Research Summary

The Strategy of Generating Ideas (SCAMPER) For Developing Lateral Thinking Skills In Mathematical Among Primary Stage Pupils.

Introduction:

The possession of thinking skills is considered to be a unique characteristic, specifically for individuals capable of dealing with the fast and changing reality that we live in, where technology is frequently providing us with a vast amount of information. However, we always have to be more dependent on our thinking abilities rather than being controlled by technology or specific and targeted knowledge; we are in constant need of criticism, learning and thoroughly understanding of information, not only obtaining it.

Therefore, thinking will always remain the prominent and renewable resource that is frequently needed. Recently, there has been a kind of thinking called "lateral thinking" which in turn contributes to the periodic evaluation of our knowledge and ideas, trying to reach everything that is new and different from the usual.

The current research attempts to develop lateral thinking using proper tools and means. The researcher adopted SCAMPER strategy. The letters of the word "SCAMPER" represent the initials of different tools. Each tool includes a set of questions considered to be different paths that guide the mind of learners for different directions of thinking. Hence, it is a very suitable tool to accomplish the development of lateral thinking.

Statement of the problem Research:

The problem of the current research has been identified in weaknesses in performing and practicing lateral thinking skills among primary stage pupils. This research attempts to solve this problem by answering the following questions:

1) What are the appropriate lateral thinking skills that have to be developed in Mathematics among primary Sixth grade pupils?

2) What is the proposed design for teaching a unit (Integer numbers set) using the strategy of generating ideas, "SCAMPER", for developing lateral thinking skills in Mathematics among primary Sixth grade pupils?

3) What is the effectiveness of generating ideas strategy, "SCAMPER", for developing lateral thinking skills in Mathematics among primary Sixth grade pupils?

Research hypotheses:

The research attempts to verify the following hypotheses:

1) There is a statistically significant difference between the average scores of the experimental group and the control group in the post test of lateral thinking skills as a whole and each sub-skill separately in favour of experimental group.

2) There is a statistically significant difference between the average scores of pupils in the experimental group in pre and post-test of lateral thinking skills as a whole and each sub-skill separately in favour of post-test.
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Research aims:

The current research aims to using "SCAMPER" strategy to develop lateral thinking skills in mathematics among primary stage pupils through:
1- Developing the appropriate lateral thinking skills in mathematics among primary Stage pupils.
2 - Identifying the effectiveness of generating ideas the strategy "SCAMPER" to develop the skills of lateral thinking in mathematics among primary stage pupils.

Research Importance:

This current research might be beneficial in several aspects, as follows:

1) For pupils:
   - Presenting a new strategy that offers an educational environment that enables them to unleash their thinking to develop lateral thinking skills.

2) For teachers:
   - Providing a teacher's guide to help them use the SCAMPER strategy in teaching Mathematics.
   - Supporting tools which enable them to assess the pupils' lateral thinking skills.

3) For designers and planners of Mathematics' curriculum of Primary stage by averting their attention towards:
   - Concentrating on the lateral thinking skills when planning or developing the Mathematics curriculum in the Primary stage.
   - The SCAMPER strategy, since it's considered one of the modern strategies of teaching Mathematics, and how to include it when planning and developing strategies and teaching methods.

4) For researchers:
   - Providing them with recommendations and suggestions for future researches that relate to the variables of this current research.
   - Benefiting from this research methodology and its tools.

Research group:

The research group was composed of primary Sixth grade pupils, there were 62 pupils, and they were divided into two groups. The experimental group consists of 30 pupils, while the control group consists of 32 pupils.

Research limits:

This current study is conferred to the following limitations:
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1) **Objective limits:**

- The suitable lateral thinking skills which consist of (generating perceptions skill, generating alternatives skill, generating concepts skill, generating ideas skill, generating innovations skill), and the sub-skills that are targeted to their development through applying the strategy of generating ideas “scamper”

- (Integer numbers set) unit that is set for Primary Sixth grade pupils in the second term year (2016/2017), it was chosen for the following reasons:
  
  * This unit consists of a set of concepts, generalizations and basic skills that are necessary for the pupils' further learning in Mathematics. It also contains many applications relevant to pupils' lives. However, there are also some difficulties in learning the lessons of this unit.
  
  * The unit contains several issues that raise many questions for pupils, thus making them indulge in searching for and thinking of answers, and therefore it may be suitable to help them develop the skills of the lateral thinking.

2) **Spatial limits:**

   The research experiment has been applied on "Farsis-B2 Primary School" of the West Zagazig Educational Department- Al Sharkiah Governorate.

3) **Time limits:**

   The research experiment was applied from Sunday (12/2/2017) to Sunday (26/3/2017).

4) **Human limits:** Primary Sixth grade pupils.

**Research design:**

   The researcher used the quasi-experimental method: to know the efficacy of the independent variable, which is the strategy of generating ideas, "SCAMPER", on the dependent variable, which is the lateral thinking of the Primary Sixth grade pupils.

**Research variables:**

1) **Independent variable:** The strategy of generating Ideas "S.C.A.M.P.E.R.".

2) **Dependent variable:** Lateral thinking skills.

**Research Materials and Tools:**

The research materials and tools prepared by the researcher are as follows:

1) **Teaching materials for the research which include:**

   - Preparing a list of lateral thinking skills.
   
   - Teacher's Guide to the strategy of generating ideas, "SCAMPER".
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- Student's activity papers.

2) **Research tools which include:**

- Content analysis of the "Integer numbers set" unit.
- Lateral thinking test.
- Mental Ability Test. *(done by Prof. Farouk Abdelfattah Mousa)*

**Research Procedures:**

The research was conducted according to a set of steps in answering the research questions as follows:

**To answer the first question: What are the appropriate lateral thinking skills that have to be developed in Mathematics among primary Sixth grade pupils?**

The researcher did the following:

1) Reviewed literature and previous studies to determine the lateral thinking skills in Mathematics suitable for Primary Sixth grade pupils.

2) Prepared a list, in its initial form, consisting of lateral thinking skills suitable for Primary Sixth grade pupils.

3) Submitted the list to curricula experts and judges to suggest any amendments, and then amending the necessary and suggested adjustments.

4) Developed the initial form of the list consisting of lateral thinking skills suitable for Primary Sixth grade pupils into its final form.

**To answer the second question: What is the proposed design for teaching a unit (Integer numbers set) using the strategy of generating ideas, "SCAMPER", for developing lateral thinking skills in Mathematics among primary Sixth grade pupils?**

The researcher did the following:

1) Reviewed literature and previous studies related to the SCAMPER strategy and how this strategy used.

2) analyzing the contents of the "Integer numbers set" unit, in terms of concepts, generalizations, facts, and Mathematical skills involved, then calculated the validity and Reliability of analysis, and then put the content analysis in its final form.

3) Designed a teacher's guide that illustrates the visualization of how to teach, the "Integer numbers set" unit, by using the strategy of generating ideas, S.C.A.M.P.E.R, and presented it to the judges and amended any mistakes.

4) Designed student activity sheets and presented them to the judges and amended any mistakes.

**To answer the third question: What is the effectiveness of generating ideas strategy, "SCAMPER", for developing lateral thinking skills in Mathematics among primary Sixth grade pupils?**
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The researcher did the following:

1) Prepared the lateral thinking skills test in its initial form, then presented it to the judges and amended mistakes, then calculated its validity and Reliability, then set the test in its final form, which is valid for application.

2) Selected the research group from Primary Sixth grade pupils, and then divided them into two equal groups, an experimental group and a control group.

3) Applied the Mental Ability Test to ensure that the two groups are equal.

4) Applied the lateral thinking on the two research groups.

5) Conducted the research's field experiment, by applying the SCAMPER strategy and teaching it to the experimental group, while the control group continued learning the usual way.

6) Applied the lateral thinking test on the two groups later on.

7) Recorded the marks and processed the data statistically, then analyzed the results and interpreted them.

8) Made recommendations and suggestions while taking into account what the research results depicted.

Research results:

1) There's a statistically significant difference at a level of (0.01) between the average grade of the experimental group and the control group in the post-application of the lateral thinking skills test as a whole, and for each of its sub-skills in favor of the experimental group.

2) There's a statistically significant difference at a level of (0.01) between the average grade of the experimental group in the pre and post-application of the lateral thinking skills test as a whole, and for each of its sub-skills in favor of the post-application of the test.

3) There's a significant impact produced by the strategy of generating ideas, SCAMPER, to develop lateral thinking in Mathematics for Primary Stage Pupils.

4) The effectiveness of generating ideas strategy, SCAMPER, has been evident in developing lateral thinking skills in Mathematics for Primary Stage Pupils.

5) There is an effectiveness of generating ideas strategy (SCAMPER) to develop the skills of lateral thinking in mathematics among Primary Stage Pupils.

6) The magnitude of the impact of generating ideas strategy (SCAMPER) to develop the skills of lateral thinking in mathematics among Primary Stage Pupils.

7) Pupils have reached the level of mastery that has been identified in the practice of lateral thinking skills as a whole and in each sub-skill.

Research recommendations:
After taking into consideration the results the research has produced, discussing them and explaining them, the research recommends the following:

1) The development of lateral thinking skills should be included in the objectives of Mathematics in the Primary stage.

2) Directing the curricula designers' attention towards the necessity of including the Mathematics curriculum with activities associated with lateral thinking; to spread the impact of its learning from inside the school to outside the school.

3) The necessity of training the teachers on new strategies which enable the development of thinking, such as the strategy of generating ideas, SCAMPER.

4) Force the pupils to practice the use of the lateral thinking skills, as those skills play a significant role in altering their thinking trends during school and in their daily lives.

5) The pupils' evaluation and test patterns have to be altered, and benefiting from the evaluation methods employed in the SCAMPER strategy, and tests equivalent to the lateral thinking skills test.

**Suggestions for further research:**

By studying the theoretical part of the research variables, and the results of the research, the following researches could be suggested:

1) The effectiveness of a program based on mathematical puzzles for developing lateral thinking skills for all educational stages.

2) The effectiveness of using SCAMPER strategy for developing parallel thinking for all educational stages.

3) The effectiveness of the SWOT strategy for developing of lateral thinking skills in Mathematics for all educational stages.

4) The effectiveness of using SCAMPER strategy for developing reflective thinking and mathematical curiosity for all educational stages.

5) The effect of a program based on lateral thinking skills for developing broad-ranged thinking in Mathematics for all educational stages.

6) A comparative study between the SCAMPER strategy, Brainstorming, and TRIZ, for developing creative thinking skills in Mathematics for all educational stages.