Do You **KNOW** What You **THINK** You Know? The Role of Metacognition in Elementary Statistics

SC297C Research Project

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What is metacognition?

Meta = beyond

Cognition = knowing

"Knowing about knowing."

What is the connection between metacognition and statistics?

Statistics involves various applications of real life situations but is also commonly associated with intricate mathematics. The failures of metacognition in statistics take on two extremes:

Underestimation- assuming the material is too complicated thus not putting forth an appropriate amount of effort and thought.

Overestimation- assuming that the material is straightforward enough to over-simplify the information and lack any complex thought or execution

Works Cited

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Article Name: *METACOGNITION IN LEARNING ELEMENTARY PROBABILITY AND STATISTICS*

Main point: A negative feeling towards statistics can often result in lower performance because of the power of metacognition.

A model of metacognition that "specifies key points where metacognitive decisions are likely to influence cognitive actions"

Table 2.

Cognitive-metacognitive framework

ORIENTATION: Strategic behavior to assess and understand a problem
- A. Comprehension strategies
- B. Analysis of information and conditions
- C. Assessment of familiarity with task
- D. Initial and subsequent representation
- E. Assessment of level of difficulty and chances of success

ORGANIZATION: Planning of behavior and choice of actions
- A. Identification of goals and subgoals
- B. Global planning
- C. Local planning (to implement global plans)

EXECUTION: Regulation of behavior to conform to plans
- A. Performance of local actions
- B. Monitoring of progress of local and global plans
- C. Trade-off decisions (e.g., speed vs. accuracy, degree of elegance)

VERIFICATION: Evaluation of decisions made and of outcomes of executed plans
- A. Evaluation of orientation and organization
  1. Adequacy of representation
  2. Adequacy of organizational decisions
  3. Consistency of local plans with global plans
  4. Consistency of global plans with goals
- B. Evaluation of execution
  1. Adequacy of performance of actions
  2. Consistency of actions with plans
  3. Consistency of local results with plans and problem conditions
  4. Consistency of final results with problem conditions

Note. From "Metacognition, Cognitive Monitoring, and Mathematical Performance," by J. Garofalo and F.K. Lester, Jr., 1985, *Journal for Research in Mathematics Education, 16*, p. 171.

Article Name: *THE APPLICATION OF DOCUMENTED PROBLEM SOLVING IN COLLEGE INTRODUCTORY STATISTICS COURSES*

Main point: Students are not learning what their professors want them to. Consequently, techniques are being tested to see if documenting problem solving can counteract the negative repercussions of metacognitive failure.

1.) Students write down the steps they took to solve a problem

2.) Professor reviews their steps to get insight into their routines of solving problems.

Article Name: *A REVIEW OF RESEARCH ON METACOGNITION IN SCIENCE EDUCATION: CURRENT AND FUTURE DIRECTIONS*

Main point: There is research being done to improve the metacognitive abilities of students in science education** by compiling information from 178 studies.

**The current trends in metacognition and science education are negative. The research in this article gives evidence and ideas for how to change this for the future.