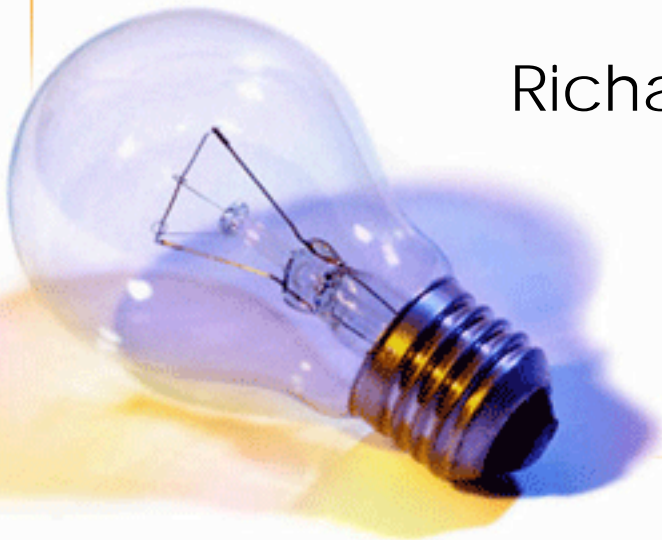


THE USE OF A THINK- ALoud PROTOCOL AS AN INSTRUCTIONAL STRATEGY TO IMPROVE NOVICE DECISION MAKING

Richard J Zahodnic





Dedication

- To my parents who saw an education as a journey which would always provide rewards commensurate with the effort,
- To my wife who allowed me to complete this journey, provided me with encouragement along the way, and always was an inspiration to completion,
- To my children, who put up with untold moods and time away from them. My hope is that this becomes an inspiration to you to become all you can be,
- To the students who participated in this study and to the memory of our lost comrade Chris, who was an inspiration to us all to continue and finish our respective journeys.



Acknowledgements

One cannot complete any endeavor without the encouragement, guidance, and support of mentors and guides along the way.

- To my committee members; Dr. Deborah Jones, Dr. Ingrid Guerra-Lopez, and Dr. Monica Tracey; without their patience, time and guidance, this project would never have been completed.
- To my major advisor Dr. James Moseley; who provided countless hours of review, encouragement, and taught me the discipline needed to complete the process.
- And to Bev Mihalko, without whose help I could not have completed this research; Godspeed in completing your journey!



Purpose of the Study

- The purpose of this study is to determine if use of a think-aloud protocol by clinical faculty will enhance the transfer of decision-making skills to novice practitioners when engaged in a problem-solving activity. If use of this protocol shows improved decision-making skill, the technique should be considered as an instructional strategy to facilitate clinical training.



Background – Respiratory Therapist

- Allied-health profession “which encompasses activities in: diagnostic evaluation, therapy, and education of the patient, family and public. These activities are supported by education, research and administration” (American Association of Respiratory Therapy)
- 110,000 RRTs nationwide



Background – Respiratory Therapist

- Board examination process to become a Registered Respiratory Therapist (RRT) includes a branching logic exam called a clinical simulation.
 - Assesses the individual's ability to collect and evaluate information pertinent to the case presented.
 - Decide an appropriate course of action based upon this information.
 - 58.5% first time pass rate as of August 2009.
 - Most fail the Decision Making section.



Background – Information Processing

- Short-term vs. Long-term memory
- Schema Theory



Background – Problem Solving

- Definition: “Stimulus situation for which an organism doesn’t have a ready response” (Davis, 1973)
- Types of Problems
 - Presented vs. Discovered
 - Well-defined vs. Ill-defined
 - Well-structured vs. Ill-structured
- Problem-solving Strategies



Background – Decision Making

- Definition: The process of selecting a solution process designed to solve a problem from a list of alternative solutions.
- Types of Decisions
 - Decisions under certainty
 - Decisions under risk
 - Decisions under uncertainty
 - Decisions under conflict
- Naturalistic Decision Making



Background – Novice – Expert

- Expert: An individual who exhibits “consistently superior performance on a specified set of representative tasks for the domain that can be administered to any subject” (Ericsson & Charness, 1994, p. 731)
- Characteristics of expertise
 - Knowledge retention
 - Organizational ability
 - Context
 - Problem-solving and Deliberate practice
- Consistency of expertise research across domains



Background – Think-Aloud Protocol

- Definition: A process where “the subject is asked to talk aloud, while solving a problem and this request is repeated if necessary during the problem-solving process thus encouraging the subject to tell what he or she is thinking (Van Someren, Barnard, and Sandberg (1994, p. 26).
- Criticism of the think-aloud protocol
- Think-Aloud as an instructional strategy
- Think-Aloud training program



Research Questions

- *Research Question No. 1:* What is the impact of the use of a think-aloud protocol by an expert as an instructional strategy on the overall decision-making performance of novice respiratory therapists on a clinical simulation exam?
- *Research Question No. 2:* Does decision making ability in one clinical scenario (care of COPD patient) transfer to care of similar clinical scenarios (care of another patient type)?
- *Research Question No. 3:* Does use of a think-aloud protocol improve the proficiency score on a clinical simulation exam?



Research Questions

- *Research Question No. 4:* Does use of a think-aloud protocol improve the efficiency score on a clinical simulation exam?
- *Research Question No. 5:* Does use of a think-aloud protocol reduce the errors of omission on a clinical simulation exam?
- *Research Question No. 6:* Does use of a think-aloud protocol reduce the errors of commission on a clinical simulation exam?

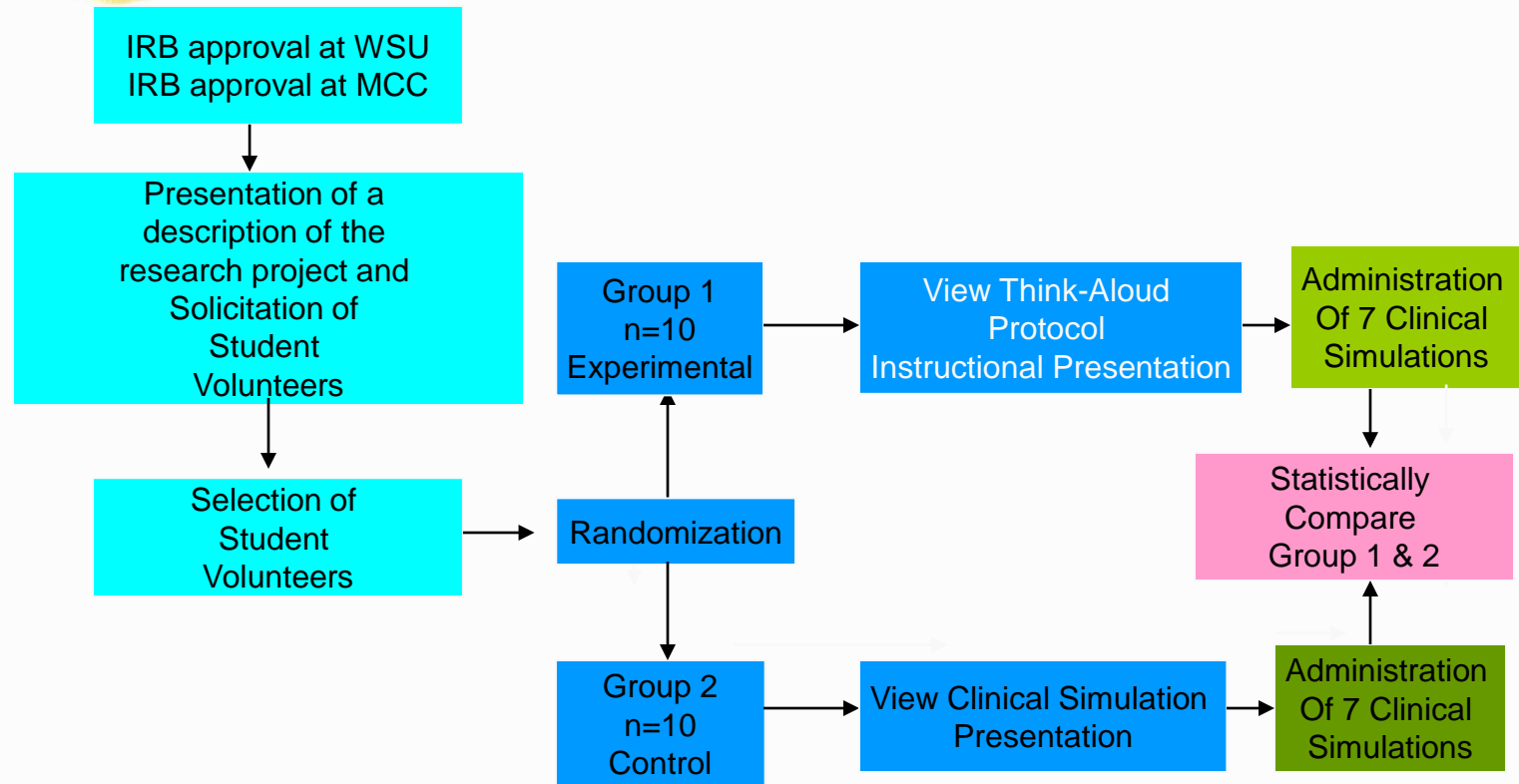


Research Subjects

- Proposed to thirty second-year Respiratory Therapy students in the final semester of training.
- 22 students expressed an interest and were scheduled for entry into the study.
- 15 actually participated on an alternate date, of which 9 were placed in the experimental group and 6 in the control group.



Research Design





Results – Mean Scores by Groups

<u>Category</u>	<u>Control Group</u>	<u>Experimental Group</u>
Information-Gathering Overall Scores	106	113.7
Information-Gathering Errors as a Result of Omission	23.8	20.11
Information-Gathering Errors as a Result of Commission	21.2	17.2
Decision-Making Overall Scores	36.5	30.2
Decision-Making Errors as a Result of Omission	15.5	14.3
Decision-Making Errors as a Result of Commission	56	63.4



Results – Mean Scores by Groups

<u>Category</u>	<u>Control Group</u>	<u>Experimental Group</u>
Information-Gathering Proficiency	70.20%	75.30%
Information-Gathering Efficiency	84.20%	86.70%
Information-Gathering Errors of Omission	15.80%	13.30%
Information-Gathering Errors of Commission	86.00%	88.60%
Decision-Making Proficiency	33.80%	28.00%
Decision-Making Efficiency	85.60%	86.70%
Decision-Making Errors of Omission	14.40%	13.30%
Decision-Making Errors of Commission	51.90%	58.70%



Results – Mean Scores by Groups

<u>Category</u>	<u>Control Group</u>	<u>Experimental Group</u>
Overall Proficiency	55.00%	55.60%
Overall Efficiency	84.80%	86.70%
Overall (Combined Information-Gathering and Decision-Making) Errors of Omission	15.20%	13.30%
Overall (Combined Information-Gathering and Decision-Making) Errors of Omission	70.20%	68.90%



Significance and Conclusion

- No component measured was deemed significant at a confidence level of $p=0.05$.
- Experimental group appeared to be better at information gathering.
- Control group appeared to be better at decision making.
 - This appeared to be primarily due the experimental group having a higher amount of errors of commission.



ANOVA – Scenario by Scenario

- None of the seven scenarios investigated showed a significant difference between groups.
- One scenario involving a child with muscular dystrophy approached significance with the control group scoring higher combined scores.



ANOVA – Transfer of Decision-Making Skills to a Similar Scenario

- The experimental group viewed a think-aloud session of an expert managing a patient with Chronic Obstructive Pulmonary Disease (COPD).
- Two scenarios involved patients with a similar disposition.
- The decision-making scores were not statistically different between groups.
- The decision-making scores were not statistically different in the remaining five scenarios between groups either.



CONCLUSIONS



Research Question 1

- *Research Question No. 1:* What is the impact of the use of a think-aloud protocol by an expert as an instructional strategy on the overall decision-making performance of novice respiratory therapists on a clinical simulation exam?
- The study failed to show a statistically significant difference between the decision-making ability of these novice performers between those exposed to a think-aloud session and those who spent an equal time-on-task in an alternate activity.
 - Experimental group did better in collecting information but were more aggressive in decision making, which resulted in a lower overall score.



Research Question 2

- *Research Question No. 2:* Does decision making ability in one clinical scenario (care of COPD patient) transfer to care of similar clinical scenarios (care of another patient type)?
- The study failed to show a statistical difference in the transfer of decision-making skills from that observed in a think-aloud session to patients of a similar type.
 - The experimental group did show higher scores than those in the control group in both the information-gathering section as well as the decision-making one. The ability to recognize similar situations and apply previously learned schema may be an important use of the think-aloud.



Research Question 3

- *Research Question No. 3:* Does use of a think-aloud protocol improve the proficiency score on a clinical simulation exam?
- The proficiency score (the extent to which participant's decisions and selections correspond to the optimal choice for a scenario) was not statistically different between the experimental and control groups.
 - Experimental group had higher scores which may indicate that the use of this instructional strategy may facilitate identification of key information needed in decision making.



Research Question 4

- *Research Question No. 4:* Does use of a think-aloud protocol improve the efficiency score on a clinical simulation exam?
- The efficiency score (the extent to which the participant's decisions and choices were ones that are considered essential or helpful to the overall successful treatment of the patient) failed to show a statistically significant difference between groups.
 - The experimental group did demonstrate an improved efficiency in both categories when compared to the control group.
 - This may imply improved ability to identify the best path for solving a given problem.



Research Question 5

- *Research Question No. 5:* Does use of a think-aloud protocol reduce the errors of omission on a clinical simulation exam?
- The error of omission rate (the degree to which the participant errs by failing to select something that is deemed essential to the management of the patient) failed to show a statistical difference between the control and experimental groups.
 - The experimental group did show reduced errors of omission in the information-gathering and decision-making sections of the seven scenarios studied.
 - The ability to use all information available, especially not overlooking key facts, may be a key attribute to optimal decision making.



Research Question 6

- *Research Question No. 6:* Does use of a think-aloud protocol reduce the errors of commission on a clinical simulation exam?
- The error of commission rate (the extent to which participants select choices that are deemed harmful or counterproductive to the management of the scenario) was not found to be statistically significant between the experimental and control groups.
 - The control group did slightly better than the experimental group.
 - This may imply that those exposed to a think-aloud may be more aggressive in their decision making, perhaps because they “thought” like an expert, without truly having the experiential context to draw from.



Implications for Instructional Design

- The use of a think-aloud may improve the development of decision-making skills in novice performers.
- This instructional strategy may allow experts, when properly trained, to transfer subtle cognitive steps utilized in the decision-making process that otherwise would not be identified by novice observers.
- The ability to demonstrate the hierarchy within the decision-making process used by expert performers may identify key steps in the process and aid in the development of instructional aids to help novices in this process.



Limitations

- Sample size.
 - Respiratory Therapy is a small group with there being less than 120 graduates in Michigan per academic year.
 - Similar research involving the education of Respiratory Therapists have had this limitation.
- Randomization methodology.
- The use of participants from only one training program.
- The use of only one expert demonstrating a think-aloud and only one scenario being used.



Implications for Future Research

- How does the use of this technique as an instructional strategy transfer to that of other health care providers where clinical decision making is a component of the training?
- How can this instructional strategy be incorporated into disciplines outside of the medical fields, especially those that use mentors as trainers? Can this technique be used to facilitate development of non-cognitive features such as attitudes and beliefs related to the corporate culture?



Implications for Future Research

- Although the instructional strategy can be used by the novice performers, can it provide additional information about how the novice comes to a decision and does the ability to identify these incorrect steps facilitate better intervention by the expert observer?



Conclusion

- This study failed to demonstrate that the use of think-aloud as an instructional strategy was useful in the desire to improve decision making skills in novice performers.
- Although there was a tendency toward that in the results, the small sampling size failed to show significant findings.
- Further studies in this area should be done with a larger number of participants to more accurately assess the use of this novel instructional strategy.

Thank you!
Questions?





References

- American Association for Respiratory Care (AARC)
www.aarc.org
- Davis, G.A. (1973). *Psychology of problems solving: Theory and practice*. New York: Basic Books.
- Ericsson, K. A., & Charness, N. (1994). Expert performance: Its structure and acquisition. *American Psychologist*, 49(8), 725-747. (p. 731)
- Van Someren, M. W., Barnard, Y. F., & Sandberg, J. A. (1994). *Practical guide to modeling cognitive processes*. London: Academic Press.