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# ANALYZING AND THINKING WHILE PLAYING A SIMULATION

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## ABSTRACT

*This paper builds on the premises that optimal learning from an experiential experience includes reflection and thinking as well as experiencing and that reflection includes an active analyzing component. The paper's focus is on that that analysis component of the reflection process. That component is defined it as the part of the learning process in which contemplations are organized into plans, reports, and/or conclusions. This paper discusses this concept, places it in the overall context of the learning process, describes appropriate previous research, proposes potential sub-components of the process, and suggests future research. 3 key phrases: Reflection, Analysis, Annual reports*

## INTRODUCTION

This paper focuses on a specific component (or sub-phase) of an identified phase of the learning cycle. The phase is the reflective phase, and the sub-phase is the analysis sub-phase. This analysis sub-phase was by Gosen (2004), who defined it as the part of the learning process in which contemplations are organized into plans, reports, and/or conclusions. This paper discusses this concept, places it in the overall context of the learning process, describes appropriate previous research, proposes potential sub-components of the process, and suggests future research.

## BACKGROUND: THE LEARNING PROCESS AND REFLECTION

For Kolb (1984), the learning process is a model of how people learn. He believes that experience plays an important role in the learning process. This process has four phases: Concrete Experience, Reflective Observation, Abstract Conceptualization, and Active Experimentation. Concrete Experience refers to involving oneself in an experience. Reflective Observation refers to reflecting on and observing the experience from multiple perspectives. Abstract Conceptualization refers to creating concepts that integrate observations into theories. The Active Experimentation phase refers to the use of ideas to make decisions and solve problems. For Kolb, active experimenting includes ideas for involvement in future experiences, and another learning cycle can occur.

Other authors besides Kolb believe reflection to be an important part of the learning cycle. Those that believe that optimal learning cannot occur without reflection include: Bowen (1987), Gosen (2004), Knotts and Keys (1997) McDevitt (2000) Taylor (1998), Thiaragajan (1994), and Zalatan (2000). For example, Thiaragajan (1994) stated that people don't learn from an experience. They learn from reflecting on the experience.

The ideas about the analysis component of the reflection phase for the present paper are borrowed from Bowen (1987). For Bowen (1987), reflection has an active thinking component. He suggested that learning has greater impact when accompanied by adequate processing time and a clear summary providing a cognitive map for understanding the experience. Reflection for Bowen then goes beyond observing and thinking. For him there is organization, active thinking, and perhaps, even plans and readiness for action. Gosen (2004) also believed that reflection includes active thinking. Gosen (2004) dealt with the reflection in the learning process in simulations, and for him, reflection includes four overlapping sub-processes: 1) the learner/player receiving feedback in the form of results from decisions, 2) a contemplation process in which results are taken in, 3) a debriefing procedure in which contemplations are discussed with teammates, other industry players, and/or the administrator, and 4) an analysis process in which contemplations are organized into plans, reports, and/or conclusions.

The overall construct of reflection, for Gosen (2004) is somewhat more comprehensive than the perspective offered by Kolb. For Kolb, reflection involves observing from multiple perspectives. In the present paper reflection involves a greater number of mental activities. For Gosen (2004) and for this paper, it involves observing behavior and results, contemplating, perhaps discussing, and formulating ideas on the basis of the contemplation and discussion.

## THE ANALYSIS COMPONENT

As indicated above, this paper focuses on one component of the reflection process, the analysis component. We think this is an extremely important component because the mental activities involved are active and future oriented. It is in this part of the learning process where learners analyze what went right and wrong and how to organize ideas to improve. Doing these mental activities appropriately and thoroughly should result in improved performance. Not doing these activities will likely not lead to such a result. The business simulation is a particularly appropriate milieu for studying this part of the reflection process. This is because a simulation involves serial decisions, and that means that it would be natural for reflection after one decision to involve both analysis of that decision and plans for the next.

To our knowledge no scholar has previously written about this part of the learning process. However some have written about reports from players as a result of analysis. There is little previous research on these reports, but there is some. Comer and Nichols (1994) administered a sales-management simulation and required pre-simulation and annual reports from players. They found that course and instructor ratings increased significantly as requirements for reports became more structured and as players were asked to visualize the sales people in the simulation as real people. DiBattista (1986) administered a mini management simulation in two sections of a freshman management class. Both sections were assigned five reports analyzing management processes during the simulation, but while both sections were required to turn in one of the reports, only one of them was required to turn in the other four. One section was required to do more written analyses than the other. DiBattista found that the students in the section that turned in all five reports performed significantly higher on an achievement test.

## FEATURES OF THE ANALYIS COMPONENT

In the Spring of 2004 we assigned one of the sections of an Administrative Policy class to turn in an annual report. Students in this section had been playing MICROMATIC (Scott, Strickland, Hofmeister, and Thompson (1992). The assignment was for players to analyze, comprehensively and in detail, why they have performed as well or as poorly as they have, and to submit plans for the future. The analysis and future plans were to have been supported by financial information.

Thirty-seven students in nine teams turned in papers. We believe that the content of these papers revealed the mental activity of the players in this game, as they analyzed previous quarterly decisions, identified the consequences of those decisions, and developed plans for the future. In other words, the content of these papers revealed the analysis sub-phase of the reflection phase of the learning cycle, at least for these thirty-seven students.

An informal content analysis of these papers revealed eight kinds of statements. The two most frequent types of statements made by students were awareness statements and analytic or analysis statements. Students expressed four kinds of awareness -- awareness of competitors' actions, awareness of the environment (e.g., that sales were increasing industry wide), awareness of problems, and awareness of their own strategies. Analytic statements were cause and effect statements. We found three kinds, depending on what students were analyzing. They could analyze data or results (e.g., our finished foods inventory was lowering our profits). They could write about observations with consequences, (e.g., sales went up with product improvements, but profits did not), and they could express game cause and effect understanding (e.g., sales people are lost when a company cannot produce enough to match sales persons' ability to sell).

Some of the statements were solution oriented. There were two kinds of statements that revealed solutions--problems with solutions and suggestions for improvement. There was also an action category. This category was similar to the solution category, except that the solution category emerged from problems, whereas the action category did not. Action statements were linked to cause and effect statements, results (e.g., these results suggested a certain action to us), or competitor actions.

Some of the papers reflected an understanding of the need in this simulation to keep a balance with respect to sales, production capacity, production, workers, and materials or an understanding of the need to sell about what was made, produce at full capacity, and not have idle workers or excess raw materials. Some student papers captured the simulation's complexity, in that these papers revealed that there were cause and effect relationships accross multiple variables in the simulation (e.g., the relationship between aggressive marketing, not producing to capacity, stockouts, selling fewer items than expected, and being penalized with a computer loan). Many of the students did calculations, of ratios, for example. Finally many students made errors.

The above categories emerged from an informal content analysis. They reveal the kinds of mental activities players may go through as they move from on set of simulation decisions to the next. We make no claim that these categories represent populations other than those sampled for this study. On the other hand both of the authors of this study have administered more than one simulation. To us, there is face validity for the above categories. Many simulation players make cause and effect statements, regardless of the simulation. Many calculate. Many make statements suggesting an understanding of the complexity of the simulation. Many make errors.

## DISCUSSION

Rigorous research should be undertaken on the concepts of reflection and analysis. Other scholars have

assigned analytical reports (Biggs, 1997, Comer and Nichols, 1994, Knots and Keys, 1997, and Zalatan, 2000) but to our knowledge, none has analyzed the content of these reports in the manner discussed here. Such research would cover information never before uncovered. This paper explores player analytical activity between the results of one set of experiential experiences and the next experiential experience when the player's approach to the next experience should incorporate learning from the initial one. In order to further understand what goes on in the learner's head when he goes through experiential learning, a study analyzing such reports is in order.

Possible categories of content of such reports have been identified above, categories that might represent the content of learner's analytical thoughts as they review previous decisions and prepare for the next ones. Future research might try to identify such content. It is also possible that some analytical thoughts are more effective than others in that the more effective analytical thoughts might lead to greater learning or better performance in the simulation. Future research might also attempt to identify these more effective analyses.

We believe that the analysis sub-phase is an important component of the learning cycle. If this is true, teachers of simulations should be teaching to enhance analytical skills as students move from one decision to the next, and all experiential learning facilitators should teach about the thought processes that occur between experiences.

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