

Evidence Based Data for Integrating Critical Thinking into the Classroom

Margaret Murray-Davis, Ph.D.

Dawn M. Larsen, Ph.D.

Autumn Hamilton, HSD

Minnesota State University, Mankato

Health Science Department

Mankato, MN 56001

Purpose

The purpose of the research was to determine whether students' ability to think critically is impacted by training in Dr. Richard Paul's critical thinking model.

The research assessed statistically significant differences between groups of students who were taught Paul's critical thinking model through an integrated curricular approach and those who were not taught the critical thinking model.

National Health Education Standards (NHES)

1. Students will comprehend concepts related to health promotion and disease prevention to enhance health.
2. Students will analyze the influence of family, peers, culture, media, technology, and other factors on health behaviors.
3. Students will demonstrate the ability to access valid information, products, and services to enhance health.
4. Students will demonstrate the ability to use interpersonal communication skills to enhance health and avoid or reduce health risks.
5. Students will demonstrate the ability to use decision-making skills to enhance health.
6. Students will demonstrate the ability to use goal-setting skills to enhance health.
7. Students will demonstrate the ability to practice health-enhancing behaviors and avoid or reduce health risks.
8. Students will demonstrate the ability to advocate for personal, family, and community health.

Research Question

Compared to the control group, does an integrated approach to teaching and practicing Dr. Paul's critical thinking model significantly improve student's ability to think critically?

If so, to what degree?

Critical Thinking Model

Dr. Richard Paul's model was chosen because it provides a concise and clear model using non-technical language for ease of implementation and understanding. The model features three inter-related components called elements of reasoning, intellectual standards and intellectual traits.

Paul's model encourages students to:

- ◆ raise vital questions and problems, formulating them clearly and precisely;
- ◆ gather and assess relevant information; arrive at well-reasoned conclusions and solutions;
- ◆ think open-mindedly with alternative systems of thought, recognize and assess their assumptions, implications, and practical consequences.

Subjects

Experimental Group:

Paul's critical thinking model was formally taught and integrated into the curriculum of two Drug Education courses. The professor who taught the Drug Ed courses had eight years experience integrating Dr. Paul's critical thinking model into various courses including drug education.

Control Group:

The two drug education classes did not integrate the critical thinking model nor were the students taught Dr. Paul's critical thinking model. This course was taught by an assistant professor in the Health Science/Chemical Dependency program.

Research Hypotheses

- ◆ **There will be no significant differences between the control and experimental group on the pre-test or baseline critical thinking skills.**
- ◆ **The experimental group will have a significantly higher degree of change/learning than the control group between the pre and post-test.**
- ◆ **There will be statistically significant change within the experimental group from pre and post-test.**
- ◆ **There will be no statistically significant change in the control group between the pre and post-test.**

Design

A pilot test was given the first week of classes. The objective of the pilot test was to evaluate the strength and weaknesses of the writing sample and to establish a baseline for scoring. The pilot test will not involve students in the testing sample.

The piloted pre-test and post-test will be administered in four classes to determine prior skills in critical thinking. The test will consist of a 1-page-writing sample. The directions from Part One and Part Two of the International Critical Thinking Test (ICAT) will be read and distributed to the students. An answered sheet will provide direction writing prompts for the convenience of the students and evaluator.

Assessment Tool

The ICAT exam is divided into two parts: 1) analysis of writing prompt, and 2) assessment of the writing prompt. The analysis is worth 80 points; the assessment is worth 20.

- In the Analysis segment of the test, the student must accurately identify the elements of reasoning within a written piece (each response is worth 10 points).
- In the Assessment segment of the test, the student must construct a critical analysis and evaluation of the reasoning (from the original piece). Scoring is aligned with a rubric delineating the level of critical thought and analysis.

Results: Baseline

Hypothesis: There will be no significant differences between the control and experimental group on the pre-test or baseline critical thinking skills.

Table 1	n	Mean
Pretest: Experimental	66	47.36 (24.70)
Pretest: Control	61	52.62 (22.97)

At baseline the experimental group and the control group reported no significant difference in critical thinking skills.

Results: Degree of Change Between Groups

Hypothesis: The experimental group will have a significantly higher degree of change/ learning than the control group between the pre and post-test.

Group	n	Mean (SD)	t
<u>Experimental</u> Change	66	10.15 (26.55)	4.63*
<u>Control</u> Change	61	-10.57 (23.84)	

* $p < .01$

The experimental group reported significantly higher degree of change than the control group.

Differences Within Groups from pre-test to post-test

Hypothesis: The experimental group will have a significantly higher degree of change/learning than the control group between the pre and post-test. There will be no statistically significant change in the control group between the pre and post-test.

Group	n	Mean (SD)	t
<u>Experimental</u>			-3.12*
Pre-test	66	47.36 (24.70)	
Post-test	66	57.52 (20.96)	
<u>Control</u>			3.46*
Pre-test	61	52.62 (22.97)	
Post-test	61	42.04 (22.86)	

* $p < .01$

It was reported that there was a significant (increase) change from pre-test to post-test in the experimental group. The control group did not show a significant gain.

Samples of Students' Responses

Question: The key idea(s) we need to understand in this text is (are)?

- ◆ Experimental Group example: "Feminism and equality is equated with alcohol consumption in flawed."
- ◆ Control Group example: "A key idea is that women should have equal rights as men."

Samples of Students' Responses

Question: The main assumption (s) underlying the author's thinking is (are)?

- ◆ Experimental Group student: "It is possible for women to establish their own relationship with alcohol apart from men's behavior."
- ◆ Control Group student: " Women and drinking is a problem because of the movement."

Discussion

This study demonstrated students who were taught and who practiced Dr. Richard Paul's Critical Thinking model performed significantly higher in their ability to think critically.

Dr. Richard Paul's model of critical thinking offers a clear and concise model for teaching critical thinking skills.

Clarifying the degree of effectiveness of the model is a pivotal contribution to developing pedagogy that encourages critical thinking.

Recommendations

Paul's model offers a multilayered approach to integrating critical thinking skills into instruction. The model has the flexibility as a tool for overall design of a curriculum; of a course; a unit; and a day of instruction.

The National Health Education Standards encourage critical thinking through the development of essential skills that encompass analysis and communication that lead to the practice and adoption of health-enhancing behaviors.