Title: What Kinds of Home Activities are Associated with Children's Mathematical Performance During the Early School Years?

Authors: Skwarchuk, S.L.[1], Smith-Chant, B.L.[2], LeFevre, J.[3], Fast, L.[3], Penner-Wilger, M.[3], Arnup, J.S.[3], Bisanz, J.[4], & Kamawar, D.[3]

Affiliated Institutions: University of Winnipeg[1], Trent University[2], Carleton University[3], & University of Alberta[4]

Objectives

The purpose of this study was to determine the kinds of activities that children engage in at home that were positively correlated with mathematics performance during the early school years. A survey of relevant literature indicated that: (1) few researchers have explored relations between mathematics performance and activities at home for children in the early school years, and (2) there is a lack of consensus concerning the kinds of activities and the quality of those activities that can be used to promote positive mathematical development in children. For example, exposure to numeracy activities in preschool has been acknowledged as being important in preparing children for formalized schooling (Anderson, 1998), and has been shown to correlate with overall mathematics performance (Blevins-Knabe & Musun-Miller, 1996; Wakeley, 2003). In a survey of parental practices, LeFevre and colleagues (LeFevre, Clarke, & Stringer, 2002) found that parental reports of the frequency with which they taught their preschoolers early numeracy skills (such as counting, or simple sums) predicted performance on a mathematical achievement test. For Kindergarten children, only frequency of teaching simple sums predicted early numeracy outcomes (Figueredo, LeFevre, & Sénéchal, 2001). From both a practical and conceptual standpoint, it is important to determine what kinds of both informal and formal activities at home affect children's mathematical competence, and whether the domains of activities correlated with mathematics achievement change over time.

Method

Math assessments were completed on 82 children in kindergarten, 90 children in grade one, and 83 children in grade two. Children were assessed using the Numeration, Addition and Subtraction subtests of the KeyMath. Parents completed a questionnaire (derived from previous research involving preschoolers) to determine the kinds of activities in which the children typically engaged at home. On the questionnaire, parents read a list of activities and indicated the frequency with which their child engaged in that activity during the past month. A five point Likert-type scale was used to delineate the frequency that children engaged in the activity. Parents could also choose a "Not applicable" category.

Data from the questionnaire were entered, coded and subject to an item analysis. Any items scored as "never" or N/A by over half the sample was excluded. Items were then clustered to represent 7 different activity domains: basic mathematics (e.g., counting objects), applied mathematics (e.g., using a calendar, wearing a watch), reading (e.g., identifying letter sounds), writing (e.g., printing, coloring, painting), daily fine motor abilities (e.g., tying shoes), manipulating small objects (e.g., using Lego), and music (e.g., playing instruments). Two items, namely "being timed" and "watching educational television," did not naturally fit into any category and were analysed separately.

Results & Conclusions

The overall questionnaire response rate was 54%. Pearson correlation analyses examined parental ratings of their children's involvement in the 7 activity domains, and the 2 other activities at each grade. The results were quite mixed, suggesting that the activities listed on the questionnaire were sensitive to ages of the children tested.

In Kindergarten, children's scores on the KeyMath subtests were negatively correlated with reported frequency of the reading activity domain ($r_{(\text{addition and reading})} = -.37$, $p < .05$), writing

activity domain ($r_{(subtraction\ and\ writing)}$= -.31) and "watching educational television" ($r_{(numeration\ and\ tv)}$= -.35), but were positively associated with "being timed" (r = .43, p<.001). The reading and writing activities on the questionnaire were very basic (i.e., identifying, sounding out, and printing letters) and thus, it was the children with the relatively weaker academic skills who were presumably still working on these tasks.

In grade one, Keymath scores were positively associated with the reported frequency of applied mathematics activities ($r_{(addition)}$= .40, $r_{(subtraction)}$= .34), manipulating small objects ($r_{(numeration)}$=.36, $r_{(addition)}$= .46) and "being timed" ($r_{(subtraction)}$= .35). Keymath subtraction scores were also negatively correlated with the reported frequency of reading activities domain (r= -.28). Thus, it is possible that children in early years schooling have moved beyond the skills of basic counting and into more applied mathematics activities, which appear to be relevant in enhancing mathematical knowledge at this grade.

By grade two, the items on the questionnaire seemed less relevant to participants in terms of their home experiences and correlations between reports of home activities and KeyMath scores were not significant. Thus, there may not be a consistent set of tasks that are associated with math performance from preschool to early school age.

Educational Significance

This research is relevant to educators interested in understanding the relation between informal and formal learning activities at home and subsequent mathematical performance at school. It will also be beneficial to educators interested in fostering partnerships between home and school to enhance the development of children's mathematical skills.

Format

The proposed format for this presentation is a small round table session. A short summary of the study will be provided, as well as an in depth discussion of the items on the parent questionnaire. Discussion time will focus on the analysis of relevant items, trajectory analyses of mathematical activities as they relate to development, and issues concerning the transfer of mathematical content across home and school settings.

References

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