The Art of Reflecting: Critical Reflection in an Agricultural Laboratory

Patterson P. Hilaire

&

Dr. Donald M. Johnson

Objectives

- Define Critical Reflection

- Describe the Study Undertaken
  - Purpose
  - Objectives

- Explain Findings

- Posit Recommendations
  - Implications for Practice
  - Implications for future research

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Critical Reflection
What is critical reflection?

An intentional internal cognitive process of analyzing, assessing, reframing and deeply considering a previous experience in order to add meaning or to learn from a given experience (Bubnys & Zydziunaite, 2010; Louise, 2010; Nguyen, Fernandez, Karsenti, & Charlin, 2014).

Simple definition:

A constant cognitive consideration of a previous experience.

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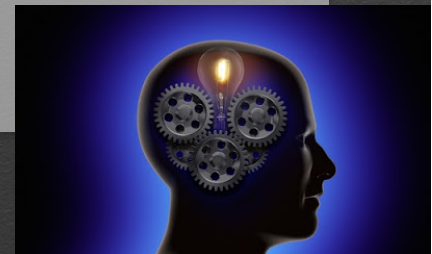
Fundamental Question

Purpose

The purpose of this study was to evaluate the effect of critical reflection on students' achievement following an agricultural mechanization laboratory activity.

Objectives

1. Determine if there is a difference in immediate cognitive achievement in selected agricultural mechanization topics by the main effect of reflection (no reflection, individual or group reflection).

2. Determine if there is a difference in delayed cognitive achievement in selected agricultural mechanization topics by main effect of reflection (no reflection, individual or group reflection).

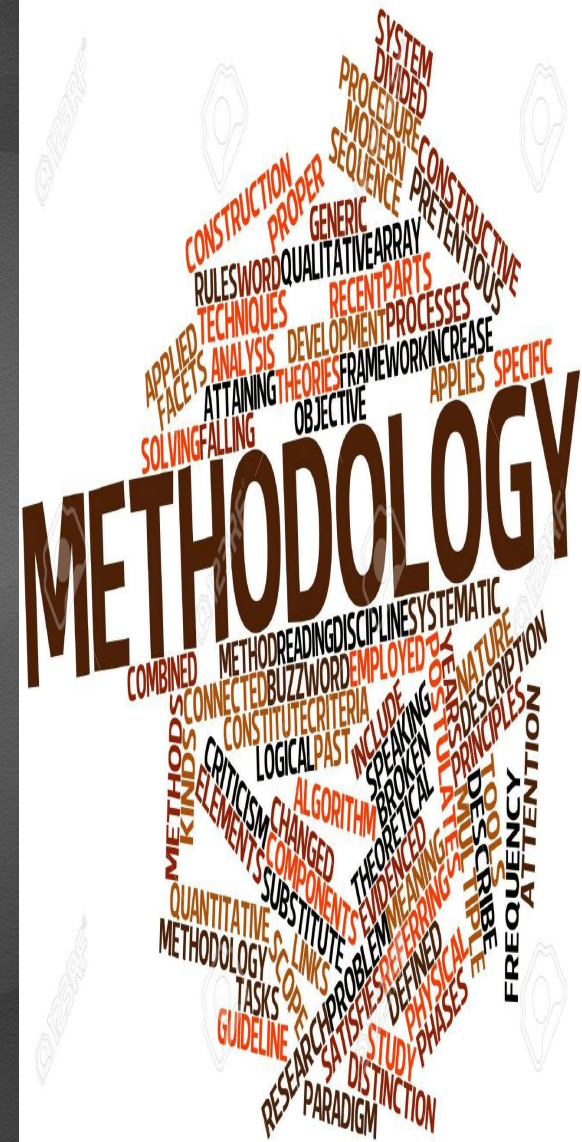UNIVERSITY OF ARKANSAS®

Methods

Population

- Accessible Population *(N =* 24)

Simple Randomized Design

- Control Group (No Reflection)
- Experimental Group: (Individual and Group Reflection)
- Instrument Developed by Researcher
- Treatment
  - 10-15 mins
  - Model after the DEAL method

Describe ⟶ Evaluate ⟶ Articulate Learning

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Summary of Experiments, Laboratory Content and Posttest Reliability

Experiment	Subject Matter	Students	Test Reliability (Coefficient alpha)
One	AC Resistive Circuits	Control ($n = 7$) Ind. Reflection ($n = 8$) Group Reflection ($n = 7$)	Immediate posttest ($\alpha = .72$) Delayed posttest ($\alpha = .65$)
Two	AC Circuit Analysis	Control ($n = 7$) Ind. Reflection ($n = 7$) Group Reflection ($n = 7$)	Immediate posttest ($\alpha = .67$) Delayed posttest ($\alpha = .64$)
Three	Electrical Motors in Agriculture	Control ($n = 5$) Ind. Reflection ($n = 8$) Group Reflection ($n = 6$)	Immediate posttest ($\alpha = .74$) Delayed posttest ($\alpha = .48$)

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Results: Experiment 1

Descriptive Statistics for AC Resistive Circuit Analysis Laboratory by Treatment of No, Individual and Group Reflection

Achievement	No Reflection			Individual Reflection			Group Reflection		
	M	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*	*n*
Immediate Posttest	5.71	2.43	7	6.25	2.49	8	7	2.53	7
Delayed Posttest	5.00	2.38	7	5.13	1.64	8	5.86	.90	7

Maximum possible score was 10 for the immediate posttest and 7 for delayed posttest.

Immediate Posttest Eta squared: 0.08.
- This accounted for 8% of variance.
- Medium Effect

Delayed Posttest Eta squared: 0.05.
- This accounted for 5% of variance.
- Medium Effect

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Results: Experiment 2

Descriptive Statistics Results for AC Circuit Laboratory by Treatment

Achievement	No Reflection			Individual Reflection			Group Reflection		
	M	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*	*n*
Immediate Posttest	5.71	1.97	7	7.43	1.67	7	8.00	1.19	7
Delayed Posttest	4.00	0.00	7	3.14	1.21	7	3.57	.79	7

Maximum possible score was 10 for the immediate posttest and 4 for delayed posttest.

Immediate Posttest Eta squared: 0.25.
- This accounted for 25% of variance.
- Large effect (Cohen,1998).

Delayed Posttest Eta squared: 0.16.
- This accounted for 16% of variance.
- Large effect (Cohen,1998).

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Results: Experiment 5

Descriptive Statistics for Electrical Motors in Agriculture Laboratory by treatment

Achievement	No Reflection			Individual Reflection			Group Reflection		
	M	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*	*n*
Immediate	3.60	1.67	5	3.75	2.12	8	4.17	1.94	6
Delayed	3.00	1.00	5	2.63	1.41	8	3.50	.55	6

Note: Maximum possible scores was 6 on the immediate posttest 4 on the delayed posttests

Immediate Posttest Eta squared: 0.02.
- This accounted for 2% of variance.
- Small Effect (Cohen, 1998)

Delayed Posttest Eta squared: 0.12.
- This accounted for 12% of variance.
- Medium Effect (Cohen, 1998)

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Qualitative Summary Assessment of Posttest Scores for All Five Experiments

Experiment	Lowest	Intermediate	Highest
Experiments One			
Immediate Posttest	No Reflection	Individual Reflection	Group Reflection
Delayed Posttest	No Reflection	Individual Reflection	Group Reflection
Experiments Two			
Immediate Posttest	No Reflection	Individual Reflection	Group Reflection
Delayed Posttest	Group Reflection	Individual Reflection	No Reflection
Experiments Three			
Immediate Posttest	No Reflection	Individual Reflection	Group Reflection
Delayed Posttest	Individual Reflection	No Reflection	Group Reflection

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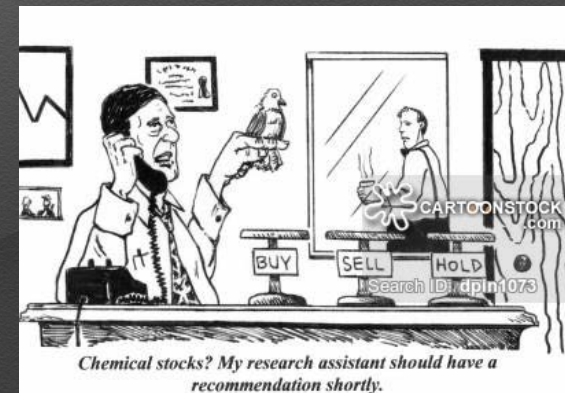
Limitations

Limited to the population of study
1. Cannot be generalized to other populations.

2. Students were only randomized once and remain in their respective groups for the entire study.

3. Delayed Posttest

- Instruments had low reliability

- Results were inconclusive

- Students may have just guess on the delayed posttest.

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Recommendation for Further Study

1. Population should be increase, and inferential statistics used to determine if there is a significant difference among the groups by main effect of treatment.

2. More than three experiments should be conducted. Expand study over the course of a semester.

3. Additional research is needed to investigate how reflection effect delayed cognitive achievement and long term memory.

Implication for Practice

1. Instructors may seek to implement reflective practices into their laboratory. Previous research have indicated that reflection is often neglected in laboratory experiences. However, reflection may prove beneficial to immediate achievement among agricultural mechanization students.

2. Students in the group reflection scored higher more often than not on immediate posttest. Instructors may also seek to implement group reflection in laboratories.

3. The DEAL Reflection model seemed to be an effective reflective model. Instructors may find it beneficial to implement the DEAL reflection model into their laboratory.

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Chemical stocks? My research assistant should have a recommendation shortly.

Questions???????