instructional processes, including curriculum adaptation, use of assistive technologies, collaborative learning strategies, and inclusive pedagogical practices. Managing computational skills transfer involves designing instructional activities that enable students to understand, apply, and generalize digital and computational concepts across different contexts. For students with disabilities, this process may involve the use of screen readers, adaptive keyboards, speech recognition software, tactile learning tools, and other assistive technologies that support accessibility (Al-Azawei, Serenelli, & Lundqvist, 2016).

Furthermore, the success of computational skill acquisition among students with disabilities largely depends on teachers' confidence in integrating technology into instruction. Teachers who possess high levels of self-efficacy are more likely to experiment with digital tools, adapt instructional materials, and create inclusive learning environments that facilitate meaningful learning experiences for students with disabilities (Ertmer & Ottenbreit-Leftwich, 2010). Conversely, teachers with low self-efficacy may avoid technology based instruction or rely on traditional teaching methods that may not adequately support computational skill development.

Self-efficacy is the belief in individual's capacities to organize information and execute a course of action to navigate a prospective situation. Social psychologist Bandura viewed self-efficacy as a key component of the self-system, which consists of an individual's attitudes, abilities, and cognitive resources (Neurino, 2012). Bandura (2012), describe self-efficacy as determinants of how people think, behave, and feel (Muraina & Oyadeyi, 2014). Self-efficacy is an important variable in predicting CT (Dickerson, 2019), as it affects CT competencies (Tsai et al., 2019), and develops CT skills (Shell et al., 2014; Webb & Rosson, 2013). It enhances the continuous use of digital tools, dedication, duty or responsibility, cooperative work, and pleasure when using digital or virtual tools (Pellas & Kazanidis, 2014), reduces computational anxiety (Durndell & Haag, 2002), increases situational interest in the learning process and develops an academic self-concept.

Studies indicate that the decline in students' CT skills can be attributed to teacher's lack of ability to develop these skills, and their limited understanding of them (Angeli & Giannakos, 2020; Gadanidis, et al., 2017; Weintrop et al 2016). One of the key factors that enhance the development of students' CT skills is the teacher's self-efficacy in CT. A teacher with high self-efficacy positively affects student learning and the construction of new competencies (Ross et al., 2001). Strong self-efficacy in digital competencies enables the teacher to implement curricula that include CT skills and computational and digital competencies (Nordén, et al., 2017). Therefore, CT self-efficacy of teachers is one of the vital variables for teaching these skills.

Theoretically, this study was established base on Bandura's Social Cognitive Theory, which emphasizes the role of self-efficacy beliefs in shaping human behavior and performance (Bandura, 2012). According to the theory, individuals' beliefs about their capabilities influence their motivation, persistence, and level of effort in performing tasks. In educational contexts, teachers who believe they can successfully teach complex skills are more likely to implement innovative instructional strategies and overcome challenges associated with teaching diverse learners. This perspective suggests that teachers' self-efficacy may significantly influence their ability to manage computational skill transfer among students with disabilities.

Empirical studies have demonstrated the importance of teacher self-efficacy in technology integration and student learning outcomes. For instance, Ertmer and Ottenbreit-Leftwich (2010) found that teachers' beliefs about their technological competence significantly influence their use of digital tools in classrooms. Similarly, Tondeur et al. (2017) reported that teachers with higher levels of self-efficacy were more likely to integrate ICT into their teaching practices effectively. In the context of special

education, Anderson and Putman (2020) observed that teachers' self-efficacy strongly predicted their ability to implement inclusive technological practices for students with disabilities.

On the importance of teacher preparedness and instructional support Grover and Pea (2013) emphasized that successful implementation of computational thinking in schools depends largely on teachers' pedagogical competence and confidence in teaching digital skills. Likewise, Yadav et al. (2016) found that teachers who received professional development in computational thinking demonstrated improved instructional practices and greater confidence in teaching technology related concepts.

In Nigeria, some studies have examined ICT integration in schools and the challenges associated with technology based instruction. For example, Ajuwon (2016) reported that inadequate teacher training and limited technological infrastructures remain significant barriers to effective ICT integration in special education settings.

Although several studies have explored ICT integration, teacher self-efficacy, and computational thinking in general education contexts, limited research has specifically examined the management of computational skills transfer and teachers' self-efficacy in special schools serving students with disabilities, particularly within the Nigerian context. Moreover, existing studies have largely focused on mainstream educational settings, leaving a gap in understanding how teachers in special schools manage the teaching of computational skills and how their self-efficacy influences this process.

Additionally, little empirical evidence exists regarding the unique challenges faced by teachers in special schools in Oyo State in facilitating computational learning among students with disabilities. Given the increasing importance of digital literacy and computational thinking in contemporary education, it is essential to investigate how teachers in special schools manage the transfer of computational skills and how their self-efficacy beliefs affect their instructional practices.

### ***Statement of the Problem***

Despite the global emphasis on digital inclusion and computational thinking education, there is a paucity of research focusing on the intersection of computational skills transfer, teacher self-efficacy, and disability education in Nigerian special schools. Most existing studies have concentrated on ICT integration in mainstream schools or on general teacher self-efficacy without specifically addressing the challenges of teaching computational skills to students with disabilities. Likewise, studies that examining how teachers in Oyo State special schools manage computational skill instruction and how their self-efficacy influences this process are scarce. This gap in the literature creates a need for research that explores the relationship between managing computational skills transfer and teachers' self-efficacy in special education contexts, particularly among students with disabilities in Oyo special schools.

Therefore, this study sought to fill this gap by investigating how teachers manage computational skill transfer and examining the role of teacher self-efficacy in facilitating effective computational learning among students with disabilities in Oyo special schools.

### ***Objectives of the study***

The general objective of this study was to investigate managing computational skills transfer and teachers self-efficacy in the 21st century in Oyo special schools.

Specifically, to

1. determine the relationship between computational skills transfer and teachers self-efficacy in the 21st century
2. examine relationship between students acquiring computational skills and teachers self-efficacy in the 21st century

### ***Research Hypotheses***

The following research hypotheses guided the study:

1. There is no significant relationship between computational skills transfer and teachers self-efficacy in the 21st century

- There is no significant relationship between students acquiring computational skills and teachers self-efficacy in the 21st century

## METHODOLOGY

The descriptive survey design was used for the study. The population for the study comprised of all special secondary school teachers and students in Oyo township of Oyo state. Purposive random sampling technique was used to select two special schools for the study. Ten teachers and twenty students each were selected from the two schools to form twenty teachers and forty students for the study. A self-developed Teacher's self-efficacy and Computational Thinking Transfer Questionnaire were used to collect data for this study. The demographic data were described using frequency count and percentage while Pearson Product Moment Correlation (PPMC) was used to test the hypotheses at 0.05 level of significance.

### *Demographic Characteristics of Respondents*

Table 1: Distribution of respondents by gender and educational qualification

		Frequency	Percentage (%)
Gender	Male	12	60
	Female	08	40
	Total	20	100
Educational Qualification	NCE	8	40
	Degree	10	50
	Post graduate	2	10
	Total	20	100

Table 1 showed that out of 20 participants in the study 12 representing 60% were male while 8 representing 40% were female. This implies more male participated in the study. The table also revealed 8 representing 40% are holder of NCE, 10 representing 50% are holder of first degree while 2 representing 10% are holder of post graduate certificate.

Table 2: Distribution of Students by Gender and Disabilities

		Frequency	Percentage (%)
Gender	Male	18	45
	Female	22	55
	Total	40	100
Disability Type	Hearing	16	40
	Visual	14	35
	Physical	10	25
	Total	20	100

Table 1 showed that out of 40 students participated in the study 18 representing 45% were male while 22 representing 55% were female. This implies more female participated in the study. The table also revealed 16 representing 40% are hearing impaired, 14 representing 35% are visually impaired while 10 representing 25% are physically impaired.

## RESULTS

Table 3: Pearson Correlation between Teachers' Self-Efficacy and Computational Skills Transfer

Variables	N	Mean	SD	r	p-value
Teachers' Self-Efficacy	20	3.10	0.68		

Computational Skills Transfer	20	2.86	0.76	0.68	0.002
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The result from table 2 shows that  $r = .68$  and  $p = 0.002 < 0.05$ , which implies there exist a strong positive correlation between teachers’ self-efficacy and computational skills transfer. Thus,  $H_{01}$  was rejected meaning that teachers with higher self-efficacy are more effective in transferring computational skills to student even student with disabilities.

Table 4: Pearson Correlation between Teachers’ Self-Efficacy and Students’ Computational Skills Acquisition

Variables	N	Mean	SD	R	p-value
Teachers’ Self-Efficacy	20	3.10	0.68		
Students’ Computational Skills Acquisition	40	2.92	0.74	0.72	0.001

The result from table 3 shows that  $r = .72$  and  $p = 0.001 < 0.05$ , which implies there exist a strong significant relationship between students’ acquisition of computational skills and teachers’ self-efficacy. Thus,  $H_{02}$  was rejected meaning that students with disabilities perform better when teachers are confident, competent and equipped with computational skills.

### DISCUSSION OF FINDINGS

The findings of this study revealed that there is a significant relationship between computational skills transfer and teachers’ self-efficacy. This implies that teachers who possess higher levels of confidence in their teaching abilities are more effective in transferring computational skills to students with disabilities. This finding aligns with the work of Ertmer et al. (2012), who reported that teachers’ beliefs significantly influence their integration of technology in the classroom.

Furthermore, the study found a significant relationship between students’ acquisition of computational skills and teachers’ self-efficacy. This suggests that students benefit more when teachers demonstrate strong confidence and competence in instructional delivery. This finding supports Bandura’s (2012) Social Cognitive Theory, which emphasizes that individuals’ beliefs about their capabilities influence performance outcomes.

The implication of these findings is that improving teachers’ self-efficacy through training, professional development, and access to technological resources will enhance both the transfer and acquisition of computational skills among students with disabilities.

### CONCLUSION

In conclusion, this study emphasized that computational thinking skills and self-efficacy of teacher predicts transmission and delivery of instruction to student of 21st century. Most importantly, the study established that transformation of computational skills to the students with disabilities rely largely on the teacher effectiveness and competence with deep knowledge of the skills. Therefore, to effectively managing computational skills transfer among students with disabilities, teachers’ self-efficacy, knowledge of the computational skills and confident in the instruction delivery were major requirement of the teachers.

### RECOMMENDATIONS

According to the findings and conclusion of this study, the following recommendations were made:

1. Teachers who will shape learners for this century and prepare them for global changes should be well equipped with knowledge of computational thinking skills and also build their self-efficacy, so they can effectively teach 21st-century skills.

2. Schools should organize continuous training, workshops, and seminars for teachers to strengthen their computational thinking skills and self-efficacy, enabling them to effectively transfer these skills to all students, including those with disabilities.

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