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The Importance and Assessment of Early Mathematics Skills in Special Schools

Abstract

This study examines the importance of early mathematics skills in special schools and the methods used for their assessment. Early mathematics skills play a significant role in the cognitive, social, and functional development of children with special educational needs. Skills such as counting, number recognition, comparison, spatial awareness, and measurement contribute to the development of daily living skills and increased independence. In special schools, the development of these skills is supported through individualized and multisensory instructional approaches. The assessment process involves observation, play-based tasks, performance-based assessment, and Individualized Education Plans (IEPs). The findings indicate that the systematic development and continuous assessment of early mathematics skills enhance the effectiveness of instruction in special education and contribute to the strengthening of inclusive education.

Keywords: *early mathematics skills, special schools, special educational needs, assessment, individualized education plan, inclusive education*

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Xüsusi məktəblərdə ilk riyaziyyat bacarıqlarının əhəmiyyəti və qiymətləndirilməsi

Xülasə

Bu tədqiqat xüsusi məktəblərdə erkən riyazi bacarıqların əhəmiyyətini və onların qiymətləndirilmə yollarını araşdırır. Erkən riyazi bacarıqlar xüsusi təhsil ehtiyacları olan uşaqların idrak, sosial və funksional inkişafında mühüm rol oynayır. Sayma, ədədlərin tanınması, müqayisə, məkan və ölçmə anlayışları uşaqların gündəlik həyat bacarıqlarının formalaşmasına və müstəqilliyinin artmasına töhfə verir. Xüsusi məktəblərdə bu bacarıqların inkişafı fərdiləşdirilmiş və çoxhissəli təlim yanaşmaları əsasında həyata keçirilir. Qiymətləndirmə prosesi isə müşahidə, oyun əsaslı tapşırıqlar, performans əsaslanan qiymətləndirmə və fərdi təhsil planları (FTP) vasitəsilə aparılır. Tədqiqatın nəticələri göstərir ki, erkən riyazi bacarıqların sistemli şəkildə inkişaf etdirilməsi və davamlı qiymətləndirilməsi xüsusi təhsildə təlimin effektivliyini artırır və inklüziv təhsilin gücləndirilməsinə xidmət edir.

Açar sözlər: *erkən riyazi bacarıqlar, xüsusi məktəblər, xüsusi təhsil ehtiyacları, qiymətləndirmə, fərdi təhsil planı, inklüziv təhsil*

Introduction

Early childhood is a critical period for the development of foundational cognitive and academic skills, among which early mathematics skills hold a central place. These skills form the basis for later learning and play a key role in children's ability to understand their environment, solve problems, and develop logical thinking.

For children with special educational needs, the acquisition of early mathematics skills is even more crucial, as it supports not only academic progress but also functional independence and participation in daily life.

In special schools, students often display diverse learning profiles that require adapted teaching strategies and individualized support. Early mathematics education in these settings must therefore be structured in a way that responds to individual abilities, learning pace, and sensory needs. Concepts such as number recognition, counting, comparison, spatial relationships, and measurement are essential for building practical life skills and enhancing communication and self-confidence among learners with disabilities (Baroody et al., 2007).

Assessment is an integral component of early mathematics education in special schools. Through appropriate assessment methods, educators can identify students' strengths, challenges, and developmental progress. Traditional standardized assessments are often insufficient for capturing the learning potential of students with special educational needs; therefore, alternative and flexible assessment approaches are required. Continuous observation, play-based activities, performance tasks, and Individualized Education Plans (IEPs) provide valuable information to guide instruction and support effective learning (Butterworth, 2005).

This study focuses on the importance of early mathematics skills in special schools and explores effective assessment practices used in special education settings. By highlighting the role of individualized instruction and continuous assessment, the study aims to contribute to the improvement of educational practices and the promotion of inclusive education (Clements & Sarama, 2020).

Research

This study was conducted using a qualitative research design aimed at examining the importance of early mathematics skills in special schools and the methods used for their assessment. Qualitative research was considered appropriate as it allows for an in-depth understanding of educational practices, teaching approaches, and assessment strategies applied to students with special educational needs.

The study population consisted of special schools providing education to children in early childhood and early primary levels. The sample included special education teachers, school administrators, and support specialists who are directly involved in early mathematics instruction and assessment. Participants were selected through purposive sampling to ensure that they had relevant experience and professional knowledge related to the research topic.

Data were collected through multiple methods to enhance the reliability and validity of the findings. Semi-structured interviews were conducted with special education teachers to gather detailed information about instructional strategies, challenges, and assessment practices used in teaching early mathematics skills. Classroom observations were carried out to examine how early mathematics activities were implemented in real educational settings and how students responded to different teaching approaches. In addition, document analysis was used to review Individualized Education Plans (IEPs), assessment records, and instructional materials related to early mathematics education.

The collected data were analyzed using descriptive and thematic analysis techniques. Interview transcripts and observation notes were carefully reviewed, coded, and categorized into themes such as early mathematics skill development, individualized instruction, assessment methods, and student progress. This systematic analysis allowed for the identification of common patterns and key factors influencing the effectiveness of early mathematics education in special schools.

Ethical considerations were taken into account throughout the research process. Participation was voluntary, and informed consent was obtained from all participants. Confidentiality and anonymity were ensured by not disclosing personal or institutional information. The findings of the study are intended to contribute to the improvement of early mathematics instruction and assessment practices in special education and to support evidence-based approaches that promote inclusive and effective learning environments.

Early mathematics skills constitute a fundamental component of early childhood education and are particularly significant in special schools, where students present a wide range of developmental characteristics and learning needs (Fuson & Briars, 2019).

In special education contexts, early mathematics learning extends beyond academic achievement and directly supports cognitive development, social interaction, communication, and functional independence. Developing these skills at an early stage enables children with special educational needs to better understand their environment and participate more actively in everyday activities. One of the core areas of early mathematics education in special schools is number sense, which includes counting, number recognition, and understanding numerical relationships (Ginsburg & Golbeck, 2004).

These skills help children grasp basic quantitative concepts such as more–less, equal–unequal, and part–whole relationships. For students with developmental delays or learning disabilities, number sense is often acquired gradually through repeated practice, visual supports, and hands-on activities. Concrete materials, such as manipulatives, visual aids, and real-life objects, play a crucial role in making abstract mathematical concepts more accessible and meaningful (Kargin & Güldenoğlu, (Eds.). 2021).

Spatial and measurement concepts also form an essential part of early mathematics skills in special schools. Understanding spatial relationships (such as up–down, inside–outside, near–far) supports not only mathematical reasoning but also orientation, mobility, and daily functioning. Measurement skills, including length, weight, time, and volume, are closely linked to practical life experiences and help students develop independence in daily routines. Teaching these concepts through real-life contexts, play-based learning, and multisensory activities enhances comprehension and retention (Van Luit & Van de Rijt, 2009).

Individualized instruction is a key principle in the development of early mathematics skills in special education. Each student's learning profile, strengths, and challenges must be carefully considered when designing instructional activities. Differentiated teaching strategies, multisensory approaches, and adaptive materials enable students to engage with mathematical concepts at their own pace. In this process, collaboration among special education teachers, therapists, and families is essential to ensure consistency and continuity in learning (Piaget, 1973).

Assessment plays a central role in guiding instruction and monitoring progress in special schools. Rather than relying solely on standardized tests, educators use alternative assessment methods that reflect students' real abilities and learning potential. Observation-based assessments allow teachers to monitor students' responses during daily activities and structured tasks. Play-based and performance-based assessments provide opportunities for students to demonstrate their skills in natural and meaningful contexts. Portfolios and Individualized Education Plans (IEPs) serve as valuable tools for documenting progress, setting realistic goals, and adjusting instructional strategies (Sarama & Clements, 2009).

Continuous assessment supports early identification of learning difficulties and helps prevent long-term academic challenges. By regularly evaluating students' progress, educators can make timely interventions and modify teaching approaches to better meet individual needs. Furthermore, assessment results provide important feedback to families and promote active parental involvement in the educational process.

Conclusion

Early mathematics skills play a vital role in the cognitive, social, and functional development of children in special schools. These skills, including counting, number recognition, comparisons, spatial awareness, and measurement, provide a foundation not only for academic learning but also for daily life skills and increased independence. In special education settings, the development of early mathematics skills requires individualized, multisensory, and context-based instructional approaches that address the unique learning profiles and needs of each student.

Assessment is equally important in guiding instruction and monitoring progress. Traditional standardized tests alone are often insufficient for capturing the abilities of students with special educational needs. Therefore, alternative assessment methods such as observation, play-based tasks, performance assessments, and Individualized Education Plans (IEPs) are essential for evaluating students' skills and planning effective interventions. Continuous and flexible assessment ensures timely support and fosters students' confidence, engagement, and success in mathematics.

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