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Effect of Traditional Games on Functional Arithmetic Skills Among Children with Mild Intellectual Disability

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***Abstract*—Functional arithmetic is important for everyday participation, including handling money, making simple purchases, counting objects and solving practical addition and subtraction problems. Children with mild intellectual disability may benefit from instruction that is concrete, repeated, motivating and connected to familiar activities. This study examined the use of two traditional games—Snakes and Ladders and Marbles—as instructional activities for functional arithmetic skills among children with mild intellectual disability. Original study data were collected from 20 children aged 11–14 years selected through purposive sampling. The study received approval and permission from the GRIID Ethics Committee. A single-group pre-test/post-test design was used, with no control group. The intervention lasted four months, with sessions of approximately 30–40 minutes per day. A 20-item Functional Arithmetic Skills Assessment Scale was prepared with reference to the Functional Assessment Checklist for Programming (FACP) and the Madras Developmental Programming System (MDPS). The reported mean score for Snakes and Ladders increased from 42.30 (SD = 9.92) at pre-test to 50.85 (SD = 9.21) at post-test. For Marbles, the reported mean increased from 42.55 (SD = 9.20) to 48.65 (SD = 8.60). The presentation also reports a difference between game-related scores (Snakes and Ladders: M = 8.14, SD = 2.81; Marbles: M = 5.80, SD = 2.82). However, the reported t- and p-values appear inconsistent and should be recalculated from the original dataset before statistical significance is claimed. The descriptive pattern indicates higher post-test scores for both activities, but the single-group design does not establish that the intervention alone caused the changes. The study suggests that familiar, low-cost games may offer a practical context for arithmetic instruction and recommends further research with verified analyses and clearly documented assessment procedures.**

***Index Terms*—functional arithmetic, traditional games, mild intellectual disability, Snakes and Ladders, Marbles, special education**

I. INTRODUCTION

Mathematics is not limited to formal classroom exercises. Everyday activities such as counting items, comparing quantities, making simple purchases, using money and solving basic addition or subtraction problems depend on functional arithmetic. These skills can support greater participation and independence at home, in school and in the community. For learners who experience difficulties with abstract concepts or generalizing classroom learning to real situations, instruction may need to make mathematical ideas visible, meaningful and repeatedly practiced.

Intellectual disability is commonly described in terms of significant limitations in intellectual functioning and adaptive behavior, with onset during the developmental period. The impact on learning varies among individuals. Some learners may require additional time, explicit modelling, repetition, structured prompts and opportunities to apply skills in practical contexts. Educational planning should therefore respond to each learner's strengths, support needs and functional goals.

A functional curriculum prioritizes skills that can be used in daily life alongside academic learning. Functional mathematics may include number recognition, counting, basic computation, money use, time concepts and problem-solving in familiar settings. Teaching these skills through concrete objects and meaningful routines can help bridge the gap between symbolic arithmetic and its everyday use.

Traditional games offer a potentially engaging context for practice. Snakes and Ladders involves number recognition, counting spaces and moving a counter according to a die or spinner. With appropriate teaching prompts, it can also be adapted to practice number sequences and simple addition or subtraction. Marbles can provide opportunities to count, compare quantities, keep score and solve simple take-away or addition problems. Games are not automatically effective instructional interventions; their value depends on how activities are structured, how skills are explicitly taught and whether progress is assessed systematically.

The dissertation on which this paper is based explored the use of Snakes and Ladders and Marbles to support functional arithmetic skills among children with mild intellectual disability. The study is relevant to inclusive and special education because these games are familiar, relatively low-cost and adaptable to different levels of support.

II. REVIEW OF RELATED LITERATURE

Research on mathematics interventions for learners with intellectual disability has examined explicit instruction, repeated practice and technology-supported learning. Schold (2022; publication details in the source presentation indicate a 2023 DOI) reported a randomized controlled trial of an app-based arithmetic intervention for young people with intellectual disability. The presentation summarizes improvements in arithmetic fact fluency, with effects reportedly maintained at follow-up. This work supports the importance of systematic instruction, although a digital intervention differs from traditional physical games.

Sittiprapaporn and Chang (2019) examined a real-time arithmetic recognition task with a small group of children with learning disabilities and reported changes in electroencephalographic activity during task practice. The study is relevant to arithmetic practice but does not directly establish the effectiveness of traditional games for children with intellectual disability.

Prabavathy and Sivaranjani (2023) explored Pallanguzhi as a play-based tool for foundational arithmetic among children with mathematical difficulties. The presentation reports positive outcomes from a small, purposively selected group. This provides a close conceptual link to the present study because both approaches use a traditional game as a context for mathematics learning.

Dandashi et al. (2015) investigated a multimedia edutainment system with a tangible user interface for children with different intellectual disabilities. The presentation describes positive effects on motivation and learning-related outcomes. Diego (2019) is cited for work on an augmented-reality serious game designed for children with dyscalculia. These studies indicate growing interest in game-based and interactive approaches, but their technologies, populations and outcomes differ from those in the present investigation.

Overall, the literature summarized in the dissertation suggests that structured, engaging activities may provide useful contexts for practicing mathematical skills. However, the evidence presented here does not establish that Snakes and Ladders or Marbles is superior to other teaching approaches. The present study should be interpreted as an exploratory investigation whose strength depends on the accuracy of its data, the clarity of the intervention procedures and the quality of its assessment.

III. RATIONALE AND NEED FOR THE STUDY

Functional arithmetic can influence how independently a learner participates in everyday routines. Children with mild intellectual disability may need explicit, individualized instruction and repeated opportunities to practice basic operations. Familiar games may increase engagement and provide naturally occurring occasions to count, track quantities and respond to numerical information. The dissertation identifies a perceived gap in the use of traditional games to teach functional arithmetic to children with intellectual disability. The present study therefore examines two selected games as possible instructional supports.

IV. AIM AND OBJECTIVES

The aim was to examine the effect of traditional games on functional arithmetic skills among children with mild intellectual disability.

To examine changes in functional arithmetic scores associated with the use of traditional games.

To examine pre-test and post-test scores associated with the Snakes and Ladders activity.

To examine pre-test and post-test scores associated with the Marbles activity.

V. RESEARCH HYPOTHESES

The dissertation states the following null hypotheses:
There is no significant difference in arithmetic skills associated with the use of traditional games among children with mild intellectual disability.
There is no significant difference between pre-test and post-test arithmetic scores associated with Snakes and Ladders.
There is no significant difference between pre-test and post-test arithmetic scores associated with Marbles.
These hypotheses are retained as stated in the source presentation. Their statistical decisions cannot be confirmed until the original data and the reported test statistics are checked.

VI. METHODOLOGY

Research Design

The study used a single-group pre-test/post-test intervention design, with no control group. The findings therefore describe changes between baseline and post-intervention assessment and should not be interpreted as definitive proof that the games alone caused those changes.

Participants and Sampling

The stated sample comprised 20 children, all genders, aged 11–14 years. Purposive sampling was used. The inclusion criteria listed in the presentation were: mild intellectual disability; age between 11 and 14 years; ability to count and recall numbers up to 25; and ability to pick up marbles using the thumb and index finger and strike a marble using the index finger. Children with associated conditions were excluded. The presentation defines mild intellectual disability using an IQ range of 50–69; for contemporary reporting, eligibility should be documented using the diagnostic and adaptive-functioning criteria applied by the responsible professionals, rather than IQ alone.

Assessment Tool

A Functional Arithmetic Skills Assessment Scale was prepared for the study. According to the presentation, the researcher referred to the Functional Assessment Checklist for Programming (FACP) and the Madras Developmental Programming System (MDPS), then prepared a pool of 20 items in the numerical domain. The presentation does not provide the full items, scoring rubric, possible score range, content-validation procedure, inter-rater reliability or other psychometric information. These details should be included in the conference version if available.

Intervention Activities

The two selected traditional games were Snakes and Ladders and Marbles. Snakes and Ladders can be adapted to practice number recognition, counting and movement across numbered spaces; the teacher can introduce structured addition or subtraction prompts where appropriate. Marbles

can be used to practise counting, comparing quantities, adding scores and subtracting marbles from a starting quantity. These are plausible instructional uses of the games, but the presentation does not specify the exact lesson sequence, number of sessions, session duration, prompts, reinforcement procedures or fidelity checks. The paper therefore does not assume that these details were implemented; they should be added from the researcher's records.

Procedure

The study was approved by the GRIID Ethics Committee, and permission for conducting the study was obtained. The intervention was delivered over four months for approximately 30–40 minutes per day. Pre-test and post-test scores were collected. For the final conference manuscript, the researcher should add the approval/permission reference number if available and describe the consent/assent process, setting, sequence of game activities, staff involved and adaptations provided, according to the actual study records.

VII. DATA ANALYSIS

The presentation reports mean, standard deviations, t-values and p-values. Paired-samples analyses may be appropriate for pre-test and post-test scores from the same participants if the assumptions and data structure support that test. The analysis should identify the exact test used, sample size for each comparison, degrees of freedom, two-sided or one-sided testing, confidence intervals and an effect-size estimate.

Results

Game / assessment	Mean	SD	Reported test result
Snakes and Ladders — pre-test	42.30	9.92	t = 13.565; p = 0.095
Snakes and Ladders — post-test	50.85	9.21	
Marbles — pre-test	42.55	9.20	t = 9.651; p = 0.052
Marbles — post-test	48.65	8.60	
Game-related score: Snakes and Ladders	8.14	2.81	Between-game comparison: t = 2.744; p = 0.009
Game-related score: Marbles	5.80	2.82	

Descriptive Pattern

For Snakes and Ladders, the reported mean increased from 42.30 at pre-test to 50.85 at post-test, a descriptive increase of 8.55 points. For Marbles, the reported mean increased from 42.55 to 48.65, a descriptive increase of 6.10 points. These differences describe the reported scores; without

the raw data and a verified analysis, they should not be interpreted as confirmed statistically significant effects or as evidence that one game is more effective than the other.

VIII. DISCUSSION

The descriptive results show higher post-test means than pre-test means for both game activities. This pattern is compatible with the possibility that structured game-based practice helped participants engage with the assessed arithmetic tasks. Snakes and Ladders offers repeated number exposure and counting opportunities, while Marbles can make quantities tangible and support counting and simple operations. The games may also provide a motivating social context in which learners can practice a skill several times with immediate feedback.

The pattern is broadly consistent with the literature summarized in the dissertation, which describes benefits from explicit arithmetic instruction, play-based learning and interactive educational activities. However, similarities across studies should be interpreted cautiously because the cited research includes different populations, technologies, intervention formats and outcome measures.

IX. EDUCATIONAL IMPLICATIONS

Teachers may consider adapting familiar games to create structured opportunities for counting, number recognition and simple arithmetic.

Game activities should be linked to explicit learning objectives and followed by practice in everyday contexts such as shopping, counting classroom materials or handling simple quantities.

Tasks should be adjusted to each learner's communication, motor and learning needs, with modelling, repetition, visual cues and positive reinforcement where appropriate.

Progress should be recorded using a clearly defined assessment rubric, and teachers should check whether skills transfer beyond the game itself.

X. LIMITATIONS

The sample comprised only 20 purposively selected participants.

The presentation does not fully document intervention duration, session frequency, implementation fidelity or the control-group procedure.

The assessment tool's validity, reliability and scoring range are not reported in the supplied presentation.

The reported t-values and p-values require verification against the original dataset.

The presentation does not provide follow-up data to determine whether any gains were maintained or generalized to everyday settings.

XI. RECOMMENDATIONS FOR FUTURE RESEARCH

Recruit larger and more diverse samples and report participant characteristics transparently.
Describe the intervention protocol in sufficient detail for replication, including session length, number of sessions, teaching prompts and reinforcement.
Use a clearly defined comparison condition where feasible and explain participant allocation.
Establish and report the assessment scale's content validity, scoring procedures and reliability.
Reanalyze participant-level data and report the test statistic, degrees of freedom, exact p-value, confidence interval and effect size.
Include maintenance and generalization measures to assess whether arithmetic skills transfer to daily living tasks.
Compare traditional games with other approaches, such as explicit instruction, manipulatives or digital games, without assuming in advance that one method is superior.

XII. CONCLUSION

This study explored Snakes and Ladders and Marbles as possible contexts for teaching functional arithmetic to children with mild intellectual disability. The presentation reports increased post-test mean scores for both activities, suggesting a promising descriptive pattern. Nevertheless, the small purposive sample, incomplete methodological details and inconsistencies in the reported inferential statistics mean that the evidence is not sufficient to confirm statistical significance or establish causation. Traditional games may be useful when deliberately connected to clear arithmetic objectives, explicit teaching and everyday application. Future research should use transparent procedures, validated assessment tools and verified statistical analyses.

REFERENCES

[1]. American Association on Intellectual and Developmental Disabilities. (2019). Definition of intellectual disability, as cited in the dissertation presentation. Full publication details should be verified.
[2]. Dandashi, A., Karkar, A. G., Saad, S., Barhoumi, Z., Al-Jaam, J., & El Saddik, A. (2015). Enhancing the cognitive and learning skills of children with intellectual disability through physical activity and edutainment games. International Journal of Distributed Sensor Networks, 11(6), 165165.
[3]. Diego, F. (2019). Design of an augmented reality serious game for children with dyscalculia. Technology Trends, 165–175. https://doi.org/10.1007/978-3-030-05532-5_1 (verify DOI formatting and publication details).
[4]. Myreddi, V. (1998). Functional academics for students with mental retardation. National Institute for the Mentally Handicapped.

[5]. Prabavathy, M., & Sivaranjani, R. (2023). Utilizing traditional game—Pallanguzhi as a tool to enhance the basic arithmetic skill of children with mathematical difficulties. Journal for ReAttach Therapy and Developmental Diversities, 6(10s(2)), 1117–1129.

[6]. Schold, D. (2022; DOI metadata in the source presentation indicates 2023). App-based mathematical intervention for youth with intellectual disabilities: A randomised controlled trial. Scandinavian Journal of Educational Research. https://doi.org/10.1080/00313831.2023.2175250 (verify year, volume, issue and page range).

[7]. Sittiprapaporn, P., & Chang, S. C. (2019). Electroencephalographic study of real-time arithmetic task recognition in learning disabilities children. Asian Journal of Medical Sciences, 10(1). (Verify page range and DOI, if available.)

[8]. World Health Organization. (2021). Definition of intellectual disability, as cited in the dissertation presentation. The exact source document should be identified before final submission.