Algebraic Thinking

Big ideas of the reading

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-Recognizing the underlying common structure of a setting, generalizing it, applying it to other terms in the sequence and using it to build an expression of elements.

-Using the common element to come up with a rule that may be used to determine any term of the sequence.

Ideas expressed in the reading that surprised me

It is surprising that there are stages in developing algebraic reasoning. Students have to understand all the steps for them to learn algebra. Developing full understanding requires that student transform from their ability to use symbols to using numbers

Uniqueness of the ideas

Until today, it had never dawned on me why algebra is a hard topic to most of the students. I now understand that it is because for one to develop algebraic thinking, one has to undergo through two main steps. The first phase involves developing awareness of an underlying algebraic structure of the operation. The second step involves expressing the

generalization algebraically. Often, students skip the first stage. Students also have to learn how to transform symbols into numbers.

Other ideas that may be relevant to understanding algebra

Tips to solving algebra include avoiding relying on memorization and letting the natural curiosity drive someone into exploring more of algebra. In addition, students ought to learn how to evaluate the general algebraic expressions and the difference between general algebraic notations

A question for further research

More knowledge is needed on the ability to fit all the algebraic varieties of a given type into a space that is itself an algebra variety.

An Exploration of Aspects of Language Proficiency and Algebra Learning

The study introduces the study precisely direct to the point. It begins by indicating to the readers about the thesis of the research, which is on how language proficiency relates to learning disability and the general academic achievement of a learner (MacGregor & Price, 1999). The

introduction also places the thesis in the context of existing debates from previous research.

Research questions

The general research question for the study is whether meta-linguistic awareness is necessary for learning algebra notation. The research question is further divided into two. (1) Is symbol awareness necessary for learning algebra notation? (2) Is syntax awareness necessary for learning algebra notation? These research questions are well contextualized in respect to grade 7-10 students in their first to fourth year of learning algebra, and hence primary education context.

Methods

The study adopted a quantitative approach in analyzing the research data. The research participants are grade 7 to grade 10 students in their first to forth years of learning algebra. The study was conducted in two phases. The first phase tested problems to help identify students with difficulty in learning English. The second phase tested increased difficulty scope and difficulty of English language used in algebra. A scoring was conducted on the test scale to increase validity and reliability of the student scores in the tests. In total, a sample of 1236 students, who were randomly

sampled from 18 schools located in Melbourne, was involved in the study. The tools for data collection adopted for the study were pencil-and-paper tests for language proficiency in algebra.

Based on own judgment, it can be said that the study adopted a cohort research design. This whereby a researcher involves a population from which a sample is drawn based on some commonalities or similarities (García-Celay & León, 2007). In reference to the reviewed study, the research sample used was common or similar in the sense that language background, amount of homework, socioeconomic status, school environment, and regularity of school attendance were controlled as confounding variables for learning mathematics (MacGregor & Price, 1999). As opposed to open cohort studies that have dynamic population, the study adopted a closed cohort design in the sense that populations from which the samples were drawn were static. This inference is drawn from the fact that grades (cohorts) 7 to 10 populations were involved, thus, presuming that no new member can join the cohort or group at one defining point from the lower grades. Hence, the population was static and not dynamic.

Major results

The major results for the study suggested a positive correlation between language proficiency and the students' scores in algebra. In this light, the study found out that only a few students with low meta-linguistic score attained high scores in algebra. To investigate on this anomalous observation, the study therefore recommended for a further research to ascertain the hypothesis that lack of meta-linguistic awareness is a hindrance to learning algebra. Another major observation made from the study is that the use of paper-and-pencil tests is reliable and valid in measuring awareness of syntax, word awareness, and awareness of ambiguity in algebra. This is because they are able to measure the meta-linguistic knowledge of learners or students for learning algebra.

Conclusion

The study concludes that since algebraic notation is affected by poor meta-linguistic awareness, a traditional algebra course does not serve to the interests of the learners or the students. In this light, the research further advocates that new algebra approaches and alternative representational systems should be embraced. In opinion, this conclusion is valid and agreeable because research and continuous improvement precipitate new ways of doing things. This is not only in the academic

sector, but also other fields have concurred with the fact that research and continuous improvement is the way to shape the world (Lagrosen, Seyyed-Hashemi, & Leitner, 2004).

Mathematics and Algebraic Proficiency

Mathematics is viewed as a hard subject that is not relevant in our day to day lives. Just by that notion, most students view it as confusing and irrelevant with some even having math phobia. Those that mathematical knowledge and skills do not use the knowledge they have proficiently. For successful mathematical learning, it takes more than just the knowledge and skills that an individual has. Students 'beliefs in their ability to solve mathematical problems and their attitude towards the same have an impact on their achievement when it comes to mathematics. Solving mathematical problems is the key to efficient learning. The ability of an individual to solve mathematical problems helps determine the proficiency one has. There is need for better teaching practices to help reduce the phobia that some students have. Developing activities that will make mathematics more exciting will increase the expertise of students in the area.

Mathematical proficiency is the ability of individuals to successfully learn mathematics. There are five strands that ensure mathematical proficiency. Strategic competence is one of the strands which deal with the ability of a student to symbolize, formulate, and solve mathematical complications. Conceptual understanding is another strand that is the ability to understand concepts in mathematics enabling them to represent concepts in various ways. Adaptive reasoning is the ability to clarify, rationalize, and reflect on logical opinions. Productive disposition is the customary feeling to view mathematics as practical and sensible. Beliefs that students have can be a barrier for an effective disposition. Procedural fluency is the final strand that deals with the skill one has to carry out procedures in an efficient and accurate manner. The strands are entangled and symbolize diverse aspects and indicate the extensiveness of mathematical actions that teachers should emphasize. All the strands must work together to ensure that the students are proficient in mathematics. Mathematical competence is important in everyday life and even the basic knowledge of arithmetic is vital in the society.

Most students are used to arithmetic in the lower grades. To them advancing to algebra poses as a difficult experience. Algebra helps build on the skills and knowledge developed from arithmetic and improve it further. A lot of

research has been carried out by different individuals and organization to help understand what causes the difficulties the students face with the transition. Algebra poses as an efficient way of expressing overview and concept. The idea when using algebra is building rules to represent different functions. Transformational activities in algebra include solving equations and simplifying expressions and are easily carried out.

To ensure mathematical and algebraic proficiency, different activities and ideas should be developed. Teachers can encourage group discussion in classrooms. Discussions not only ensure that students interact amongst themselves, but also encourage students to share their different views on issues and eventually come up with solutions for the same. Students get more insight on the problem hence increasing their knowledge on the subject. Students can also share different strategies for coming up with solutions. Individuals have different methods of solving mathematical problems. Sharing enlightens them and ensures that they have different ways of coming up with solutions hence ensuring proficiency. Encouraging students to adopt mental computation is also important. It helps portray ones understanding of the important mathematical concepts and ability to solve problems. Students have a better understanding when they represent ideas in different formats, like symbols and pictures. The

mathematical concept becomes more meaningful and understandable. Teaching for mathematical and algebraic proficiency will help change the attitude that most individuals have off the subjects. Incorporating mathematics in the lives of the students will increase their understanding skills and ability to formulate solutions.

References

Britt, S.M., & Irwin, C.K. (2008). Algebraic thinking with and without algebraic representation:

a three-year longitudinal study. *ZDM Mathematics Education*,40, pp.39–53.

García-Celay, I. M., & León, O. G. (2007). A guide for naming research studies in Psychology. *International Journal of clinical and Health psychology* , 7(3), 847-862.

Lagrosen, S., Seyyed-Hashemi, R., & Leitner, M. (2004). Examination of the dimensions of quality in higher education. *Quality Assurance in Education*, *12*(2), 61-69.

MacGregor, M., & Price, E. (1999). An Exploration of Aspects of Language Proficiency and Algebra Learning. *Journal for Research in Mathematics Education* , 449-467.

Kilpatrick, J., Swafford, J., & Findell, B. (2001). *Adding It Up: Helping Children Learn Mathematics*. Washington, DC: National Academy Press.