Developing Tools for Research on School Leadership Development:

An Illustrative Case of a Computer Simulation

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ABSTRACT

Purpose: The extant literature on school leadership development is dominated by conceptual analysis, descriptive studies of current practice, critiques of current practice, and prescriptions for better ways to approach practice. Relatively few studies have examined impact of leadership development using experiment methods, among which even fewer studies have involved a cross-cultural comparative perspective.

Design/methodology/approach: This is a methodology development paper. It discusses the feasibility of a computer simulation as a research tool for experiment studies in leadership development, with a focus on cross-cultural comparative research. Exemplary research questions, experimental design, and data analyses are illustrated.

Findings: Three categories of cross-cultural comparative research questions are proposed: comparative study of leadership expertise, comparative study of leadership development instructional approaches, and comparative study of leadership development process.

Originality/Value: This study demonstrates the research potential of a leadership development training tool and provides methodological guidance for this form of scholarship.

Keywords: simulation, experiment, cross-cultural comparison, leadership development.

The literature on school leadership development has long been dominated by conceptual analyses, critiques of current practice, descriptive studies, and prescriptive treatises (Bridges, 1977; Brundett, 2001; Bush, 2008; Hale & Moorman, 2003; Griffiths, 1988; Hallinger, 2003; Hart & Pounder, 2003; Huber, 2003, 2004; Jackson & Kelley, 2002; Leithwood, Jantzi, Coffin & Wilson, 1996; McCarthy, 1999; Murphy, 2006; Murphy & Hallinger, 1987). This literature has yielded useful information about the content, trends, curriculum designs and learning methods employed in leadership development programs in education. Yet, as noted a decade ago by Wildman (2001) there was little in way of empirical research on which to assess the efficacy of different types of programs and practices. Our own review of this literature suggests that there continues to be a scarcity of empirical studies of program impact on either participants or their organizations (Barnes, Camburn, Sanders, & Sebastian, 2010; Darling-Hammond, LaPointe, Meyerson, Orr, & Cohen, 2007; Leithwood, Bauer & Riedlinger, 2009; Leithwood, Riedlinger, Bauer, & Jantzi, 2003; Levine, 2005; Murphy, 2006; Spillane et al., 2010).

The cause for the stunted development of knowledge in this field stems, at least in part, from the modal research designs and methods that have been employed by scholars (Bridges, 1982; Leithwood et al., 1999, 2009; Murphy, 2006). We suggest that scholars will need to adopt more powerful research designs if we hope to gain greater leverage on important questions concerning the learning process and outcomes of leadership preparation and development programs. These include longitudinal, quasi-experimental and experimental designs that involve creating conditions and tracing the impact on participants' knowledge,

leadership practice, and organizations (e.g., see Camburn, Goldring, May, Barnes, Spillane, & Supovitz, 2007; Goldring et al., 2008; Hallinger, Lu & Showanasai, 2010; Hallinger & Lu, 2011; Honig & Louis, 2007; Leithwood et al., 1999, 2003, 2009: Luyten, Visscher, & Witziers, 2005; Spillane et al., 2010; Veenmana, Vissera & Wijkamp, 1998).

These observations take on added significance in light of recent international growth in school leader preparation and development programs. Whereas 30 or more years ago both scholarship and practice in this domain were concentrated in North America and Australia (e.g., Bridges, 1977; Gregg, 1969; Griffiths, Stout, & Forsyth, 1988; Hallinger, 1992; Hallinger & McCary, 1990; Hills, 1975; Murphy, 1992; Murphy & Hallinger, 1987; Walker, 1987), since the turn of the millennium the education, preparation and development of school leaders has become a global enterprise (Brundett, 2001; Bush, 2008; Hallinger, 2003; Huber, 2004; Murphy, 2006; Wallace Foundation, 2008; Walker, Chen & Qian, 2008). Yet, research that can inform program designers about the portability of training content and methods across cultural contexts remains similarly scarce.

This paper describes a research and development effort aimed at developing tools designed to facilitate experimental, cross-cultural research on the learning of school leaders. More specifically, the article describes how one widely-used computer simulation, *Making Change Happen*™ (The Network Inc, 1999), is being enhanced with the capability to gather meaningful data on the learning of school leaders. Because this research tool is still in the beta testing stage, the paper is limited to illustrative examples of how we plan to use the simulation in cross-cultural experimental research. We seek to demonstrate how technology-

enabled simulations can be employed not only to foster the learning of school leaders, but also to facilitate research aimed at understanding and extending the impact of leadership preparation and development.

Theoretical Perspectives

In this section of the paper, we begin by providing an overview of research on school leadership development. Then we examine the use of simulations in management education and research. Finally, we introduce the specific simulation employed in this research and development effort.

Research on School Leadership Development

For more than four decades scholars have observed that the range of research designs employed in educational leadership and management remains severely attenuated, with an unswerving reliance on post-hoc cross-sectional surveys (e.g., see Bridges, 1982; Erickson, 1967; Haller, 1979; Hallinger, 2011; Murphy, 2006). Table 1 shows the frequency of experimental research designs employed in studies published in eight international school leadership and management journals over the past decade. The journals published very few articles using experimental methods in general, and even fewer on the effects of leadership preparation and development. One reason for the dearth of experimental studies has been the lack of appropriate problem tasks for surfacing and measuring what school leaders know and can do (Goldring, Huff, Spillane, & Barnes, 2009). Another is the perceived difficulty in maintaining the fidelity of experimental conditions when conducting field studies (Camburn

et al., 2007; Leithwood et al., 2003). Nonetheless, since leadership education activities, courses, and programs can be conceived as types of interventions, we suggest that, despite the challenges involved, experiments and quasi-experiments (Campbell & Stanley, 1966) represent suitable research designs for exploring their impact (e.g., Barnes et al., 2010; Camburn et al., 2007; Goldring et al., 2009; Hallinger & Lu, 2011; Hallinger et al., 2010; Veenmana et al., 1998).

[Insert Table 1 about here]

There is a similar dearth of longitudinal research in studies of leadership preparation and development (Heck & Hallinger, 2005, 2009; Leithwood et al., 2009). Since the processes associated with leader learning unfold over time, they seem ideally suited to longitudinal research. Moreover, we note that both graduate and professional development programs collect copious information over extended periods of time that could be employed in longitudinal studies (e.g., see Hallinger & Lu, 2011; Hallinger et al., 2010; Leithwood et al., 2003). Yet, despite this potential, longitudinal studies in educational leadership and management are distinguished primarily by their rarity.

Another research approach generally overlooked by scholars in school leadership preparation and development research lies in the form of cross-cultural comparative research designs. Despite the increasingly global scope of interest in school leadership and its development, relatively few scholars have sought to conduct empirical comparisons of these processes across different cultures. We note a recent study by Johnson, Møller, Jacobson, and

Wong (2008) compared successful principal practices in US, Norway, and China. They reiterated that leadership practices are socially constructed and sensitive to their national historical, cultural and institutional contexts. Yet the methodology employed in this study was, as is typical in this field, largely descriptive. Indeed, when we searched for studies that combined a cross-cultural comparative focus with experimental, quasi-experimental and/or longitudinal research designs, the result was a null set. During this era of globalization of education we must become more proactive in exploring both the learning processes and outcomes of leadership preparation and development programs across cultures.

Using Simulations as Tools for Learning and Research

Simulations and games, used as long ago as the 1950s, have become increasingly common in programs of professional education (Boulos, Hetherington, & Wheeler, 2007; Cohen & Rhenman, 1961; Faria, 2001; Hallinger et al., 2010; Hallinger & McCary, 1990; Lean, Moizer, Towler, & Abbey, 2006; Raia, 1966; Salas, Wildman, & Piccolo, 2009; Scherpereel, 2005; Slotte & Herbert, 2007). Proponents have argued that simulation-based learning is closely aligned to several important goals of education in the professions. These include enhancing complex applied competencies in decision-making and teamwork, fostering skills in higher order thinking and reflection, and learning to use knowledge as a tool for problem-solving (Adobor & Daneshfar, 2006; Gary & Wood, 2011; Hallinger & McCary, 1990; Rosen et al., 2008; Salas et al., 2009; Scherpereel, 2005; Steadman, Coates, Huang, Matevosian, Larmon & McCullough, 2006). Scholars in various disciplines further

assert that computer simulations offer unique advantages in creating a problem-focused, engaging, active learning environment (Hallinger et al., 2010; Lean et al., 2006; Salas et al., 2009). Moreover, preliminary empirical studies suggest that simulation-based learning offers a superior method of helping students learn how to apply theoretical principles (e.g., Gary & Wood, 2011; Hallinger et al., 2010; Salas et al., 2009; Scherpereel, 2005; Steadman et al., 2006).

Well-designed computer simulations create a form of 'virtual reality' that challenges participants to solve high fidelity, complex, dynamic management problems (Bell et al., 2008). Participants must 'situate knowledge in a problem context' and consider the contingencies that impact on its application (Wagner, 1993). Researchers conclude that simulations are a useful means of surfacing participants' assumptions, and scaffolding the development of knowledge and skills (Hallinger & McCary, 1990; Stasser, 1988). This makes them a promising tool in a program of research and development in educational leadership and management (Berends & Romme, 1999; Hallinger et al., 2010; Salas et al., 2009).

The potential of simulations as research tools has been demonstrated in psychology (e.g., Loomis, Blascovich, & Beall, 1999), organizational studies (e.g., Harrison, Carroll, & Carley, 2007), medicine (e.g., Larson, Christensen, Abbott & Franz, 1998), and education studies (e.g., Garrison & Anderson, 2003; Hallinger et al., 2011). Simulations engage learners in a complex extended problem-solving process that challenges learners to apply formal and tacit knowledge in the development of a solution. This makes simulations ideally suited for

the purpose of examining the impact of leadership development on higher order thinking of learners.

Important contributions underlying the study of higher order thinking in professional fields have been made by scholars employing theoretical lenses from the cognitive sciences (e.g., Bransford, 2000) as well as adult learning (Kolb, 1984) and development (e.g., Kegan, 2009). Scholars adopting a cognitive perspective on leader learning have focused on the manner by which the capacity to apply knowledge and skills to the solution of problems changes and develop over time (e.g., Ohde & Murphy, 1993). A predominant research strategy employed in this domain lies in comparing the manner in which novices and experts approach and solve practical problems (e.g., Leithwood & Stager, 1989; Wagner, 1993; Yekovich, 1993). These comparisons can be used to identify both differences in content knowledge and thinking processes between the two groups.

For example, in a classic study in educational leadership and management, Leithwood and Stager (1989) compared the problem-solving processes employed by groups of novice and experienced principals. They found differences in the problem-solving strategies employed by the more experienced leaders. When solving complex problems, their thinking was guided by over-arching principles that could be applied across situations. This conclusion is similar to findings reported by researchers who have studied ‘practical problem solving in other professional fields (e.g., Wagner, 1993; Yetkovich, 1993).

Sugrue (1995) configured the knowledge structure necessary for successful complex problem solving into three levels: understanding facts and concepts, understanding principles (i.e., the relationship between concepts), applying concepts and principals to conditions and procedures. A meta-analysis of assessment studies of the effects of problem-based learning (Gijbels, Dochy, Van den Bossche, & Segers, 2005) revealed that 77% of sampled studies assessed learning outcomes in terms of concepts-level effects, 42% of the studies assessed principle-level effects, and 20% assessed application-level effects.[i] The study also found that the first two levels of knowledge were often measured by progress tests, multiple-choice questions, oral examinations, whereas the third level of knowledge was mostly measured by open-ended essay questions, performance on genuine tasks, or standardized simulations. An important finding from this meta-analysis was that different instructional approaches produced differential effects depending upon the level of knowledge being measured. More specifically, they found that problem-based learning produced its most powerful effects at the level of learning principles that underlie the application of knowledge to professional practice.

Although the Gijbels et al's (2005) review was limited to studies of problem-based learning, scholars have suggested that computer simulations offer a similar advantage in developing the higher order thinking of learners (Gary & Wood, 2011; Hallinger et al., 2010; Salas et al., 2009; Scherpereel, 2005; Steadman et al., 2006). Indeed, we further assert that simulations also offer the capacity to collect more meaningful data on the knowledge acquisition of learners than paper and pencil tests. Simulation software can be programmed to

track the sequence and types of decisions made by the learners as well as by measures of their success in solving simulation problem. These types of information can offer useful measures of the learning process and outcomes.

To date, researchers have used this approach to study information flow in group decision-making (Larson, Christensen, Abbott, & Franz, 1998), as well as social norms and behaviors of teams (Yee, Bailenson, Urbanek, Chang & Merget, 2007). We wish to suggest, however, that there is even greater untapped potential in using simulations as research tools. In the next section we show how this is possible in the context of a specific simulation used in leadership preparation and development programs.

The Making Change Happen™ Simulation

The *Making Change Happen*™ (The Network Inc, 1997) computer simulation has been used in training programs with more than 10,000 leaders over the past decade. Initially designed for use in North America, the simulation has been adapted for multiple cultural and linguistic contexts (e.g., Netherlands, China, Thailand, Korea). Originally the simulation was played as a 'board game' with cards and movable pieces (Author, 2007). A decade ago, the simulation was programmed into a computer version that could be played as a stand-alone software application (i.e., installed on individual computers). Most recently, the simulation has been redesigned into an online version which offers advantages both in terms of accessibility for use in education programs as well as in collecting data for research. Thus, as we shall elaborate, when the on-line version is played anywhere in the world, it will generate

an data file that includes a variety of information related to the learning process and outcomes.

Overview of the simulation as a learning tool. In the *Making Change Happen*™ simulation, the new Director of the Best School System (BSS) is implementing reforms in teaching and learning, school management systems, and information and communication technology. Foremost among these changes is a new learning technology system (IT 2020) that will enable teachers to communicate and access information more easily, and integrate learning technology into teaching and learning activities. When playing the simulation, each team of learners is placed in the role of a project implementation team. The team is responsible for developing a strategy for implementing IT 2020 over a three-year period of time in a virtual school system. The strategy is aimed at raising staff awareness of the change, creating a broad base of interest, enabling new skills, and supporting staff use of IT 2020 in their daily work. The simulation game board is presented in Figure 1.

[Insert Figure 1 about here]

During the simulation, the learners encounter a range of 'typical obstacles' to change including budgetary constraints, lack of administrative support, uneven levels of staff interest and skills, and political resistance. The players use a budget to implement activities that are intended to engage and support the staff as they come to terms with this innovation (see the right side of the game board in Figure 1). As the team implements its change strategy, it

receives continuous feedback in the form of staff movement through the stages of change, as well as explicit narrative responses.

A ‘successful change strategy’ will result in most of the staff reaching the ‘Routine Use’ level of use of IT 2020 as well as a substantial increase in the number of ‘Bennies’ (i.e., performance benefits). At the end of the simulation, the team receives an assessment of its level of success based upon the number of staff who ‘changed’ (i.e., staff in Routine Use Stage) and improvements in school performance (i.e., Bennies).

The decision rules embedded in the simulation are based on several complementary theories of organizational change (e.g., Crandall, Eisemann, & Louis, 1986; Hall & Hord, 2002; Kotter, 1996; Rogers, 2003). For example, the descriptions and actions of staff are based on Roger’s (2003) adopter type theory. Patterns in staff responses to change over time incorporate principles derived from Hall and Hord’s (2002) CBAM model. Effective strategies can also be represented in terms of Kotter’s (1996) sequence of strategic organizational change. We emphasize, however, that these theories are not obvious (.e., labeled). Nor are they introduced to learners in advance of playing. Instead, they represent a form of embedded knowledge that learners access as they gain experience in managing change in the context of the simulation.

Thus, the computer simulation combines features of problem-based (Bridges & Hallinger, 1995) and experiential learning (Kolb, 1984). As learners play the simulation multiple times, they begin to ‘see patterns’ in the form of sequences of activities that combine

to overcome the various obstacles to change. Gradually, the knowledge base that underlies successful change strategies becomes apparent to the learners. The learning sequence employed with the simulation enables students to construct principles of successful change and compare these both to their personal experience as well as to formal theories.

As noted the focus of change in the simulation is implementation of a new IT system. However, the simulation has been designed so that the lessons in change management learned by students are broadly applicable to many other types of change efforts. These include implementing a new curriculum, other innovations in pedagogy, a school merger, or new performance appraisal system. Moreover, as suggested earlier, the simulation has been adapted for different organizational (i.e., business and school) and cultural contexts. These adaptations have involved revisions to text describing the context, as well as decision rules, and language (see for example, Hallinger & Kantamara, 2001)

Developing the research capacity of the simulation. Recently two significant changes have been made to the simulation. First, as noted above, the simulation has been reprogrammed from a stand-alone CD Rom application to an online internet-based application. This not only solved the problem of supporting multiple versions (e.g., school and business), languages, and platforms (e.g., Mac, PC, Linux), but potentially increases accessibility during a global expansion in school leadership development.

The second revision was to reprogram the simulation with the capacity to unobtrusively collect data on the process and outcomes of leader learning. As we shall

describe in detail, the simulation is able to track the sequence of decisions that each team (or individual) makes as it plays the simulation, as well as their results. This information can be captured and saved as a data file. The 'data' can then be employed in understanding features of the learning process and outcomes.

When the two types of revision are taken together, the potential of the simulation as a research tool becomes more apparent. In the new online version, each simulation session played by a learner of team of learners anywhere in the world is saved as a data file comprised of information that can be analyzed. Moreover, as implied earlier, it is typical for learners to play the simulation anywhere from five to 50 times. Thus, it is possible not only to compare data profiles across individuals, but also over within individuals over time. That is, one could examine the learning trajectory of an individual or team that plays the simulation 10 times, thereby offering insight into how knowledge develops. Of course, this could also be compared across individuals.

The combination of online accessibility to the simulation and data collection capacity on key facets of leader learning means that the simulation can be used as an efficient tool in the study of leadership development across different national contexts. For example, we were recently approached concerning the availability of advanced assessment tools for use in a research and training project with school leaders across a half dozen European countries. The simulation would appear to offer a different type of value when compared, for example, with self-report or even 360 degree paper and pencil assessments. In the following section of the

paper we describe how the simulation could be employed in a program of cross cultural research on leader learning.

Illustrations of Simulation-Enabled Research on Leader Learning

In this section of the paper, we seek to demonstrate the types of research questions and designs that could be addressed by employing the *Making Change Happen*™ simulation as a tool for cross-cultural comparative research. For each cluster of research questions we will demonstrate how the simulation could generate relevant data. Then we provide an illustrative example of how such data could be analyzed.

In this era ICT is taking on increasing importance as a solution for professional learning. We believe that this offers new possibilities for accessing types of data that were previously difficult to obtain. The fact that the data are generated unobtrusively, and without any change to the learning process is another advantage. In this section we will illustrate how tools such as this computer simulation can make simultaneous contributions to both professional learning and research on leadership development.

Understanding Novice-Expert Differences in School Leadership Development

As a result of the gap between reform in educational policy and practice, a global consensus has emerged on the need of designing effective training program for school leaders. As noted earlier, this has led to considerable experimentation with different approaches to administrator preparation and development. However, without an empirically-tested knowledge base, the content school leaders should receive in training remains

contested. Simply stated, the voluminous literature in this field offers little or no guidance concerning either what leaders should learn or how to ensure the retention and transfer of meaningful knowledge to the workplace.

Over the past two decades, researchers focusing professional learning have made a useful distinction between the content knowledge and skills underlying effective practice (Ohde & Murphy, 1993; Wagner, 1993). In the teaching domain, this led scholars to focus not only on the development of teaching skills and behaviors, but also on ensuring that teachers possessed the domain specific knowledge relevant to their subject (Bransford, 2000). Moreover, over time it became clear that these could not be divorced from one another. Teaching skills and knowledge of the subject go hand in hand. The same appears to hold true in administrative work (e.g., see Leithwood & Stager, 1989; Ohde & Murphy, 1993; Wagner, 1993).

Important contributions to knowledge concerning the nature of professional learning in a variety of field were made by studies that examined the application of knowledge by experts and novices when solving problems (Bransford, 2000). This body of cross-disciplinary research highlighted differences in the capacity of experts and novices to identify underlying problems, recognize cues and patterns in problem contexts, and apply their knowledge in the form of meaningful solutions. These have also been used to inform our understanding of how expertise develops among professionals.

Research questions. Expert novice research in educational leadership and management can be traced back to the classic study conducted by Leithwood and Stager (1989). Using an interview methodology, they compared the responses of novice and experienced principals to a variety of problem scenarios. They found that the experienced principals were able to discern underlying problems and patterns in the case problems. They attended to the more important cues and were less distracted by less relevant events. When faced with ambiguity, they were able to use their values to formulate a coherent strategy for problem resolution.

We believe that the simulation can be employed as a more powerful tool for data collection on similar research issues. Rather than asking people to tell us "What would you do?" the simulation allows us to capture the active decision of the leaders in solving a complex problem. Since the simulation is grounded in specific theoretical constructs of change management, we are able to asses both problem-solving processes and application of knowledge. Using the simulation we could address questions such as the following.

1. *Are there differences in the outcomes of experts and novices in their simulation results (i.e., ability to solve the problem)?*
2. *In what ways do the change strategies employed by experts and novices differ when solving the problem in the simulation?*

Research Design. This study could employ a quasi-experimental design with one between-subjects factor. The study is labeled "quasi-experimental" because the participants are not randomly assigned to differentially manipulated conditions; instead, the participants

are classified according to a preexisting characteristic (i.e., novice or expert status). A weakness of this type of quasi-experimental design may be that "the independent variable is confounded with extraneous variables so that researchers do not know whether any change in the dependent variable is actually due to variation of the independent variable" (McGuigan, 1997, P. 320). Nonetheless, it is still a useful design, especially for social scientists, to infer causal relationship between an independent variable and dependent variable when randomized treatments are not possible (Campbell & Stanley, 1966).

Regarding the measurement of variables in the illustrative research, participants' novice/expert status can be coded from the strategy record. Their performance scores and levels can also be directly retrieved from the data saved at server. Specific conceptual variables derived from change theory (e.g., creating a sense of urgency, vision formation and communication, coalition building etc) can be operationalized in the simulation.

Through analysis of the decision sequence tracked by the computer, the conceptual variables can be coded into continuous numerical variables and thus measured. Using this approach, we can compare the strategies of the expert and novice principals. Since this type of quasi-experimental design contains only one between-subjects factor, we could perform a *t* test to test the propositions whether expert school leaders perform better and different change strategies than novice school leaders.

Cross-Cultural Study of Approaches to Leadership Development

As a result of the gap between reform in educational policy and practice, a global consensus has emerged on the need of preparing more adept leadership at the school level. This has led to a new focus on the training of school leaders throughout the world. However, the fit between instructional approaches in use and the cultural orientation of learners across different societies remains a concern for researchers as well as for instructors (Coleman, 1996; Hu, 2002). This issue has taken on increased relevance with the global spread of curricula across different societies. The portability of content knowledge and instructional approaches used in these programs have both been called into question.

For example, in the past it was often been assumed that Asian learners prefer rote learning and teacher-directed instruction. Scholarly discourse suggests that active learning approaches conflict both with the Asian student's beliefs about the purposes of learning and normative hierarchical relationships that exist between teachers and learners (e.g., Hu, 2002). Despite these assertions, two different cross-culture empirical studies found little evidence indicating that the structure of learning process in Asian learners is different from Western learners (Kember, 2000; Watkins, Reghi, & Astilla, 1991). Moreover, in the practical higher education teaching context in East Asia, instructors often find themselves at a loss as to how to engage students actively in their learning.

Yet both interview and survey studies conducted in Asia revealed that these cultural characteristics do not necessarily hinder student from engagement in active learning approaches. For example, better learners do not see memorizing and understanding as separate, rather, they believe repetitive learning enhances retention and understanding (Biggs,

1996; Biggs & Tang, 2007; Watkins, 2000). It is also noted that, in contrast with Western learners whose intrinsic motivation is treated as the precursor of deep learning, Chinese learners are more likely to be activated by a mixed motivational stream. This is comprised of "personal ambition, family face, peer support, material reward, and, yes, possibly even interest" (Biggs & Watkins, 1996, p. 273). In collectivist cultures, these are high levels of achievement motive, rather than extrinsic forms of motivation that would in turn depress intrinsic learning motivation (Kember, 2000). Additional studies have documented that Asian learners are more likely to attribute success to effort and persistence (Biggs, 1996; Hess & Zauma, 1991; McClure et al., 2011).

Research questions. Thus we have reasons to believe that some of these Asian cultural characteristic may act as positive advantages rather than constraints in the implementation of active learning. With the aid of the simulation, researchers could verify the following research questions:

1. *Are there differences in the learning effectiveness of the simulation between Asian and Western school leaders?*
2. *Are there differences in instructional effectiveness of simulation-based training between Asian and Western school leaders?*

Research Design. Again we could adopt quasi-experimental design with one between-subjects factor to test whether Asian and Western school leaders receive leadership training approach differently. This time the independent variable is culture (Asian vs. Western), whereas dependent variables are learning effectiveness and instructional effectiveness.

Research actually use the simulation as a training tool, and deliver the same set of training to both Asian school leaders and Western school leaders, and then compare their efficiency in reaching some objective learning goals and their evaluation of instructional effectiveness.

Participants' learning effectiveness initially is indicated by the extent of meeting the goals prescribed in the simulation, i.e., performance scores and levels at the simulation. Additionally, learning effectiveness can be measured using summative assessment. Participants may be asked write up a strategy paper that describe, analyze and evaluate their change strategies used on the simulation. Instructors judge the extent that participants have mastered key knowledge points. Participants' instructional evaluation of instructional effectiveness could be measured by end-of-training questionnaire. The questions may ask about general evaluation of instructional effectiveness, as well as specific aspects of instructional effectiveness such as content design and participants' engagement. Researchers could use *t*-test for independent groups to test the propositions whether simulation-based training is a effective learning and teaching method for both Asian and Western school leaders.

Cross-Cultural Study of Leadership Development Process

By employing the simulation, we could also explore learning trajectories of Asian and Western school leaders. In Asian schools, institutional and cultural norms have traditionally supported a centralized model of leadership with formal and informal authority located in the principal (Cheng & Walker, 2008; Dimmock & Walker, 1998; Hallinger & Kantamara, 2000;

Hallinger & Lee, 2011). It has been asserted that Asian school leaders tend to adopt a `top down approach in change implementation. More specifically, it has been observed that greater centralization of formal authority and cultural influence among formal leaders (e.g., school principals) creates a tendency to forego information giving and interest building among staff during the early stages of the change process (Hallinger & Lee, 2011). Some scholars and practitioners regard this as a key obstacle for successful change implementation due to school leaders' inability to interest, motivate, and mobilize teachers to change (Hall & Hord, 2002; Hallinger & Lee, 2011; Kotter, 1996).

Research questions. Here we compare the use of *Communication for Change* (a strategy opposed to top-down approach) in the change management strategies of expert and novice principals across cultures as a means of exploring patterns of leadership and learning across cultures. The related research questions might include the following.

1. *How do the Communication for Change strategies of expert and novice principals compare in the American context?*
2. *How do the Communication for Change strategies of expert and novice principals compare in the East Asian context?*
3. *How do differences in the Communication for Change strategies of expert and novice principals compare between American and East Asian contexts?*
4. *Are there differences in the rate at which novice principals learn more effective Communication for Change strategies across the two different cultural contexts?*

As suggested above, we hypothesize that Asian school leaders would tend to employ a higher incidence of top-down change strategies. These strategies would feature less communication and emphasize one-way information giving more than interest-building.

Although this pattern of *Communication for Change* would be also be most apparent among the novices in both groups, we predict more rapid learning among the Western novice leaders due to more conducive cultural norms supporting communication across levels (e.g., lower power distance).

Research design. A mixed methods quasi-experimental design with both between-subjects and within-subjects factors can be employed to address this research question (Seltman, 2012). The between-subjects factors are the cultural background of school leaders (e.g., East Asian vs. American school leaders) as well as novice or expert status of school leaders. The within-subjects factor is the longitudinal effect of culture on learning over time. The dependent variable is participants' learning of the Communication for Change strategies.

The conceptual definition of *Communication for Change* is, the density and breadth of activities employed by leaders to convey the purposes and goals of change, understand and address personal and professional concerns of staff, and motivate staff to positively engage the change. Within the context of the simulation in which the school system is implementing new learning technology, we can operationalize this variable as the presence of specific activities or sequences of activities that fulfill the requirements of this definition. We should further note that within the simulation, we define a 'change strategy' as the cumulative sequence of decisions made by learners to implement the new learning technology.

As noted above both density and breadth of communication are incorporated into our definition of *Communicate for Change.* For example, activities that can be used to

Communicate for Change include Talk to (Staff) once, twice or three times, distributing Written Information about IT 2020, holding a Presentation about IT 2020, Holding an IT 2020 Demonstration with staff, or taking staff on a Field Visit to other schools. We are able to program the simulation to track the 'change strategies' of the learners by taking into account 1) the number of communication activities employed, 2) their density (e.g., how many and which of the staff the leaders Talked To), and 3) the sequence of activities (i.e., interest-building activities such as the Demonstration and Field Visit *should* be conducted *after* initial informational-giving activities such as Written Information and Presentation). The rationale underlying these measurement decisions can be linked directly to theories of change (e.g., see Hall & Hord, 2002; Kotter, 1996).

It is normal for learners play the simulation multiple times during a training program (Hallinger, 2007; Hallinger, Lu & Showanasai, 2010). During the first couple of attempts, the learners rely upon their *tacit knowledge* to address the task (i.e., implementation of IT 2020) and solve the problems that they encounter over the three year period of change. The instructional sequence used with the simulation does not present theoretical knowledge in advance but rather invites learners to 'learn from their experience' in playing the simulation (Kolb, 1984). Gradually, new knowledge shared through several channels (e.g., instructor debriefing, sharing among learners themselves, reading, powerpoint) is integrated by the learners as they continue to play the simulation.

Each simulation session will generate a data file or record for each learner. Thus, if a learner plays the simulation five times, it is possible to track the trajectory of learning through

changes in the strategy employed by the learner 'over time' (i.e., across the several simulation sessions). These represent 'repeated measures' that can be analyzed within and across individuals, as well as within and across groups (e.g., within novice Asian principals, between Asian Novice and Expert principals etc.).

In addressing the research questions posed above, we would proceed through as sequenced set of descriptive and inferential analyses. These start with analyzing the characteristics of each group, and then formulating comparisons of novices and experts within cultural groups. Then analysis would move on to comparing the 'initial state' of the contrasting cultural groups, and then the learning trajectory of the contrasting groups. These analyses would provide insight into whether Asian school leaders adopt different *Communication for Change* strategies at an early learning stage, and the extent to which cultural norms create barriers to learning strategies. Mixed-effects model analyses can be employed to explore the learning trajectories of school leader learners and test for differences between two cultural groups and (Heck, Thomas, & Tabata, 2010; Seltman, 2012).We would expect not only differences in the initial state of experts and novices across the two cultural groups, but possibly slower rates of learning approaches that conflict with deep-seated cultural norms.

Discussion

Although recent research highlights the potential of active learning approaches such as problem-based and project-based learning, simulation-based learning, cooperative learning, the model methods of conducting studies of professional learning are inadequate to

assess their impact on learners. Experimental and quasi-experimental studies in educational leadership and management are ‘rare events’ (Bridges, 1982; Erickson, 1967; Haller, 1979; Hallinger, 2011)), as are cross-cultural comparative studies. Cross-cultural comparative experimental studies are simply not to be found in our field. Along with others, we ae assert that the increased investment of funds into the professional learning of school leaders demands the use of more powerful research tools that are capable of assessing the impact of different approaches on the contextualized application of knowledge among learners. We use the term research tools to include research designs, methods of data collection, as well as data analysis.

Scholars also underscored the importance of assessing leadership expertise in terms of higher level application of knowledge. We propose that computer simulations represent a promising tool for assessing higher levels of knowledge and conducting experimental research with a cross-cultural comparative focus. Using the *Making Change Happen*™ simulation as an example, we demonstrated three categories of questions in leadership development research that could be undertaken within this frame of reference using more powerful research designs.

These illustrative research questions draw on three important aspects in leadership development: the basis of leader expertise, instructional approaches employed in leadership development, and internal learning process of school leaders. Across the three categories of research, the primary role of the simulation varies. In the first category of research questions, the simulation functions as application problem for school leaders to articulate their higher

level of expertise. In the second category of research questions, the simulation primarily functions as a training tool. In the third category of research questions, the simulation still primarily functions as a training tool, yet the focus shifts towards a longitudinal assessment of change in knowledge structure over time.

With the potential and advantages of simulation as a research tool being said, possible disadvantages of experimental research strategies should also be noted. Various extraneous variables (e.g., maturation, instrumentation, history) can threaten the internal validity of results (Campbell & Stanley, 1966). Further, the role domains of school leaders are multi-faceted, *Make Change Happen* is a specialized computer simulation in school change, while it provide a common "ruler" to compare and contrast the assumptions, knowledge, and skills of school leaders in the domain of school change, for researchers who are interested in other role domains of school leaders such as improving student learning, shaping learning culture at schools, or turning around failing schools, this simulation may not be an ideal one.

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Table 1. Use of Experimental Methods in Research Published in School Leadership and Management Journals, 2000-2011 (*N* of Articles)

Jnl/Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
EAQ	1		1									1
EMAL												
IJEM												
IJLE			1									
JEA												
LPS												
SESI					1	1	1	2		1	1	1
SLAM						1						

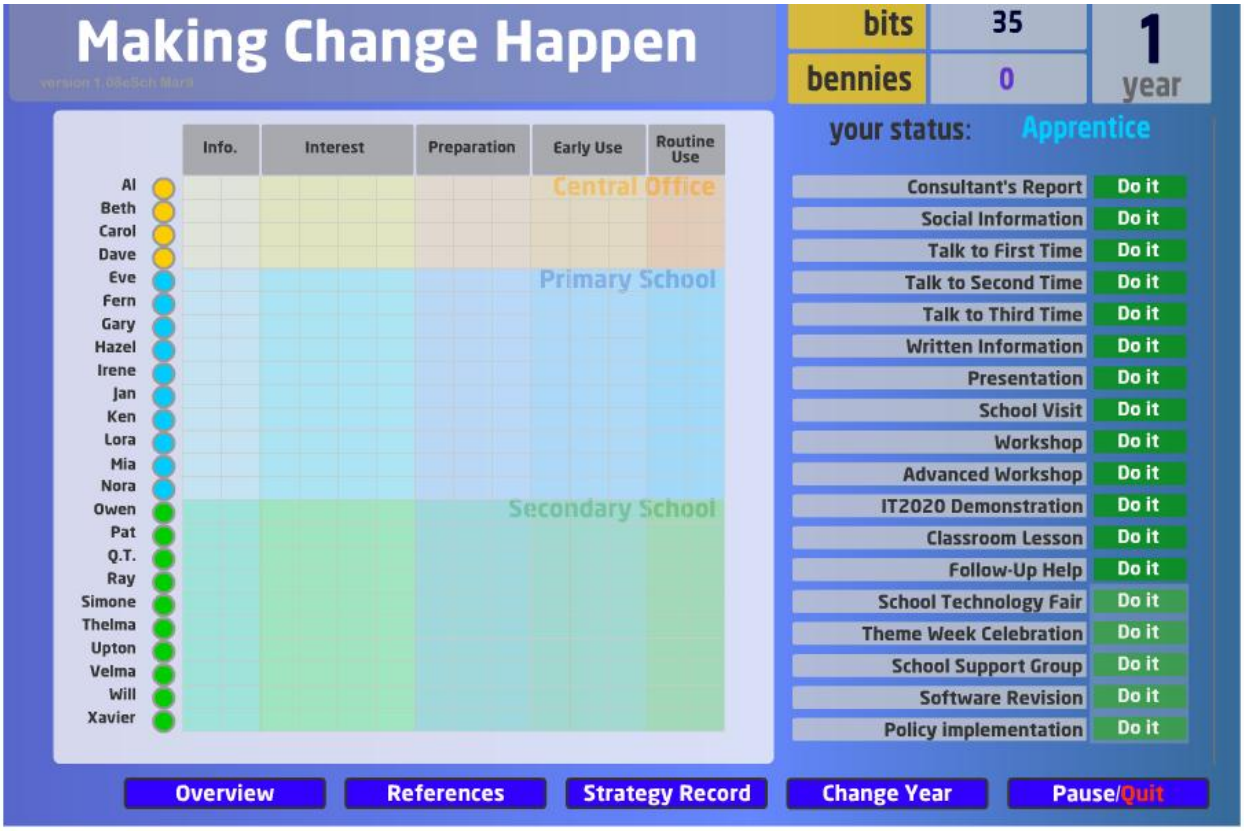

Figure 1. Game Board of the *Making Change Happen*™ Simulation

[i] The percentages added up to 139 because some studies presented more than one category of effects.