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ABSTRACT

This paper presents a rationale for using high-fidelity computer simulation in planning for and implementing effective multicultural education strategies. Using computer simulation, educators can begin to understand and plan for the concept of cultural sensitivity in delivering instruction. The model promises to emphasize teachers' understanding of and empathy towards students from different backgrounds. A conclusion is that computer simulation is an effective, innovative, and necessary tool for multicultural education, giving educators the ability to simulate diverse ethnic situations in any school environment. Today's computer simulation technologies promise to help educators understand culturally sensitive instructional-delivery strategies. A compelling reason to develop high-fidelity simulations as microcultures is to help end prejudice that exists in an increasingly diverse world. (LMI)

Computer Simulation (Microcultures): An Effective Model For Multicultural Education

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Abstract

The objective of this study was to determine the rationale for using high fidelity computer simulation in planning for and implementation of effective multicultural education strategies. The findings were based on the growing need for an effective teaching strategy for increasing awareness of multicultural education and on the development of computer simulations since World War II. Computer simulations have been a promising model available to educational leaders and researchers for over 35 years. Using computer simulation, educators will begin to understand and plan for the concept of cultural sensitivity in delivering instruction. The model promises to emphasize understanding and empathy towards students from different backgrounds than those of the teachers. The findings implied that computer simulation is an effective, innovative, and necessary tool for multicultural education, giving educators the ability to simulate diverse ethnic situations in any school environment.

Computer Simulation:
An Effective Model For Multicultural Education

Society in the United States is experiencing rapid changes in at least two demographic areas that are directly impacting the public school system: the number of culturally-different learners is on the increase while the number of culturally-different teachers is on the decline (Boyer, 1993). These two trends might account for part of the perception that public schools are not meeting the needs of such a changing society (Reilly, 1993). To counter this lack of societal confidence, educators need to address a growing call for the delivery of culturally sensitive instruction. This call is based on the fact that educators must now have the "knowledges and skills needed for the delivery of instruction to populations primarily unlike one's self, as well as, to those like one's self" (Boyer, 1993, p. 5). One strategy for reinforcing such instructional delivery relies on the recent advent of affordable high fidelity computer simulation. Such simulations promise to bring about opportunities for design and construction of innovative conceptual tools to be used for teaching educators how to deliver culturally sensitive instruction.

The need for the delivery of culturally sensitive instruction brings about two issues to be addressed in the classroom. The first issue is the consideration of every individual child in every classroom. Individual children belong to specific cultures, diverse in nature. Those diverse cultures serve to define reality to a point that this reality is taken for granted by those interacting in it (Shutz, 1972). Hammers (1985) describes four conditions in life that give rise to the development of the unique personalities of every culture:

> 1) the physical conditions including geography, climate, and things in one's life, 2) the social environment including family, friends, and all those other people past and present that make their presence felt in one's life, 3) an orientation to time including the history of one's culture and how one's life span relates to history, and

finally, 4) the unique genetic heritage with which each one is born including the physical and mental strengths and weaknesses of that heritage. (p. 54)

Conflict arises when people from one culture, who have not interacted in the same four conditions (i.e., reality) of another culture, fail to acknowledge the unique constructs of that reality, therefore, knowingly or not, deny the foundation upon which the other culture depends (Noesjirwan and Freestone, 1979). This failure to acknowledge another's reality can only bring about misinterpretation of each other's actions and negative attitudes towards each other's cultures. To overcome this misinterpretation educators need to ask questions regarding each individual child. From where does the child come? What culture does that child use as a framework for conceptualizing reality? To what values does that child grasp? How can those unique cultural ideologies be positively reinforced, insuring a promotion of equality in the classroom? This first issue of individualism defines a need to celebrate "the distinctiveness that makes us who we are" (Boyer, 1992, p. 2).

The second issue addresses the common tie that binds all cultures into one group: humanity. All cultures have certain things in common. Boyer (1992) outlines eight commonalities that are fundamental characteristics of all cultures. Those commonalities are birth, growth, and death; symbolic language; aesthetic awareness; awareness of the past, present, and future; desire to form groups; connectedness to nature; work, consumption and production; and meaning and purpose in life. Boyer goes on to suggest that these eight commonalities should become organizers for curriculum, using academic subjects to reinforce the bigger picture of existence itself. The students "would not only discover the human commonalities; they would discover the different ways in which humans around the world express the commonalities that we share" (p. 13). Such commonalities are also reflected in a variety of content theories of motivation. Maslow's (1970) need hierarchy theory, Herzberg's (1959) motivation—hygiene theory, and

Alderfer's (1972) existence relatedness growth theory all reflect certain needs that are common to humankind. Those needs determine how we much effort we exert in our day-to-day activities, how we persist in the continuation of specific activities, and in what direction those activities will carry us.

Educators need to address both of the issues of uniqueness and commonality during the lesson-planning stage and the delivery of instruction to children in the classroom. Mai-Dalton (1993) suggests that teachers should address the specific differences and similarities between cultures. McGee Banks (1993) reports that "knowledge about the cognitive styles and cultural backgrounds of their students can help teachers identify and build on their students' strengths" (p. 46). Such a proposition involves a high complexity factor, especially when the cultures of both teacher and student are different. To insure culturally sensitive delivery a theoretical model can be used as a training tool for educators that will represent classroom settings where people from different cultures currently exist. Such a model can be used as a framework for teaching the perspectives of uniqueness and commonality to educators, who, in turn, will deliver instruction using culturally sensitive techniques.

Figure 1 models both of these perspectives in the minimum possible nonlinear system of a tetrahedron (Fuller, 1975). The tetrahedron shows how every part of a given nonlinear system (e.g., social system) interrelates with every other part, creating a synergetic, multi-dimensional whole.

Insert Figure 1 about here

The four points of the tetrahedron represent Hammer's (1985) four conditions unique to any given culture. The eight cross-sections (i.e., dotted lines) of the tetrahedron represent Boyer's (1992) list of the eight commonalities that all cultures share. Consider the

individual as a central point inside the tetrahedron. This tetrahedral model cannot not fully represent a social system because there is no easy way to illustrate the interrelationships between the points of the tetrahedron, the individual "inside" the tetrahedron, and the relationship to time and space in any given culture. The tetrahedron can be used, however, in illustrating how the eight commonalities between the world's cultures are available for structuring curriculum that is inclusive to all cultures. When one tetrahedral model interfaces with another, not all of the four points are obvious to both cultures, and the individual "inside" the model is lost from view. Only the eight commonalities are obvious to those outside any given culture. This limited model is a beginning for planning multicultural education. To fully integrate a nonlinear systems approach with both the uniqueness and the commonalities, another conceptual model is necessary.

One problem in developing such a model is the above-mentioned interrelationships between the complex nature of large social systems (i.e., cultures) operating over time, space, and the complex behavior of individuals operating within those nonlinear systems (Noesjirwan and Freestone, 1979). Natural or experimental studies do not fully identify all of the interrelated variables that exist between both the individual and the culture. A different model is necessary to address all of the related variables. Forrester (1968) described such a model.

> Most dynamic behavior in social systems can only be represented by models that are nonlinear and so complex that analytical mathematical solutions are impossible. For such systems, only the simulation process using step-by-step numerical solution is available. (p. 3-10)

Such a model demonstrates the power of *feedback* in a system. Feedback, an integral part of open systems theory, communicates to an action either positive or negative reinforcement, allowing the action to become stronger or weaker as time allows

(Senge, 1990). An ability to see interrelationships over time, rather than linear cause-effect chains would help us to focus on emergent patterns in the system rather than isolated points. Thus, a change from a linear focus in systems thinking to a nonlinear one should help us to recognize types of structures that might reoccur again and again.

Recognizing both the power of systems theory and the emerging concepts in nonlinear mathematics (e.g., *chaos, complex adaptive systems, fuzzy logic, neural networks, and artificial life*), a potentially powerful tool for understanding the totality of large social systems can now be modeled in computer simulations (Hentschke, 1975; Richardson & Pugh, 1981; Senge, 1990; Richardson, 1991; Waldrop, 1992). Complex interrelationships in systems are sometimes best described by using computationally difficult nonlinear mathematics. With the advent of powerful desktop computers, the potential to use nonlinear, systems-based simulations is now available to educators. Bell (1975) suggests that it is possible to simulate the basic form of the model, using simulation in part as a test of the theory, and in part as a heuristic device. Hass and Parkay (1993) observe that "computer-based simulations . . . permit compelling representations of reality" (p.83).

Recent computer simulation techniques combine theory, experiment, feedback, nonlinear mathematics, compressed time and space, in a *microworld* (Senge, 1990) environment. Such a controlled environment can demonstrate how the whole of a defined system is greater than the sum of its parts (i.e., synergy). A "microculture", representing the large social system (i.e., culture) interacting with the individual member of that system over time, can now be constructed to illustrate to educators the complex interrelationships of individual students as they participate in their respective cultures. Microcultures can also give educators the ability to perform experiments in diverse simulated settings (e.g., a range of ethnically diverse virtual classrooms) without committing "educational suicide" by doing the wrong thing in the real world. This

opportunity to apply recently learned strategies for culturally sensitive delivery of instruction can only reinforce such strategies, letting educators pick and choose the most appropriate teaching strategy based upon successes and failures in the simulation settings. Microcultures can react to teacher input much like real students in a classroom, giving the educator a chance to apply theory in a simulated microworld.

Hammers (1985) feels that the promise of simulation carries with it the idea that one can enter fully into the culture as a "native", without viewing the culture from the outside world as a visitor would. This in-depth viewpoint may provide the educator with a more accurate outlook of "what it might be like for a person, like himself or herself, to have been born and raised in that foreign environment than actually living there might provide" (p. 55). Simulations can also provide, through the microculture metaphor, diverse cultural settings that would be hard to address in relatively sheltered, homogenous populations of majority-group members. Byrnes and Kiger (1992) suggest that simulations "may be one avenue for sensitizing participants to the unequal treatment of many groups in our society and requiring participants to rethink their own beliefs about group differences" (p. 467). They suggest that simulations can identify prejudice as an issue so that stereotyping, for example, becomes a problematic issue rather than a taken-for-granted phenomenon, and, therefore, becomes more difficult for a participant to discount.

Another reason for using simulations in multicultural education stems from the role-playing or participation in simulations that have shown some effectiveness as a method of changing attitudes and reducing prejudice (Neves & Sanyal, 1992). Hasell (1987) reports how simulations are being used as a method for communication that allows community values to be expressed and incorporated in physical design in community projects. "It [simulations] has the potential to become an integral part of a

design theory directed toward the creation of egalitarian, responsive, and humane environments." (p. 83)

When it comes to evaluating the educator's competence in culturally sensitive delivery of instruction, not all types of simulations promise to be successful. A growing body of research has indicated that *low fidelity* simulations (e.g., written instructional problems) are inappropriate for competence evaluation (e.g., Jones, Gerrity, & Earp, 1990; Swanson, Norcini, & Grosso, 1987). Education has been using these types of simulations for years (King, 1970). On the other hand, *high fidelity* simulations (e.g., microworlds) are being used with great success for competence evaluation (Norman, 1993; Curry, Wergin, & Associates, 1993). The accuracy of high fidelity simulations make them virtually indistinguishable from real life to the typical user, even to the point where "a pilot's first real flight in a new aircraft model is often with a plane full of passengers" (Sheridan and Zeltzer, 1993, p. 22).

High fidelity simulation brings about an opportunity for the participant to master two relevant modes of cognition, *experiential* cognition and *reflective* cognition (Norman, 1993).

> Simulated experiences have the potential to become powerful instruments of cognition. They support both experiential and reflective processes: experiential because one can simply sit back and experience the sights, sounds, and motion; reflective because simulators make possible experimentation with and study of actions that would be too expensive in real life. (p. 205)

In experiential cognition, the participant's skills can be developed and refined to the point of automatic reflexive action during the simulation (e.g., an airline pilot practices the proper responses for quick, effortless emergency strategies in keeping a 747 out of trouble during a flight simulation session). In reflective cognition, the participant's reasoning and decision-making skills are developed and refined to the point that

reflective thought can be automatic before and after simulation sessions (e.g., an educator successfully predicts and thoughtfully critiques the outcomes of new culturally sensitive strategies used during a microculture simulation session). Meyers and Jones (1993), and others structure simulation sessions with reflection as a debriefing element, where the user looks at what was achieved during the simulation and how that relates to the desired outcomes. Horak (1991) states that simulations help in problem solving from the development of "awareness of and a concern for metacognitive processes" (p. 3). Thatcher (1990) argues that debriefing, using reflection as a main element, is the most important point of simulations. Therefore, the real problem-solving in a simulation takes place after the reflection component has been addressed.

Meyers and Jones (1993) report seven skill areas that can be developed and practiced using simulations: general skills (e.g., nonverbal communication), specific skills (e.g., monitoring and adjusting instructional delivery), team skills (e.g., group decision-making), problem-solving skills (e.g., a social science experiment), synthesizing skills (e.g., a multicultural problem discussed in class, but not in the text), basic empathic skills (e.g., imagining the woes of an HIV-positive student), and advanced empathic skills (e.g., reversing roles of students from different cultures in a diversity exploration simulation). Hass and Parkay's (1993) findings support the apparent benefit of increasing interpersonal skills between team members. In simulation sessions of the M-1 tank, the U. S. Army reported that during simulated stressful conditions groups of simulators were as useful for teaching teaming skills as they were for teaching the mechanics of tank operation. This second-order effect (Papert, 1993) is, arguably, "a less specific but more powerful role: By entering the culture of the school it [the computer] can weave itself into learning in many more ways than its original promoters could possibly have anticipated". (p. 53)

Computer simulation promises to help professional educators in at least five areas: to help clarify complex problems (e.g., diversity); to give educational leaders a common language on which to discuss possible solutions to identified problems (e.g., identifying culturally sensitive instruction strategies); to show the complex interrelationships between complex problems (e.g., cross-cultural commonalities); to test solutions before they are implemented, thereby saving the educator from disaster (e.g., applying culturally sensitive strategies); and to allow educators to develop successful reflexive and reflective types of behaviors (e.g., practicing culturally sensitive strategies). Simulations are powerful teaching tools (Dyson, 1992). "Real world teaching tries to avoid disasters, but in fact people can learn best through mistakes—as long as they're only simulated." (p. 142)

Some issues in multicultural education (e.g., the sociohistorical and sociopsychological relations between European-Americans and African-Americans) are too diverse to be replicated in a simulation. There is, however, the need for simulations to give facsimiles of experiences that educators could not have in the real world. "A European-American cannot fully know what it is like to be African-American and experience racial discrimination. Simulations can, however, distill cognitive, affective, and moral elements of the experience in a controlled environment." (Byrnes & Kiger, 1992, p. 467) In Boyer's (1992) fourth human commonality (i.e., the awareness of the past, present, and future) there is a defense for the study of Western culture to understand our past as a nation and the study of non-Western culture to understand our future in a increasingly diverse world.

High fidelity computer simulations have been used as effective learning tools in many areas of the military, science, business, government, and industry (Garove, Handley, and Stevens, 1975). Medicine is using simulation to allow doctors to treat theoretical patients on their computer screens and to observe the results of their decisions

(Curry, Wergin, and Associates, 1993). High fidelity simulations are necessary in multicultural education, too.

Today's computer simulation technologies promise to help educators understand culturally sensitive instructional delivery strategies. In the not-too-distant future, virtual environment technologies will allow participants in microculture simulation exercises to literally "walk a mile in another's shoes" by strapping on helmet, boots, and gloves and take a step into a "three-dimensional" microculture, along with the sights, sounds, and even smell, touch, and kinesthesia (Papert, 1993) that are missing on today's desktop computers. Such technological advances will "allow us to experience a variety of physical and social interactions not only through our own eyes but that of another" (Sheridan and Zeltzer, 1993, p. 27). Until then, there is at least one compelling reason to begin developing high fidelity simulations as microcultures, and that is to help end the prejudice we find in our increasingly diverse world.

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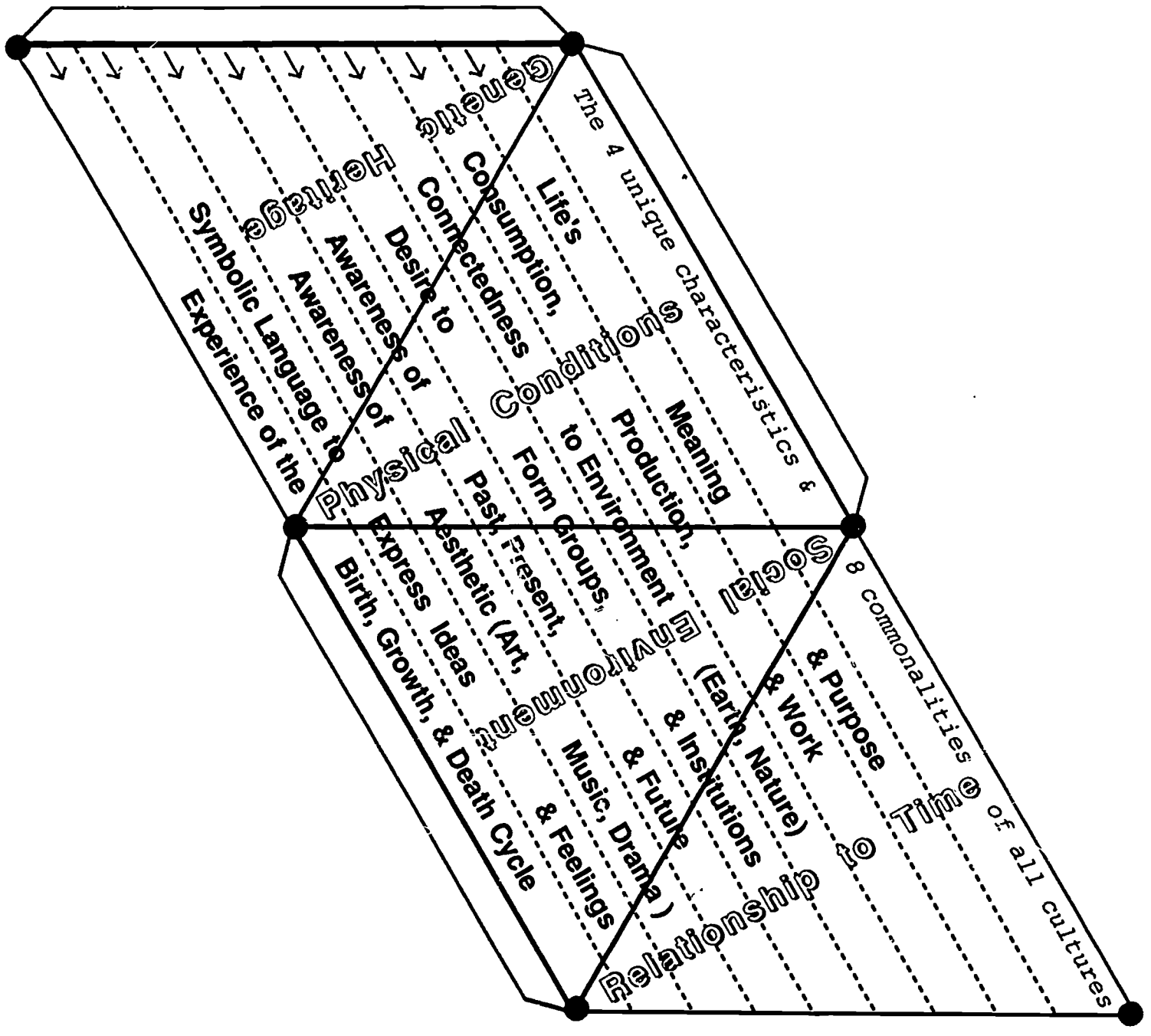
Figure Caption

Figure 1. The eight commonalities and four unique characteristics in all cultures.



Biography

The author, Jorge O. Nelson, is the recipient of a doctoral fellowship sponsored by the Office of Overseas Schools, Department of State, Washington, D.C. and Memphis State University where he is currently a graduate assistant in the Department of Leadership, College of Education. He was the former Assistant Director of the American School of Asunción, Paraguay and has previously taught at the International School in Islamabad, Pakistan and the International School in Bangkok, Thailand. He currently resides in Memphis, Tennessee with his Paraguayan wife, Mila, and their one year old son, Elias.