The effectiveness of educational-games strategy on developing number sense of the primary school pupils.

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A theses presented by

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Research summary

Introduction:
Due to the difficulty confronted by many primary school pupils in performing calculations mentally, which was indicated by several studies conducted in this area, and the use of traditional methods of teaching based on lecturing and diction in presenting mathematics lessons which consequently results in memorizing the pupils to the steps they use to solve a certain kind of Mathematical problem and conducting these steps routinely, and the adoption of using calculator as well, in addition to the lack of activities and exercises contained in mathematics' textbooks, which helps in training students to use and apply mental computation strategies, approximate estimate and other number sense skills, there was a need to pay more attention to developing number sense skills and Recruitment of mental strategies in solving mathematical problems, which requires making a transition from using traditional instructional methods which works on developing root-memory to the use of teaching strategies which works on developing number sense skills.

Therefore this research aimed at investigating the effectiveness of using Educational-games strategy on developing primary school pupils' Number sense skills, and introducing a model that demonstrates how to use Educational-games strategy in developing number-sense skills, and determine the relationship between number-sense skills and academic achievement among pupils.

Problem of the research:
According to what has been mentioned above, the research problem could be summarized in the following statement.

"The inadequacy of teaching methods, which results a shortage in the performance of the primary school pupils' number-sense skills and lack of activities and exercises used in their development."

Questions of the research:
1. What are the number-sense skills that have to be developed for primary school pupils?
2. What are the features of both "Fraction and decimals" and "Approximation" units which are scheduled on fourth grade primary school
pupils - the second semester- according to educational-games strategy?

3. To what extent will educational-games strategy be effective in developing number-sense of fourth grade primary school pupils?

4. What is the correlation between number sense skills and academic achievement of fourth grade primary school pupils?

Aims of the research:
The present study aimed at:

1. Determine number-sense skills that have to be developed for primary school pupils.

2. Investigate the effectiveness of using educational-games strategy in developing fourth grade primary school pupils' number sense skills.

3. Investigate the effectiveness of using Educational-games strategy in increasing academic achievement of fourth grade primary school pupils.

4. Determine the relation between number sense skills and academic achievement of fourth grade primary school pupils.

Significance of the research:
The present research could contribute in:

1. Introducing a list of number-sense skills that should be developed for primary school pupils.

2. Helping primary school mathematics teacher to understand skills, importance and concept of number-sense.

3. Introducing a model demonstrates how to use educational-games strategy to develop number-sense skills of the primary school pupils.

4. Directing the attention of planners and developers of mathematics curriculum to the importance of developing number sense skills, starting from the early stages of education and the provision of activities required to do so.

5. Determine the relation between number sense skills and academic achievement of fourth grade primary school pupils.
limitations of the research:
The present research is delimited to the following:

- **Scientific limits:**
  1. Applying both "Fraction and decimals" and "Approximation" units which are scheduled on fourth grade primary school pupils -the second semester- after reframing them according to educational-games strategy.
  2. Three number-sense skills. (Mental computation- Approximated estimation- Recognition of the impact of mathematical operations on numbers).

- **Human limits:**
  A sample of fourth grade primary school students (80 pupils) divided into two equal groups (control and experimental) of (40 pupils each), in Nasr El-Dein primary school, Dep. of El-Omranya, Giza governorate.

- **Locational limits:**
  The experiment of the research was applied at Nasr El-Dein primary school, Dep. of El-Omranya, Giza governorate.

Tools or instruments of the research:

1. Number sense test (which contains three sub-tests: Mental computation, Approximated Estimation and Recognition of the impact of mathematical operations on numbers tests).
2. Achievement test.

Procedures:

*The present research went through the following procedures:*

1. Reviewing literature and related studies to the current field in order to take advantage of them in the preparation of the theoretical framework of the current research.
2. Prepare a list of number-sense skills that should be developed for primary school pupils and present them to a group of arbitrators to reach its final form.
3. Execute Content analysis for both "Fractions and Decimals" and "Approximation" units which are scheduled on fourth grade pupils the second semester, to determine the aspects of learning (concepts, generalizations and skills) included in these units.
4. Reframing both "Fraction and decimals" and "Approximation" units which are scheduled on fourth grade primary school pupils -the second semester- according to educational-games strategy.
5. Preparing teacher guide and student worksheets for the two units according to educational-games strategy.
6. Preparing a test on number sense and adjust it statistically.
7. Preparing achievement test and adjust it statistically.
8. Select a sample of pupils (80 pupils) of fourth grade pupils and divided it into two equivalent groups (control group 40 pupil and experimental group 40 pupil).
9. Pre-testing of the research tools on the two groups (experimental and control group); in order to identify their equivalence in the number sense test (with its skills) and academic achievement test before applying the research experiment.
10. Teaching both units for the two groups as follows:
   - *experimental group*: Studying using educational-games strategy
   - *Control group*: Studying using the traditional method.
11. Post-testing of the research tools on the two groups (experimental and control group); after applying the research experiment.
12. Analyzing the obtained data statistically using the appropriate techniques.
13. Interpreting the results, and coming to conclusions, recommendations and suggestions for further research.

**Results of the study:**

1. There is a statistically significant difference at 0.01 level between mean scores of the experimental group and control group in the post testing of the number-sense test for the experimental group.
2. There is a statistically significant difference at 0.01 level between mean scores of the experimental group and control group in the post testing of the achievement test for the experimental group.
3. There is positive correlation which is statistically significant at 0.01 level between the scores of pupils of the experimental group in the number sense test and the achievement test scores in the post testing.