UNDERSTANDING OF ALGEBRAIC NOTATION AND ITS RELATIONSHIP WITH COGNITIVE DEVELOPMENT AMONG FORM FOUR STUDENTS

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Kefahaman Notasi Algebra Dan Perhubungannya Dengan Perkembangan Kognitif Di Kalangan Pelajar Tingkatan Empat

ABSTRAK

Kajian ini bertujuan untuk mengenalpasti interpretasi abjad yang digunakan dalam ungkapan dan persamaan algebra oleh 139 orang pelajar Tingkatan Empat di sebuah sekolah menengah. Ia juga menentukan taburan tahap kefahaman notasi algebra dan taburan tahap perkembangan kognitif mereka. Ia menyiasat perhubungan antara tahap kefahaman notasi algebra dengan tahap perkembangan kognitif ini. Untuk mencapai tujuan-tujuan tersebut, dua set instrumen kajian digunakan: Ujian Algebra dan Ujian Penaakulan Longeot.

Dapatan kajian ini menunjukkan bahawa lebih daripada 80% pelajar menggunakan tahap interpretasi abjad yang rendah dengan berjayanya. Sebagai bandingan, kurang daripada 30% menggunakan tahap interpretasi abjad yang tinggi dengan berjayanya.

Sembilan jenis kesilapan pelajar telah dikenalpastikan semasa mereka menginterpretasikan abjad. Kesilapan menggabungkan elemen-elemen nombor dan algebra adalah yang lebih kerap dan dibuat oleh 50.4% pelajar. Kajian ini juga mengenalpastikan kesilapan menuliskan hasildarab dan bukan hasiltambah abjad-abjad. Kesilapan ini tidak pernah dijumpai dalam kajian-kajian lalu dan 29.5% pelajar-pelajar membuat kesilapan ini.

Hasil kajian ini menunjukkan bahawa terdapat lebih ramai pelajar (61.2%) di tahap kefahaman notasi algebra yang rendah berbanding dengan 38.8% di tahap

yang tinggi. Ramai pelajar berada di paras perkembangan kognitif konkrit (71.9%) berbanding dengan paras perkembangan kognitif formal (28.1%). Tambahan juga, terdapat perhubungan di antara tahap perkembangan kognitif pelajar dengan tahap kefahaman notasi algebra mereka. Pelajar yang beroperasi pada tahap perkembangan kognitif formal mencapai tahap kefahaman notasi algebra yang lebih tinggi sedangkan pelajar yang beroperasi pada tahap perkembangan kognitif konkrit mencapai tahap kefahaman notasi algebra yang lebih rendah. Perbezaan tahap kefahaman notasi algebra di antara pelajar di tahap perkembangan kognitif konkrit dan tahap perkembangan kognitif formal adalah signifikan.

Kajian lanjutan dalam kefahaman notasi algebra atau dalam aspek-aspek lain di bidang algebra dicadangkan.

ABSTRACT

This study attempts to identify the interpretation of letters used in algebraic expressions and equations by a sample of 139 Form Four students in an urban secondary school. It also determines the distribution of their levels of understanding of algebraic notation and their cognitive levels. It further investigates the relationship between the levels of understanding of algebraic notation and cognitive levels. To achieve these aims, two sets of instruments were used: the Algebra Test and the Longeot Reasoning Test.

The findings of the study show that more than 80% of the students could successfully use the lower level of interpretations of letters. In contrast, less than 30% were successful in using the higher level of interpretations of letters.

Nine error types made by the students in their interpretations of letters were identified. The error of conjoining numerical and algebraic elements was the most prevalent, with 50.4% of the students making this error. The error of writing down of product instead of sum is peculiar to the study, as it is not noted in past studies. This error was made by 29.5% of the students.

The findings also reveal that a majority of the students (61.2%) were in the lower levels of understanding of algebraic notation compared to 38.8% in the higher levels. Most of the students were at concrete level of cognitive development (71.9%) compared to formal level of cognitive development (28.1%). In addition, there was a relationship between students' levels of cognitive development and their levels of understanding of algebraic notation. Students at formal cognitive levels

achieved higher levels of understanding of algebraic notation while those at concrete cognitive levels achieved lower levels of understanding of algebraic notation. The difference in the levels of understanding of algebraic notation between students at concrete and formal cognitive levels was statistically significant.

It is suggested this study be extended to further studies in the understanding of algebraic notation, specifically or in other aspects of algebra, generally.

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To my family members for lovingly putting up with my idiosyncrasies throughout the whole course and standing by me all the way, I dedicate to them this research report.

Most of all, all praise and glory to God Almighty, the Giver of every good and perfect gift, and with Whom there is no variation or shadow due to change.

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