THE IMPACT OF LEE STRATEGY ON THE ACHIEVEMENT OF SECONDARY SCHOOL STUDENTS IN BIOLOGY AND THE DEVELOPMENT OF THEIR COGNITIVE REPRESENTATION

The "Li" cognitive strategy integrates Piaget and Vygotsky's theories, addressing verbal problem-solving in a social context that organizes the classroom environment. Piaget emphasizes that learners build knowledge through personal exploration, with thought preceding and facilitating language development, while teachers create opportunities for discovery-based learning. Conversely, Vygotsky focuses on learning through social interactions, particularly with knowledgeable others, such as peers or adults. He argues that culture and environment influence cognitive development, and language drives cognitive growth. He recommends that teachers help learners progress via cognitive scaffolding. Both theories view learners as active participants.

Authors
Amnah Alraddadi.

PHASEs OF THE "Li" COGNITIVE STRATEGY

The "Li" strategy includes four stages:

1. Understanding the Problem: Involves questions such as, "What is the content of the problem?", "What are the relationships between the terms?", and "What questions are we answering?"
2. Formulating a Plan: Questions include, "Can we draw a helpful image or shape?", "Could a map or table aid us?", "Is there a pattern?", "Have you solved a similar problem before?"
3. Executing the Plan: Entails steps such as "Carry out the next step", "Organize the information", "Seek alternative hypotheses", "Eliminate incorrect assumptions", and "Verify each step".
4. Reviewing the Plan: Questions include, "Is your solution logical?", "Can you find another solution?", and "Could you create a similar problem?"

RESEARCH SIGNIFICANCE

The study aims to:

1. Equip students with productive thinking skills.
2. Encourage biology teachers to use the "Li" cognitive strategy.
3. Guide educators to train teachers in implementing strategies that enhance learning retention, creativity, and innovation.
4. Provide teachers with a framework for using the "Li" strategy in biology instruction.
5. Offer a theoretical background on the "Li" cognitive strategy.

OBJECTIVE

1. Define the productive thinking skills to be developed in biology for high school students.
2. Model how the "Li" cognitive strategy can enhance productive thinking skills.
3. Predict the impact of the "Li" strategy on productive thinking skills.

METHODOLOGY

In this research, the researcher followed:

1. Descriptive Method: Used to prepare the theoretical framework and review previous studies that addressed the Li Cognitive Strategy and productive thinking skills.
2. Experimental Method: Employed using a quasi-experimental design with two groups:
   - Control Group: A group of students who study the selected content using the traditional teaching method.
   - Experimental Group: A group of students who study the selected content using the Li Cognitive Strategy.

RESULTS

To Answer the Second Question: "What is the effect of using the Li Cognitive Strategy in teaching biology on developing productive thinking skills in high school students?"

1. Develop a test to measure productive thinking skills in high school biology students.
2. Present the test to a panel of expert judges, modify it based on their feedback, and finalize it.

3.Administer the test to second-year high school students.
4. Calculate the impact size of using the Li Cognitive Strategy on developing productive thinking skills in the experimental group students.
5. Record the results and analyse them statistically.

ANALYSIS

I The overall average score for students in the experimental group on the post-test of productive thinking was 20003, compared to 11.43 for students in the control group. The t-value was 11.18, with a significance level of 0.001. Figures (1) and (2) illustrate this. From Table (1) it is evident that the study's first hypothesis is confirmed, which states: "There is a statistically significant difference at the level of <0.05 between the mean scores of students in the experimental and control groups in the post-test for productive thinking skills, in favour of the experimental group students." The researcher attributes the superiority of the experimental group students to the connection of prior experiences with new ones. This connection led to the generation of a greater number of diverse ideas among experimental group students. Additionally, learning according to the steps of my cognitive strategy contributed to meaningful learning based on understanding rather than memorization. This, in turn, enabled students to acquire information and skills through direct experiences, fostering productive thinking skills and motivation for achievement in biology among experimental group students.

- Skill of Fluency and Flexibility: The average post-test score of students in the experimental group was 4003, while for the control group, it was 2030. The t-value was 6.43, with a significance level of 0.001.
- Skill of Problem Analysis: The average post-test score of students in the experimental group was 3.97, while for the control group, it was 2.53. The t-value was 4.55, with a significance level of 0.001.
- Skill of Expansion or Detailing: The average post-test score of students in the experimental group was 3.93, while for the control group, it was 2003. The t-value was 6.86, with a significance level of 0.001.
- Skill of Imagination: The average post-test score of students in the experimental group was 4000, while for the control group, it was 2007. The t-value was 6.92, with a significance level of 0.001.
- Skill of Evaluation: The average post-test score of students in the experimental group was 4.10, while for the control group, it was 2.50. The t-value was 4.97, with a significance level of 0.001.

CONCLUSION

The "Li" strategy allowed students to connect new concepts with prior knowledge, leading to better comprehension, retention, and academic performance. Enhanced classroom interaction, feedback, and discussion supported students' engagement, ultimately fostering productive thinking skills. The study concludes that the "Li" cognitive strategy has a substantial positive impact on high school students' productive thinking skills, particularly in biology.