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The Use of Simulations in a Teacher Education Program: The Impact on Student Development.

A Critical Review

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Abstract

Simulations and games have been used in education for decades, but most of this development has been in the areas of business and economics. Well-designed simulations and games have been shown to improve decision-making and critical thinking skills as well as teaching discipline-specific concepts. Active learning also helps students develop interpersonal and communications skills. It is believed that simulations can be adapted and developed in other areas of education.

In this paper, a description of a simulation that has been developed and used in a human development course in the teacher education program is reviewed. Students were divided into groups and the groups were given specific roles related to a scenario dealing with a dysfunctional family. The roles included the parents, advocates for the children, the children's teachers, psychologists, and judges. The groups were given information at the beginning and during the simulation. The advocate groups made their presentations to the judges and the judges decided the case. The simulation was constructed so that there was no "right" or "wrong" answer.

The most important part of the scenario was the debriefing that occured after the judges reached a decision. At this time, the participants discussed the reasons related to the responses and the problem solving process used within the simulation. By dissecting the motives and actions of the individual participants, it was possible to identify the underlying themes. In the simulation described here, the students were able to identify cooperation and cooperative learning, problem solving, communication, self-efficacy, motivation, and application as important themes. The simulation provided students with a hands-on exercise that illustrated and reinforced those concepts and skills that will be important in their careers.

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A Critical Review.

The use of simulations in an educational environment has been most noted in the area of business. Chamberlin (1948) developed a laboratory simulation in the area of economics related to imperfect competition. Since this development, the use of simulations in the business world has become so popular that there is a journal titled *Simulation & Gaming* that is exclusive to this field. The use of simulations allows for role playing and hands-on learning. It is believed that this same approach can be applied to the field of education.

Simulations can be used to demonstrate principles and provide experiential learning. This type of active learning provides both students and instructors a change from the traditional classroom lecture and can be used to highlight and support lecture-related materials. Interactive learning activities can be designed to be as brief as a single class period, or long enough to span several class periods (Brozik and Zapalska, 2002a).

During the last two decades, the curriculum in the area of higher education has experienced a change. Previously, the prevailing teaching methodology was that of classroom lecture and discussion, but today it is not rare to find individual analysis of group roles, group dynamics, individual and group decision making, role-playing, and other human development skill exercises used in the college classroom. An important objective in teaching is to ensure that students are exposed not only to theoretical frameworks but also to real world situations where they can gain experience in applying their knowledge. A teaching approach that helps meet this objective in the classroom is the use of simulations that replicate real world situations. Simulations contribute to the learning process, particularly in transferring learning from the

conceptual base to its ultimate application. The strong relationship between the degree of perceived realism and the perceived contribution of the simulation to learning is important (Brozik and Zapalska, 2002b; Brozik and Zapalska, 2003).

A simulation creates a dynamic environment in which students can make decisions concerning human development issues related to a school setting. Within the structure of the simulation, students focus on the decision making process and several rounds can be completed within a single class period. One key aspect of the simulation is stressing that it is not a game in which there are winners and losers. The purpose of the exercise is to explore decision making techniques and see the results of specific decisions. The structure of a well-designed simulation is rich enough to examine many different aspects of the problem presented (Brozik and Zapalska, 2002a; Brozik and Zapalska, 2003).

It is believed that simulations are effective in the process to enhance students' self-efficacy. In their research, Thompson and Dass (2000) found that students who engaged in the simulations showed an increase in self-efficacy that was significantly larger than gains due to learning by the case method approach. The simulation process elicited a greater response from the learners than that of the case study group (Thompson and Thompson, 1995). Overall, simulations are more effective at enhancing self-efficacy compared to the case studies and are better at increasing written communication skills (Thompson and Dass, 2000).

Queen (1984) believes that "through the process of group interaction, students actively participating in a simulation can vicariously experience a reality paradigm of scientific discoveries, social issues, and world events" (p. 144). Instructors can use simulations to provide enhanced learning experiences for students. It is through the use of simulations that students take an active role in learning. The learner becomes an active participant in the learning process

and, in turn, the student gains insight into the nature of the process being simulated. The simulation provides opportunities for the active learner to develop skills in decision making and problem solving skills that can be applied to the social sciences. The instructional advantages to using simulations in a higher education setting allow the learner to experience life-like situations in a realistic environment that is conducive to the active involvement of all students. Simulations encourage motivation, provide the opportunity for student involvement, allow for the generation of new insights, increase the formulation of new concepts, and create the ability for students to solve problems within a realistic and controlled environment (Queen, 1984).

Research Question

Given the limited research in the use of simulations in the field of teacher education, counseling, and athletic training, the pilot study described in the next section, will be applied to another human development class in the fall of 2003 to determine any consistency in the results or themes of data. The research question is, "What are the prominent themes and characteristics of an effective simulation used in a human development class geared for preservice teacher education majors, counseling majors, and athletic training majors?" It is hypothesized that the prominent themes and characteristics will be consistent with the past research and will be related to cooperation, communication, motivation, problem solving, application, and self-efficacy.

Research Method

Contained in the research method section is a description of a past human development simulation conducted by the authors. The present proposal will use the same format as described in the present text in order to obtain further data to validate the pilot study results. The

population and number of students in the proposed study are similar to the pilot study simulation format described in the following text.

A human development class in the teacher education program, which totaled 25 students, was randomly divided into five groups of five students. Each group was given a brief scenario that it had to collectively debate the outcome of their analysis to the instructor. The students had prior knowledge in the area of biological development and the theories of Sigmund Freud, Erik Erikson, Jean Piaget, B.F. Skinner, Noam Chomsky, Lev Vygotsky, and Lawrence Kohlberg. They were allowed to use their textbook and were required to apply five terms that they have acquired from the text for the purpose of their argument.

Group number one was given a scenario in which they were the parents of a dysfunctional family. The group was given the profile of a male and female parent who had two female children. The group's objective was to plead its case to the judge to maintain legal guardianship of the dysfunctional children. (The scenario did not include the term dysfunctional, but for purposes of clarification for the reader this descriptive term is most appropriate.)

The second group was to act as the attorney to advocate for the children. The group's sole responsibility and overall goal was to obtain the best help for the children within the parameters of the simulation. This may mean that the children would leave the home of the parents for some other type of care or require counseling for the entire family. The simulation is constructed so that the goal of the attorney and the parents are oppositional in nature.

The third group represented the children's teachers within the local school district. The goal of the teachers were to provide the best possible learning environment that was also social and academic in orientation. This group could advocated for the students to be placed in a learning environment that was outside the scope and reach of the parents. The teachers believe

that they know what is in the best interest of the child without any input from the attorney. The

focus of the teachers were to provide an environment that enriched the behavioral and academic

components of the children as well adjusted adults.

The fourth group was that of the psychologist. The responsibility and goal of the

psychologist was to assist the parents and the children with obtaining optimal development. This

group was given the responsibility to advocate for both the parents and the children in this

simulation. Their scenario provided this group with the greatest amount of history related to the

development of the family.

The ultimate judge in this case was the instructor who had an advisory board of five

students. This was the last group in the simulation. The advisory board critically reviewed each

of the other group's oral presentations and determined if there was a viable solution to the

problem presented in the simulation. The advisory board determined what group provided the

best argument within the scenario. It is important to note that each group was given the objective

to plead its case for its specific role within the simulation. The simulation was designed to not

have a "winner" or "loser," but to increase the amount of learning taking place among the

students. By giving the students a roughly common goal but adversarial approaches to that goal,

the simulation could demonstrate to the students the complexities of operating in a real-world

environment.

Prior to the initiation of the scenario, the instructor orally provided the class with a

general profile of the family. The profile included a brief history of the mother, father, and the

two children. The profile also included academic, social, physical, and emotional development

of the parents and children, as well as the economic status of the family. Each group was

permitted to talk to the other groups, but this fact was not openly revealed at the beginning of the

simulation. At the midpoint of the scenario, the instructor provided further information to increase the potential for the exchange of information between and among groups.

At the close of the simulation, each group completed a debriefing exercise for a specific set of points. The groups were asked to apply four concepts that they used from their class notes and text to complete the simulation process. Along with this application approach, the learners were asked to describe the process that they used to gather information and engage their individual group members. They were also asked to describe the process by which they learned during the simulation. It is from the students' feedback that the simulation was analyzed. The information was then reviewed and from this review, specific themes emerged. The themes are described in the results section.

<div align="center">Results</div>

Cooperation and Cooperative Learning

During the simulation, the participants regarded cooperation and cooperative learning as an interplay between and among each of the group members with the key factor being that of engagement and empowerment. There have been numerous research articles that discuss the affects of achievement, learning outcomes, increase in interpersonal relationships, and positive student attitudes toward learning, regarding the process of cooperation and cooperative learning environments (Johnson and Johnson 1994; Nastasi and Clements, 1991; Slavin, 1995). Cooperative learning can lead to increased levels of achievement that are greater in scope than levels of individual achievement in a competitive classroom approach. In a cooperative learning environment, students tend to have a greater understanding of the content information being

taught and the potential for the mutual construction of active participation. This greater understanding occurred in the human development simulation.

The groups in this specific simulation benefited greatly from peer interactions and group involvement. The groups that ranked the simulation as effective also felt a sense of support and cohesiveness among their group members. It is also important to note that the groups must have the opportunity for feedback by the instructor or it is possible for high achieving students to regress to a lower potential cognitive state (Tudge, 1992). It is the responsibility of the instructor to provide an engaging simulation to avoid such dilemmas. Taking into account the research in the area of cooperative learning groups (Educational Research Service, 1989), and the findings from this research, the cooperative learning environment increased student motivation, positive behaviors, attitudes toward the content information being taught, and created a mutual respect among the students and teacher.

Problem Solving

Problem solving has been defined as providing a solution to a specific behavior. Taking into account the student feedback and the observations of the researchers, problem solving dealt with two prime aspects. The first aspect was related to the students resolving the specific scenario within the simulation and the second aspect dealt with the learners resolving personal conflicts among the group members.

The groups were homogenous in nature because they lacked both gender and cultural diversity. Nevertheless, they still had to solve interpersonal conflicts. Evertson, Emmer, and Worsham (2000) believed that the steps to solving a problem are to identify the problem, debate alternative solutions, and then obtain a commitment toward action. The majority of learners in

this present simulation did in fact complete such tasks. Glasser (1975 and 1986) proposed a

process for a person to use in an instructional setting for an effective problem solving strategy.

This approach was geared toward a teacher/student atmosphere, however, the students who

participated in the simulation tended to arrange the group dynamics in a similar fashion. The

successful simulation groups tended to identify the problem, focus on the behavior that needed to

be solved, assigned specific tasks related to the person's responsible for the needed change, and

evaluated the outcome of the behavior.

Communication

        Communication between the instructor and the student, as well as the student and his or

her peers, is vital in any simulation process. Communication dealt with both verbal and

nonverbal behaviors. Taking into account the idea of achievement and communication, it is

important to mention the works of Cruickshank (1985) and Land & Smith (1979). Research

linking the connection between effective communication and student achievement involves

numerous variables. These variables include: precise terminology, connected discourse,

transitional signals, and emphasis (Eggen and Kauchak, 1992). For effective communication to

occur in any simulation process, the above variables must be exercised to achieve a sense of

student satisfaction within the learning environment.

        During the debriefing period, after the simulation had ended, the students discussed their

satisfaction related to participating in the simulation and their sense of accomplishment. A few

of the students did ask for greater details related to the structure and format of the simulation

process. Such students felt uncomfortable with this novel idea of providing vague outcome

objectives related to the simulation. The students were provided with a written scenario but a

few students wanted specific steps on how to complete the simulation. They wanted to be

guided through the entire simulation. A few times throughout the simulation, such stimulus

bound students became frustrated when an outcome that they expected to occur did not actually

occur. These few students felt that greater communication needed to occur within their group

and that the instructor should have intervened to prevent any miscommunication.

Self-Efficacy

When the topic of self-efficacy is discussed, it is important to mention the work of

Bandura (1977, 1986, and 1995). Bandura (1995) believed that "self-efficacy is concerned with

people's beliefs in their capabilities to produce given attainments" (p.1). Graham and Weiner

(1996) found that academic performance increases and the level of self-efficacy increases when a

learner obtains short term goals related to progress, is taught specific learning strategies, and

receives some type of reward based on achievement. In the present simulation, the students were

given numerous goals to complete, were taught prior learning strategies, and received points for

their achievement. The process that Graham and Weiner (1996) outlined was consistent with

this study.

High levels of self-efficacy also contribute to other variables that are not directly

measured in an academic setting. Flammer (1995) found that students who have high levels of

self-efficacy tend to be motivated, optimistic, physically healthy, and less depressed. The

participants in this simulation did not mention these as characteristics that they learned from this

process, but the atmosphere of excitement within the classroom was quite high.

The majority of the students who were in the human development simulation were also

preservice teachers. Successful teachers have a strong sense of self-efficacy. Hoy and Woolfolk

(1990 and 1993) believe that teaching-efficacy is a teacher's belief that he or she can teach a person to learn. This is a prominent characteristic for the preservice teachers to learn. If the preservice teachers acquire a high level of self-efficacy during their training, there is a high probability that as future inservice teachers, they will obtain a high level of teaching-efficacy. Hoy and Woolfolk (1990 and 1993) believe that teachers with a high sense of self-efficacy work harder and are more persistent when dealing with difficult teaching situations. Most importantly, "Any experience or training that helps you succeed in the day-to-day tasks of teaching will give you a foundation for developing a sense of efficacy in your career" (Woolfolk, 2004, p. 370). This human development simulation provided the preservice teachers with the fundamental concepts that they will use in the real teaching world.

Motivation

Motivation has been widely defined in the field of education (Sprinthall, Sprinthall, and Oja, 1994). For purposes related to the simulation, motivation dealt with the topics of being on-task, having an interest to learn, and demonstrating the curiosity to complete the simulation. The students continually echoed, throughout the simulation, that they enjoyed the opportunity to role play and the experience of engaging in this academic exercise. The students became more motivated to be engaged in the simulation process when they felt a sense of belongingness within the group as well as being a competent group member. Stipek (2002) believes that a student's interest in a topic will increase when he or she has the opportunity to experience success. The student may not initially feel interested in an academic topic, but upon success in a task, interest will increase. This belief held true during this simulation.

Berlyne (1960 and 1966) believes there is a physiological basis toward a person being aroused due to a state of curiosity. The same belief has been generalized to the teaching field. Lowenstein (1994) found that a person's level of curiosity, and motivation, will increase when there are gaps in the information that is being presented. "The curious person is motivated to obtain the missing information to reduce or eliminate the feeling of deprivation" (Lowenstein, 1994, p. 87). Lowenstein's (1994) belief held true during the simulation. The students were not given all the information related to each of the scenarios, but they continued to seek some type of closure related to the simulation. At times, the students would create unrealistic assumptions about possible outcomes.

Harter (1988) created a model of motivation. She believed that a person first must have a level of competence in an area that leads to success, while also having the support and appropriate feedback from significant others. This will first lead a person to a higher level of self-esteem, then a sense of satisfaction and accomplishment (mood), and finally to the action of motivation. This process leads a person to be curious about his or her learning process. The students in the simulation were given enough information to peak their curiosity while also allowing them the opportunity to succeed. Woolfolk (2004) cites that one of the ways to make learning fun is to create an instructional design that employs games and simulations. This simulation demonstrates that this is true.

Application

During the latter stages of the simulation process, it became apparent that the students were applying the concepts from the text in order to problem solve. The learners were able understand why they had to learn certain developmental theories, and during the debriefing

period stated that they now recognized the importance of these theories. The use of the term

"application" is best described as the process in which an active learner is able to take a

theoretical concept and use it in a situational experience. Bloom, Engelhart, Frost, Hill, and

Krathwohl (1956) believe that an effective instructional approach should have six basic

objectives or cognitive domains. Bloom's taxonomy has six levels that build upon the previous

levels. The levels include knowledge, comprehension, application, analysis, synthesis, and

evaluation. The learners within the simulation were all able to achieve the analysis level, with

the majority of students being able to evaluate the entire simulation.

        The simulation participants also applied the theories of Erikson (1950, 1959, 1968, and

1980), Piaget (1967 and 1973), Skinner (1971, 1988, and 1989), Vygotsky (1993), and Kolhberg

(1971, 1975, and 1984) during the final evaluation process and debriefing period. Numerous

participants echoed how realistic the family profiles were, given the fact that many had friends or

family members that had very similar experiences to those family characteristics that were

discussed in class. Gardner (1983 and 1999) proposed the theory of multiple intelligences which

lends itself well to this simulation. There are eight areas of human ability that include: logical-

mathematical, linguistic, musical, spatial, bodily-kinesthetic, interpersonal, intrapersonal, and

naturalist. Multiple intelligences are essentially based upon the belief that all students do not

learn in the same manner. The traditional college lecture format is a form of auditory learning

that may not allow for all students to excel. Nevertheless, some kinesthetic students learn better

from hands-on approaches. The simulation process provides a form of hands-on learning, in

which the learner is actively participating in the class. It is through this active participation that

the students were able to apply the theoretical concepts that were taught and self-reported higher

levels of understanding.

Discussion and Conclusion

The purpose of this simulation was to identify the prominent themes and characteristics related to the development of preservice teachers in various areas of education. In a successful simulation, the individual groups must solve problems and make decisions given real world scenarios that are conflicting in nature. Each group had the opportunity to share information with the other groups. This created a situation where communication and cooperation became important among and between the individual groups. Opportunities were created for collusion and collaboration with each of the groups while some groups chose to work independently within the simulation structure (Brozik and Zapalska, 2002a).

The simulation format allowed for an active learning process. Whereas the traditional lecture format is passive in nature and does not allow for a high degree of teacher/student interaction and student/student interaction, the simulation format allowed for a high degree of interaction between and among all parties. Each group was responsible for its specific tasks and were held accountable for the material that it orally presented and defended to the instructor. This process invited the use of analysis and active discussion within the classroom. The students were motivated to learn because the simulation presented an environment that was active and held the learners' attention.

The achievement and participation of the learners increased during the simulation process. When discussing achievement, it is important to describe the work of Piaget (1967 and 1973) and his assertion that achievement is related to the ability to solve problems. According to Piaget (1967), adolescents are capable of abstract thought or "formal" and "hypothetico-deductive" thinking (p. 62). Taking these theories into account, and in order for advanced

problem-solving to occur; a person must be operating at the formal level of thought. The same is true when discussing adult achievement. The preservice teachers, counselors, and athletic trainers should have the cognitive background to solve problems that engage formal thinking but the majority of the students who engaged in the simulation did not describe any higher order thinking characteristics.

Along with the area of achievement is the topic of self-efficacy. By the end of the simulation, the students stated that they were more confident and capable of solving problems. This relates well to Bandura's theory. Bandura (1977, 1986, and 1995; Bandura and Walters, 1959) is one of the most noted persons to examine and create a social learning theory related to aggression and, in his latter works, coined the term "self-efficacy." In an examination of Bandura's (1977) and Sears' (1951) theories, Grusec (1992) found that "beliefs about self-efficacy arise from the individual's history of achievement, . . . from observations of what others are able to accomplish, . . . attempts of others to mold feelings of self-efficacy through persuasion, and from consideration of one's own physiological state" (p.785). At the conclusion of the simulation, the students self-reported having a greater sense of efficacy.

The learners who participated in the simulation stated that they enjoyed the process and enjoyed learning using the simulation instructional approach. Many of the students stated that the simulation process was a "fun way to learn." The human development simulation provided the students with a safe environment in which they could experiment with real world situations related to the challenges of future career conflicts. The simulation provided the learners with a variety of decision making situations; the opportunity to use prerequisite skills and the refinement of such skills; the environment to work collectively with students who have a variety of learning abilities; the refinement of communication skills; the ability to apply theory to real

world problems; and a nontraditional learning environment where students have the opportunity

for creative problem solving.

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