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Exploring the Psychological Advantages of Early Computer Education in Early phases of Development

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Abstract: ***The present work aims to explore the significance that teachers attribute to psychological approaches in the process of teaching and learning computer science in early formative years in a Public Educational Institution located in Bawana, Delhi. The research methodology employed is descriptive, using a field design. The study sample consisted of fifteen early formative years teachers. Data collection was conducted through interviews and a Likert scale questionnaire. Quantitative analysis of the data was performed using descriptive statistics. Results reveal that 40% of teachers always consider the basics of computers, while 60% consistently base their planning on the programming relevance in the teaching-learning process. Furthermore, 80% of teachers always prioritize lab activities to promote logical or operational thinking in students, while 20% always utilize recreational activities as a strategy for teaching and learning computer science in their classrooms. However, no respondents indicated consistent use of psychological approaches to enhance the teaching and learning of computer science in a world marked by constant transformation. To summarize, this study highlights the importance of shaping a positive outlook on computer science from an early age to develop students' abstract thinking, logic, and critical reasoning abilities. It emphasizes the need for incorporating psychological approaches to effectively teach and learn computer science among early formative years. By fostering a supportive environment, students can better navigate the challenges of Computer science and embrace its potential as they progress through their educational journey.***

Keywords: ***Psychological Approach, Formative Years, Public Educational Institution, Quantitative Analysis.***

1. INTRODUCTION

Today, there is a growing significance of computer science and its profound connection to human survival. In daily life, countless activities demand decisions based on this field of knowledge. For instance, selecting the best product alternative, managing bank accounts,

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adjusting medicine doses, learning food preparation, calculating and converting digits, engaging in artistic and sports endeavors, designing structures, vehicles, and even spacecraft - all these are intricately linked to computers [1]. It undeniably forms an extensive list where computer knowledge has been an integral part of humanity's evolution, enhancing the quality of life for people. This preamble serves to reiterate, as various debates and discourses have expressed, that computer science is fundamental and essential in the education of all individuals. Its teaching holds particular significance, especially during formative years, where children begin to establish a deeper connection with logical concepts. The teacher's role is to impart knowledge while instilling in students a conscious and positive disposition to tackle everyday problems[2]. To summarize, teaching computer science in early childhood education goes beyond merely introducing technology; it cultivates essential skills that will benefit children throughout their lives. By fostering problem-solving, creativity, computational thinking, and collaboration, early exposure to computer science paves the way for well-rounded, tech-literate individuals who can thrive in the digital age [3] [4]. As educators continue to integrate computer science into early childhood curricula, they empower children with the tools they need to navigate and shape the future with confidence.

Benefits of Teaching Computer Science in Early Childhood Education

In the modern world, computer science has become an integral part of daily life, and its importance is only expected to grow in the future [5]. As technology continues to advance, early childhood education plays a crucial role in preparing young learners for an increasingly digital world. Introducing computer science concepts at an early age not only fosters technological literacy but also nurtures critical skills such as problem-solving, creativity, and logical thinking [6].

1. **Early Exposure to Technology:** Introducing computer science to young children allows them to become familiar with technology from an early age. This exposure builds confidence in navigating digital tools and platforms, setting a solid foundation for future learning.
2. **Enhancing Problem-Solving Skills:** Computer science education encourages children to approach problems methodically and logically [7]. Through coding activities and computational thinking, children learn to break down complex problems into smaller, manageable parts, fostering critical problem-solving skills.
3. **Promoting Creativity and Imagination:** Computer science offers a unique blend of logic and creativity. When children engage in coding and programming, they can bring their imaginative ideas to life, fostering creativity and innovation[8].
4. **Building Computational Thinking:** Computational thinking involves analyzing problems and finding solutions using the principles of computer science. By honing this skill, children develop a structured approach to addressing challenges, which can be applied across various subjects and real-life situations [9].
5. **Fostering Collaboration:** Many computer science activities involve teamwork and collaboration. As children work together to solve problems and create projects, they learn valuable social and communication skills, preparing them for future collaborative endeavors.

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Effective Strategies for Teaching Computer Science to Young Children

1. **Play-Based Learning:** Utilize playful activities and games to introduce computer science concepts [10]. Games can involve sequencing, pattern recognition, and basic coding exercises tailored to the age and developmental level of the children.
2. **Hands-On Exploration:** Offer hands-on experiences with age-appropriate technology tools, such as tablets or child-friendly coding toys. Encourage children to explore and experiment with these tools to build familiarity and confidence [11] [12].
3. **Integrated Learning:** Integrate computer science concepts into other subjects, such as math and science. For example, use coding exercises to reinforce math concepts or create interactive science simulations.
4. **Storytelling and Creativity:** Encourage children to create stories, animations, or simple games using basic coding principles. This approach combines creative expression with computer science learning, making it engaging and enjoyable [13].
5. **Teacher Professional Development:** Provide teachers with opportunities for ongoing professional development in computer science education. This empowers educators to incorporate innovative teaching methods and stay updated with the latest technological advancements [14] [15].

2. METHODOLOGY

The aim of this study is to investigate the role of psychology in optimizing the teaching and learning of computer science. To achieve this, a mixed-methods approach will be employed, integrating both qualitative and quantitative data collection methods. The study will be conducted in the context of a secondary school that offers computer science education.

Participants

The participants in this study will consist of computer science teachers and students enrolled in computer science courses at the selected secondary school. A diverse sample of teachers and students will be chosen to ensure a comprehensive understanding of the subject.

Data Collection

For data collection, a combination of interview and a Likert scale questionnaire was employed [16] [17] [18]. The interview serves as a technique to gather personalized and oral information about individuals' lived experiences and subjective aspects, such as beliefs, attitudes, opinions, and emotions, related to the subject under study. On the other hand, the questionnaire used in this research comprises a series of questions focusing on one or more variables to be measured.

Ethical Considerations

Ethical guidelines will be strictly adhered to throughout the study. Informed consent will be obtained from all participants, and their identities will be kept confidential. Participants will be informed of their right to withdraw from the study at any point without any negative consequences.

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Population and Sample

The population under investigation comprised fifteen (15) teachers working at the primary education stage, as mentioned in the preceding lines. When the entire population is included in a study, and no sampling is required, it is referred to as investigating the universe. In this particular case, we worked with the universe, meaning no sampling was conducted. Therefore, the sample is considered a census since 100% of the population was selected due to it being a manageable number of subjects.

Data Analysis:

a. Quantitative Analysis: The quantitative data from surveys and questionnaires will be analyzed using statistical software. Descriptive statistics will be used to summarize the data, and inferential statistics will be employed to identify any significant relationships or correlations between variables.

b. Qualitative Analysis: Thematic analysis will be used to analyze the qualitative data obtained from interviews and classroom observations. Transcripts and notes will be coded to identify recurring themes and patterns related to the use of psychology in computer science education [19] [20].

3. INTERPRETATION AND RESULTS

The fifteen teachers provided the questionnaire in all respective classes and the responses were summarized. The dataset comprised of 510 students in total.

Table 1: Interpretation of Questionnaire sample

Sample Questions	Response option 1: Agree	Response option 2: Disagree	Response option 3: Neutral
Do you conduct a diagnostic assessment to determine the initial level of your students when beginning the process of teaching and learning new IT concepts?	485	5	0
When planning IT classes for your students, do you base your approach on the postulates of existing theories about the teaching and learning process?	488	2	10
In resolving problems related to the real context of the students, do you strategically emphasize and prioritize logical or operational thinking in the child?	490	5	5
Do you view playful activities as an effective strategy for teaching and learning computer science among students?	478	12	10
In a world undergoing constant transformation, do you believe that psychological approaches play a significant role in enhancing the teaching and learning of computer science among primary school students?	494	3	3

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4. ANALYSIS AND CONCLUSION

The significance of computer science in daily life cannot be overstated, as it is continuously involved in various operations that shape our everyday routines, including purchases, payments, banking transactions, and more. A solid understanding of computer science knowledge is essential for navigating the logical and coherent development of our society [21] [22] [23]. As emphasized from different perspectives in the texts consulted and throughout this document, the school plays a fundamental role in ensuring the quality training of teaching and learning processes, particularly in computer science skill development, starting from the early years of a child's education. It is during this phase that children establish a deeper connection with role in ensuring the quality training of teaching and learning processes, particularly in computer, and thus, it becomes crucial to present the subject in an attractive, easy-to-understand, and enjoyable manner, tailored to their developmental stage. This approach lays the foundation for successful learning experiences in subsequent years of study. This reflection underscores the necessity of fostering a positive perception of role in ensuring the quality training of teaching and learning processes, particularly in computer from childhood. By gradually nurturing skills such as abstraction, logic, and critical thinking, children can embark on a journey of learning that is both fulfilling and empowering.

In conclusion, the study of IT from an early age should aim to instill in students a positive outlook on this science. By doing so, they can gradually acquire the essential skills it offers, while simultaneously benefiting from the supportive role of the psychological approach in their learning journey. Ultimately, providing a strong and positive foundation in computer science during childhood will pave the way for a lifetime of successful learning and problem-solving in our ever-changing world.

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