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# Using Simulation-Based Training to Enhance Management Education

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*We suggest that simulation-based training (SBT) offers many advantages as an approach for management education, and in an effort to guide and encourage its appropriate use, we provide several practical guidelines regarding how best to implement simulation-based training in the classroom. Our hope is that these guidelines will increase the use of high-quality SBT interventions in management education, and consequently, improve the performance of management and organizations alike.*

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Imagine the following scene: A newly promoted member of a management team at a company sits down at their very first team meeting. The team has been tasked with deciding how to allocate the budget for a newly acquired project. As the team begins to discuss the budget, the newest member thinks, "It feels like I have been here before." Because of this feeling of familiarity, rather than sitting back and getting a feel for how this process occurs, without hesitation, the new member quickly engages in the discussion and starts contributing new ideas and expertise to the group. Why would this newest member of the management team feel experienced in this situation and consequently jump right into the mix? Because several years earlier, while earning a management degree, he or she participated in a simulation-based training (SBT) exercise focused on decision making in top management settings prior to being appointed to the current management team. By engaging in a simulated scenario similar to the scene described, the newest addition was able to contribute to the effectiveness of the group more quickly and openly. Simulation-based training allows for the development of management skills at a much faster pace than usual, making it an ideal technique to use in management education programs.

Schoolhouse management education and training represents a perfect opportunity for infusing SBT approaches to improve the quality of our busi-

ness professionals earlier in their careers. More and more professionals are starting their careers with advanced degrees (e.g., MBA) and entering the workforce with a great amount of academic learning. This is promising in terms of management development, but it is important to note that earning an MBA or other graduate management degree does not necessarily guarantee that students are gaining practical management experience during their schooling. Furthermore, students entering the business arena directly after undergraduate education are often severely lacking in practical experience. Consequently, we suggest that the continuum of technologies that can be considered SBT could be used in a variety of ways to develop management skills both in undergraduate and graduate management programs to give students the hands-on practice they need before they enter the corporate world.

Management simulations have been becoming increasingly more prevalent in the education system over the past several decades (Dale & Klason, 1964). In accordance with this, many critiques and reviews regarding management and business simulations have been produced (e.g., Adobor & Dane-shfar, 2006; Faria & Nulsen, 1996; Fripp, 1997; Lean, Moizer, Towler, & Abbey, 2006; Romme & Putzel, 2003; Summers, 2004). However, the majority of the literature focusing on simulation in management education is descriptive rather than prescriptive.

In other words, it describes the current state of simulation technology in management education and what types of simulations are used, but does not provide guidance as to how to most effectively utilize SBT to develop the skills of management students. Therefore, we simultaneously make a case for why SBT should be used more frequently in management education and training in the schoolhouse, and, more importantly, provide some guidance regarding how best to use SBT for this purpose.

Toward this overarching goal, we take three main directions. First, we briefly define and describe SBT in order to build some foundational knowledge behind the use of simulations in management education. Second, we discuss the unique advantages of SBT as a practice-based training approach with a focus on how it can enhance management education in particular. Third, we provide several practically oriented principles for the effective implementation of SBT in management education. Finally, we conclude with several emerging areas of research regarding the use of SBT in management education and a few final remarks.

#### WHAT IS SBT?

Simulation-based training encompasses a continuum of technology intended for training purposes. *Simulation*, in general, is any artificial or synthetic environment that is created to manage an individual's (or team's) experiences with reality (Bell, Kanar, & Kozlowski, 2008). Training is the systematic acquisition of attitudes, concepts, knowledge, rules, or skills that should result in improved performance (Goldstein, 1991). As a consequence, *simulation-based training* can be conceptualized as any synthetic practice environment that is created in order to impart these competencies (i.e., attitudes, concepts, knowledge, rules, or skills) that will improve a trainee's performance. Simulation-based training is just one training approach that particularly focuses on providing trainees with the opportunities to develop and practice the required competencies and receive feedback (Salas et al., 2008).

For the sake of understanding and clarity, the continuum of extant SBT techniques can be loosely grouped into three primary categories: role-playing simulations, physically based simulations, and computer-based simulations (Summers, 2004: 209). The simplest form of simulation, role-playing, does not use any sort of computer program or technology, but instead requires participants to engage in fictional business situations. These types of simulations usually do not require any sort of physical equipment and are more focused on replicating real-life problems for the par-

ticipants to address behaviorally. For example, imagine a class of MBA students practicing their presentation skills by giving the class a fictional business briefing. This could be considered a type of role-playing simulation aimed at developing public speaking skills. Another example of a role-playing simulation is the BaFá BaFá simulation created by Simulation Training Systems (Summers, 2004: 210). In this complex role-playing simulation, students are divided into groups that represent two cultures, and the students assume the values of their respective culture in order to build an awareness of how culture can influence people in organizations, and how to respond to individuals from different cultures.

At the next level, physically based simulations require the participant to interact with some physical representation of a business, usually in the form of a board game or a card game. For example, the business simulation known as MERKIS (Strauss, 2006) uses a small scale model of a factory to simulate a business. Students are separated into teams, and each team has a physical factory floor with production machines to manage. The simulation requires the students to set goals, make purchasing decisions, manage their time, and track their progress (Strauss, 2006). In another physically based simulation known as Tinsel Town (Devine, Habig, Martin, Bott, & Grayson, 2004), students take on the role of a top management team of a fictional movie studio and use paper handouts (e.g., screenplay packets, profit sheets, recommendation sheets) to make decisions regarding which screenplays to produce and how to make the most profit.

Finally, computer-based simulations, as the name implies, involve some level of computer technology. This category includes a wide variety of simulation technologies, ranging from basic PC-based simulations (e.g., flight simulation PC game) to full motion simulators (e.g., space flight simulators for NASA training) and virtual reality. This is the most commonly utilized type of SBT in management education, and many commercial PC-based management simulations have been developed and marketed. For example, the game Bank President created by the Lewis Lee Corporation is a PC-based simulation of a banking business in which teams of students perform all of the duties required to manage a bank, such as purchase, sales, and lending decisions (Koppenhaver, 1993). Students are able to check reports remotely regarding their gameplay and interact with other team members via the Internet.

Regardless of the type of SBT used in management education (i.e., role-playing, physically

based, or computer-based), SBT at its core is first and foremost a training and learning methodology. Therefore, the purpose of SBT for management education remains constant across the three categories: to impart to management students the competencies (i.e., knowledge, skills, and attitudes) that will ultimately improve their performance and the overall performance of the organizations that eventually employ them. Due to its practice-oriented nature, SBT provides many advantages as a management education tool. In the following section, several of these advantages are described in further detail.

### **ADVANTAGES OF SBT FOR MANAGEMENT EDUCATION**

As previously mentioned, SBT is one of many potential approaches for delivering training to a population of learners. As a hands-on practice-based training approach, however, SBT presents a variety of advantages both in absolute terms and in comparison to other training methodologies. We delineate several of these distinct advantages that make it an ideal supplement for improving the quality of management education. Again, it is important to note that we are not suggesting SBT is so superior that it should replace all existing training or learning interventions used in management education, but instead, SBT presents an advantageous opportunity for enhancing and improving existing management curricula.

#### **SBT is Superior to Other Training Strategies for Imparting Complex Applied Competencies**

One of the most common criticisms of management education, and education in general, is the tendency to focus on the teaching of theory, but not on the application of that theory to practice (Lane, 1995: 610). This is where SBT can provide the biggest advantage in that a well-designed simulation can potentially impart both theory and practice simultaneously. The nature of managerial work, in general, lends itself to simulation-based training because so many of the skills and competencies necessary to be a successful business manager are only acquired through practice. For example, leadership skills, strategic decision making, and effective communication are all behavioral skills that cannot be truly developed simply through knowledge-based training methods. While lecture- and paper-based materials are necessary and effective in terms of imparting declarative knowledge (e.g., facts, basic conceptual information) of managerial practices to students, SBT provides a setting in which management students can comfortably and

purposefully apply that knowledge and practice more complex skills, leaving them more prepared to enter the workforce after graduation. In a recent review examining the superiority of management simulation games to other learning approaches, Wolfe (1997) concluded that across many empirical studies, management simulations produced more learning than the case study approach for management education.

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#### **SBT Can Lead to Learning in a Reduced Time Frame**

SBT accelerates the development of expertise. Traditionally, the majority of skills necessary for effective management are developed slowly over the course of a career via on-the-job experiences. Simulations can allow for quicker development of these skills because of their ability to collapse time and space (Lane, 1995). For example, a simulation can be used to replicate multiple decision-making situations over just a period of a few hours and can provide rapid, concrete feedback after each decision episode. This SBT characteristic is critical for the development of decision-making skills in particular because it is often difficult to track and manage decision-making processes in the real world (Keys & Wolfe, 1990). In a simulated environment, however, the learning curve can occur at an accelerated pace, as students engage in decision-making processes and adjust their strategies because feedback is immediately provided. This advantage of SBT allows for management students to gain skills and competencies that are normally only gained over years of experience in a much shorter span of time.

#### **SBT Provides a More Complex and Realistic Learning Environment Than Other Training Strategies**

One clear advantage of SBT is that simulations can provide a complex model of reality within which trainees can practice their skills and competencies (Cook & Swift, 2006; Lane, 1995). If the simulation is complex enough, this rich environment makes the simulated situation more realistic,

and therefore, the learning is more applicable to later performance in the industry. A main goal of simulation is to mimic real-life situations, and therefore, SBT allows for learning to be grounded in a context that is directly relevant to the management students. Unlike lecture- or text-based training materials, SBT allows the trainee to apply knowledge and skills to a realistic problem and witness the outcome firsthand. For example, if management students are enrolled in an interpersonal communication course, they will only be able to develop their communication skills by engaging in the act of communicating directly. While listening to a lecture about various approaches to communication may be helpful for imparting a general knowledge regarding communication, the student will ultimately need to practice these skills to become a skilled communicator.

Bell, Kanar, and Kozlowski (2008: 1420) list immersion as one of the core benefits of SBT. *Immersion* refers to the sense of realism that a simulation elicits. It is important to note that immersion does not necessarily mean that the simulation is physically realistic, but rather that the simulation replicates the basic underlying psychological processes that would occur in the intended transfer setting. The potential for immersion in SBT can enable management students not only to engage in the training situation more readily, but also prompt relevant emotional responses during training that may be critical to the gaining of new competencies (Lane, 1995).

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### **SBT More Readily Allows for Reality To Be Simplified and Manageable**

While SBT allows for the complex modeling of reality, simulations also allow for reality to be simplified enough to make training manageable and the game playable (Cohen & Rhenman, 1961; Cook & Swift, 2006). Simulations provide a balance between the complexity of the real world and the simplicity of other training strategies. For example, it can be difficult to use real-world business situations as training scenarios when there are so many contextual factors influencing outcomes, and therefore, outcomes cannot be immediately

measured and related back to the trainee's actions as feedback. Conversely, simpler educational strategies such as lectures or demonstration videos allow trainees to hear about or observe effective management skills, but do not allow them to actually *practice* the skills themselves. This balance between complexity and simplicity makes the SBT environment realistic enough to stimulate critical thinking and allow the trainee to apply knowledge in a practical way, while still giving the trainer enough control over the situation to guide learning in the desired direction.

One particular type of simulation that focuses on this simplification of reality is known as synthetic task environments (STEs). STEs are usually designed to be lower in physical fidelity, and may not even directly replicate the referent task, but reproduce the core behaviors and cognitions of interest, making them ideal for management education. In other words, while STEs may replicate less of the mundane aspects of reality, the task is designed to maintain cognitive fidelity. Many of the PC-based business simulation games that have been commercially developed and used in management education (e.g., Airline; Smith & Golden, 1987) can be categorized as STEs. Overall, this compromise between manageability and realism makes SBT an incredibly practical and advantageous training tool for management educators.

### **SBT Provides a (Relatively) Risk-Free Environment for Learning and Experimentation**

One common responsibility of management members is to handle crises and unexpected events at a high level within the organization. This presents a very challenging training situation in that crises situations often are associated with high-stakes outcomes, and learning on the job is not the most desirable way to train for these events, as failure can result in catastrophic outcomes. Furthermore, learning on the job tends to discourage innovative or risky decision making, as the decision has very "real" consequences in terms of the livelihood of the organization and the decision-maker as an employee at that organization. Simulation-based training has a very salient advantage for this situation in that it provides a risk-free environment for management students to test and practice experimental and innovative new techniques. Simulation-based training can be used to simulate potential crisis events such as catastrophic business failures while providing a relatively risk-free opportunity for management students to practice emergency response strategies without fear of negative personal or organizational consequences.

While there is always some risk involved in any situation, such as the risk of embarrassment or interpersonal discomfort, there is no risk of harming real organizations or real employees via the decisions made in the simulation. Trainees are therefore more likely to think creatively and experiment with different strategies since there are no "real" negative consequences for simulated organizational failure. This aspect of SBT is especially useful when training is focused on developing strategies for handling high-risk situations. Of course, the benefits of a risk-free practice environment are most effectively fostered when the course instructor encourages creative or risky decision making as a learning experience, rather than penalizing students for making mistakes (Keith & Frese, 2008). This reduction in risk makes SBT an ideal method for the development of innovation or crisis management skills, which are very difficult to train using knowledge- or demonstration-based methods.

### **SBT is an Ideal Method for Training Infrequently Engaged but Critical Skills**

In every job, particularly in management positions, there are certain tasks which are performed with such low frequency that skill degradation can occur, or skills may simply never be acquired. Restated, if an individual never gets the opportunity to practice or even experience certain task situations requiring certain skills, he or she may be completely unprepared for that situation in the future. For example, as mentioned previously, one event that management employees do not often experience is the catastrophic failure of a business. However, one can imagine that a scenario such as imminent business failure is precisely when the actions and expertise of management become most critical. SBT, as a practice-based training approach, provides an opportunity for management to practice responding to these infrequent, yet critically important, scenarios.

### **SBT Can Be Quite Affordable**

While the umbrella of SBT encompasses a variety of technologies and approaches that vary widely in their cost, both in terms of money and time, there are numerous SBT options that are incredibly inexpensive, yet very effective training tools. Research has shown that even relatively simple business simulations are more effective tools for improving understanding of concepts than other learning approaches, such as case studies (Raia, 1966). Some business-ready simulations are free and readily available (e.g., Tinsel Town; Devine et

al., 2004), while others cost only a small one-time fee similar to buying a computer game (e.g., MERKIS; Strauss, 2006). While SBT may not necessarily be less expensive than other training methods such as lectures or demonstration videos, it can often be comparable in price, and it is well worth the small cost to provide students with engaging, realistic practice scenarios within which to develop and sharpen the skills that will make them more effective professionals.

### **SBT is (Usually) Simple to Learn and Operate**

The word "simulation" often conjures a belief that all SBT interventions require users to understand and manage complex technology. However, more often than not, SBT does not require any more specialized knowledge from the instructor than other training approaches. There are a variety of simulations that do not even require computer proficiency, because they mimic board games in their format (e.g., Tinsel Town; Devine et al., 2004). Even simpler still, role-playing exercises require nothing more from the instructor than an understanding of the material being taught and some creative thinking in developing basic fictional situations in which the students "act out" the appropriate management skills. Therefore, the specialized skills necessary to deliver SBT can range from negligible to more demanding depending on the particular simulation that is utilized. While it may be a little more taxing to learn how to operate a fully virtual simulation with complex equipment, the vast majority of business and management simulations require, at most, a basic level of computer gaming proficiency. And as an added bonus, if the simulation includes some sort of automatic feedback, SBT can even lower the workload for the course instructor, who would traditionally be responsible for observing and evaluating each and every student personally.

### **SBT is a Form of Learner-Controlled Training**

Not all students learn in the same way at the same pace. Researchers have suggested that learner control is important for facilitating effective learning (e.g., Merrill, 1975; Morrison, Ross, & Baldwin, 1992; Reigeluth & Stein, 1983). Simulation-based training allows for increased learner control, meaning trainees can work through the training content at their own pace, taking more time to clarify any unclear aspects, and exploring options within the simulation. Unlike other methods of training such as lectures or video-based demonstrations, which move at the same pace for all students, this can allow for deeper development of

the desired skills. Lectures or video-based demonstrations potentially result in certain trainees being understimulated while others fall behind. While this particular advantage is more salient for individually oriented SBT interventions rather than team-oriented simulations, it can still allow for small groups of students to work through concepts and materials at a self-determined pace. Particularly for individual training, SBT allows each trainee to control the learning experience, making it more effective for them individually.

### **SBT is Inherently More Engaging Than Other Training Methods**

Finally, one of the most salient advantages of SBT is the inherent entertainment value of simulation- and game-based learning. Because SBT tools are often game-based, they provide trainees with an enjoyable and engaging medium for learning. The training literature has suggested that motivation is critical for training to be effective (Matheiu & Martineau, 1997; Tannenbaum & Yukl, 1992; Tharenou, 2001). As a hands-on training approach, SBT is more likely to engage the trainee than more passive methods (e.g., lectures), and therefore, provides a level of intrinsic motivation that improves learning and retention of the material being trained. Using simulations as part of management curriculum has been empirically demonstrated to increase interest, involvement, and enthusiasm toward the educational material (Keys & Wolfe, 1990; Raia, 1966). It is important to note, however, that enthusiasm toward the training is not fully sufficient for training to be successful. As has been illustrated by Alliger and Janak (1989), there is a relatively weak relationship between affective reactions, such as enjoyment, and learning. While high levels of entertainment tend to enhance the intrinsic motivation of trainees and make active engagement and learning retention more likely, if the training is badly designed or does not address the necessary competencies, the most entertaining game in the world will not be effective as a training intervention. Therefore, it is important to take into consideration all aspects of the training design when developing or selecting an SBT intervention.

### **Summary**

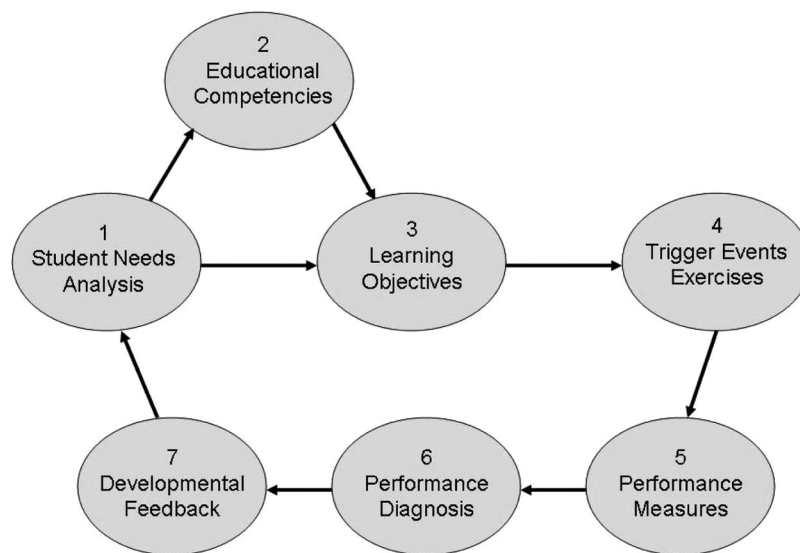
The advantages delineated above make a strong case for the use of SBT in management education. However, it is important to note that we aren't suggesting that SBT be used to replace other types of instructional approaches in our educational systems, but instead, that it provides an advanta-

geous way to supplement current educational methods and develop managerial competencies at a deeper, more practical level. In addition, the characteristics of SBT that make it a useful educational intervention will not matter unless the training is implemented appropriately. In order for the learning and transfer of competencies to successfully occur, SBT must be approached like any other training intervention—systematically. In the following section, we describe some of the basic principles of training design, development, implementation, and evaluation that are critical if SBT interventions are to be successfully implemented in management education.

### **STAGES OF SBT DEVELOPMENT AND IMPLEMENTATION IN MANAGEMENT EDUCATION**

Training is a long-standing central topic in both the science and practice of organizations, and consequently, much has been accumulated regarding how to best design and develop training. Regardless of what level or type of simulation technology is involved, seven basic stages have been delineated as necessary to make simulation-based training effective (see Salas, Wilson, Burke, & Priest, 2005). These stages of SBT development closely follow the basic principles of training design and include (1) training needs analysis, (2) development of task competencies, (3) specification of training objectives, (4) development of training events, (5) development of measures, (6) diagnosis of performance, and (7) feedback and debriefing. Originally identified for the development of SBT for medical training, we have revised these seven stages of training development and implementation to be more specifically applicable to SBT in management education, and we delineate each adapted stage in the following section (see Figure 1).

Training needs analysis is the first, and arguably the most critical, step in the creation of any training system. Before you can design or implement any training intervention, the scope and purpose of the training must be determined. Who specifically, needs training, and what content should the training address? In order to answer these questions, the first step in a training needs analysis is to assess and inventory the knowledge, skills, and attitudes (KSAs) held by the intended trainee population, and the skills participants need in training. In the case of management education, this would require the course instructor to assess the KSAs currently held by the management students, as well as the KSAs that the man-



**FIGURE 1**  
**Stages for the Successful Implementation of SBT in Management Education**

agement students need to be effective professionals when they graduate. Often these decisions will be driven by the purpose of the specific course in question, as well as the level of education of the students. For example, in an undergraduate interpersonal communications course, an appropriate SBT exercise might focus on building and practicing basic communication skills. Or perhaps a certain set of MBA students is lacking in terms of creative thinking and innovation. These students likely would benefit from engaging in a more complex behavioral simulation of a new product development session. The training needs analysis informs the educator which particular competencies are deficient in the student population, and therefore, what type of SBT interventions will be the most advantageous for their particular skill development.

The second step of SBT development is to use the previously gathered inventory of KSAs to develop the specific tasks and competencies that will be trained in the simulation. In this step, the desired outcomes of the training are specified. In other words, based on the gathered skill inventory information, what change in knowledge, skill, or attitude should occur at the conclusion of training? This step is critical for the development of any training intervention. At this stage, the learning outcomes are specified at a more general, overarching level. In terms of management education, these learning outcomes may correspond with the pre-specified goals of the course or perhaps the overall program competencies. Specifically regarding the development of a simulation-based training intervention, this stage of training development should focus on skill-based competencies.

These specified outcomes set the direction for the rest of the training development process.

Once the general goal of the training has been identified in terms of the skills to be enhanced, the next step consists of specifying specific, measurable training objectives based on the overall training goal. These training objectives can be both task-specific and task-generic. For example, a task-specific training objective could specify that the students demonstrate their ability to accurately complete a certain report or form, whereas a task-generic training objective may require students to demonstrate basic interpersonal communication or negotiation skills. These objectives should answer several questions, such as "under what conditions will the learning be demonstrated?" and "what standards of performance are considered acceptable or successful?" When developing training objectives, it is important that they directly address competencies specified in the needs analysis and that they clearly outline what constitutes acceptable and unacceptable performance. For example, what constitutes successfully completing a report? Does it need to be 80% complete? 60% complete? The training objectives should be developed at the deepest level of specificity possible.

After the training objectives have been specified, the simulation scenarios must be developed or chosen to appropriately trigger the required competencies. In other words, the simulation scenarios and events must provide opportunities for the trainee to demonstrate and practice the relevant competencies. For example, if the overall goal of a training system was to impart communication

skills and a business simulation was used that required little interaction between the students, then the training would not be very effective. Therefore, it is important to design or select training scenarios that match the competencies identified during the training needs analysis. For management education, this stage of the process will often consist of choosing an existing business simulation that is most appropriate for the material being taught. The most important issue to consider is that the simulation chosen will provide opportunities to engage in the behavior or skill being developed.

Once the simulation events are designed or chosen, the fifth stage is when performance measures are developed in order to assess the outcomes of the training scenarios. This step of training development is absolutely critical to the success of the SBT intervention. Without the ability to accurately measure a construct such as training performance, it is impossible to truly understand, control, or improve it—you cannot manage what you cannot measure. It is impossible to provide feedback without measuring performance, and it is impossible to invoke learning in students without providing feedback. Therefore, the effectiveness of SBT as a training intervention is contingent upon the quality of performance measurement that is embedded in the simulation, and moreover, the quality of management education as a whole is contingent upon the quality of feedback provided to the students.

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When performance measurement is mentioned in an educational context, it often calls to mind the image of standard paper-and-pencil knowledge tests. However, management educators should make a concerted effort to consider a wide range of performance measurement approaches and

choose a form of measurement that most appropriately captures the desired learning as identified in earlier steps. Knowledge tests are perfectly acceptable for assessing the development of declarative knowledge, but if behaviors or skills are the focus of training, as they often are when using SBT approaches, then behavioral performance measures, such as observational ratings or process measures, are more appropriate. Therefore, more complex behaviorally focused performance measures should be used in management simulations.

In the sixth step of SBT development, the previously chosen performance measures are used to gather performance data and compare the performance of the students to the standards and objectives specified in step three. Without accurate measurement of student performance, it is impossible to assess whether the desired competencies are being gained, and therefore, whether the training is effective. That the performance measures capture both the outcomes of the training as well as the processes within training is critical. This allows for the causes of performance to be related to the outcomes, which will increase the utility of the feedback developed in the final step. For example, if management students are developing decision-making skills using a PC-based game that simulates a fictional organization, it would be important to capture both their decision-making process (i.e., communication, consensus building) as well as their final decision outcome.

The final stage in SBT is the development of constructive feedback based on the performance measurement data. This feedback helps to develop the skills and competencies by iteratively providing guidance to the trainees. Feedback is critical to the development of the desired competencies in the trainees because it provides diagnostic and prescriptive information regarding the performance of the trainees throughout the training cycle. Feedback is the aspect of SBT that makes it training rather than just a simulation. Without timely and appropriate feedback, trainees cannot learn from mistakes and successes. The key to the successful implementation of SBT is to guide the learning that is occurring, and this guiding happens by providing prescriptive, process- or behavior-oriented feedback throughout the training process. This allows the trainee to adjust strategies and improve competencies while proceeding through the simulation. In the end, a simulation without systematically designed learning objectives, carefully embedded scenarios, accurate performance measures, and detailed developmental feedback, will not train anyone.



## GUIDELINES FOR EFFECTIVE SBT IMPLEMENTATION IN MANAGEMENT EDUCATION

Now that SBT has been described and its potential advantages for the management education community enumerated, one question remains to be answered: "How does one use SBT to effectively enhance a management education program?" As previously mentioned, a relative lack of literature focuses on prescriptive guidelines regarding the use of simulation in management education. Therefore, our primary contribution here is to provide a set of practically oriented guidelines for just this purpose. These guidelines delineate a variety of contextual factors that can be manipulated or controlled to ensure the success of SBT as well as general rules of thumb drawn from the training literature. We acknowledge that several of these guidelines are broad enough to apply to a variety of training situations, but throughout the discussion, we focus on the application of each guideline for SBT interventions in particular. We hope that these guidelines (summarized in Table 1) will help

management educators, both in graduate and undergraduate programs, to appropriately and effectively integrate SBT interventions in management curriculums in such a way as to improve the quality of learning occurring in the management education system.

### Guideline 1. Know Your Competencies: Gather Management Student Learning Needs

One of the most critical steps in designing and using SBT appropriately is to conduct a thorough training needs analysis first. While this topic has already been discussed relatively thoroughly, it is worth mentioning again due to the importance of this step. Unfortunately, the nature of the education system as a whole often leads educators to ignore it in the training design process. It is often assumed that the content included in the course description is exactly what the students need to learn, and often the training needs analysis stops there. However, it is possible that the management students are missing a critical skill or competency

**TABLE 1**  
**Guidelines and Implementation Tips for SBT in Management Education**

Guideline	Implementation Tips
1. Know your competencies: Gather management student learning needs.	<ul style="list-style-type: none"> <li>▪ Leverage course descriptions to inform learning needs.</li> <li>▪ Assess current skills levels in the students to inform learning needs.</li> <li>▪ Ask the students directly what competencies they need to develop.</li> </ul>
2. SBT isn't a panacea: Balance learning needs with costs.	<ul style="list-style-type: none"> <li>▪ Use SBT when the desired competencies are complex, behavioral, or skill based.</li> </ul>
3. Take the students' characteristics into account when choosing the simulation.	<ul style="list-style-type: none"> <li>▪ Consider lecture-based methods for training simpler declarative knowledge.</li> <li>▪ Implement SBT as early in management education as possible; students with fewer skills will gain more from simulation.</li> </ul>
4. Fidelity in management SBT: More isn't always better.	<ul style="list-style-type: none"> <li>▪ Use learning needs information to ensure that SBT focuses on competencies that are underdeveloped in that particular set of students.</li> <li>▪ Use the lowest level of fidelity necessary for the particular training need.</li> </ul>
5. Provide detailed learning-focused feedback, often.	<ul style="list-style-type: none"> <li>▪ Focus on increasing cognitive fidelity rather than mundane realism.</li> <li>▪ Tie feedback directly to the learning objectives.</li> <li>▪ Provide diagnostic feedback that describes causes of effective and ineffective performance (e.g., explanation of why a choice is wrong, how to appropriately perform a task).</li> </ul>
6. Evaluate SBT: Directly measure students' learning outcomes.	<ul style="list-style-type: none"> <li>▪ Provide feedback at multiple instances throughout training.</li> <li>▪ Measure learning outcomes in addition to reaction outcomes in order to assess the effectiveness of the simulation.</li> <li>▪ Consider all three categories of learning outcomes (cognitive-, skill-, and affective-based outcomes) when developing measures of simulation effectiveness.</li> </ul>
7. Performance measures: Embed and automate within the simulation.	<ul style="list-style-type: none"> <li>▪ Design performance measures to assess learning objectives and the educational competencies.</li> <li>▪ Embed performance measures into the simulation in as unobtrusive a manner as possible.</li> <li>▪ Use automated performance measures (e.g., number of errors recorded by the computer program) whenever possible.</li> </ul>
8. Before, during, and after: Adopt a systems approach to management SBT.	<ul style="list-style-type: none"> <li>▪ Ensure that the students are prepared for the simulation.</li> <li>▪ Provide a supportive environment for simulation.</li> <li>▪ Encourage students to be enthusiastic toward the simulation.</li> <li>▪ Provide opportunities for practice after simulation is complete.</li> </ul>

not necessarily included in the written course description, but nonetheless critical to their success upon entering the workforce. Training can be perfectly designed and executed, but if the content being addressed is not what the trainees need, then no one will benefit. In terms of SBT in management education, instructors should focus on the behavioral skills the current management students are missing and choose or design SBT systems that address those particular skills. As previously mentioned, the practice-based nature of SBT makes it most ideally suited for the training of behaviors or skills. However, this does not necessarily mean that SBT cannot be used successfully to improve knowledge or understanding of concepts. Research has shown that business simulations are superior to case-study type learning approaches, even in terms of rote knowledge (Raia, 1966). Overall, management educators should make a concerted effort to delve deeper into understanding the needs of the students through surveys and interviews, asking the students directly what competencies they feel they need more training in.

### **Guideline 2. SBT Isn't a Learning Panacea: Balance Learning Needs With Costs**

It is important to note that while we have made a case that SBT is an advantageous training tool, it should not be perceived as a cure-all for management education, or as uniformly superior to other types of training and learning interventions. As has been mentioned, SBT has been empirically shown to be superior or equivalent to other training approaches in the majority of studies (Faria, 2001: 102). However, this also means that in a smaller subset of studies, SBT was not found to be superior to other training techniques. This suggests that depending on the needs of the students and the costs associated with the implementation of SBT, simulation may not be the ideal training choice. For example, some types of learning objectives are just as effectively met using other approaches such as lecture- or text-based training methods. For example, all management courses, like other academic courses, will include simpler, more straightforward learning objectives along with more complex, integrative, application-based learning objectives. The simpler objectives, such as rote memorization of key terms or historical events, may not warrant the use of a SBT intervention, and lecture- or text-based learning approaches may be sufficient to achieve learning in these areas.

However, SBT has been shown to be a very effective way, compared to other training methods, to develop more complex knowledge and skills in

trainees (Feinstein, 2001; Keys & Biggs, 1990; Steadman et al., 2006). This is because SBT, unlike more passive information- and demonstration-based training methods, requires the trainees to directly apply knowledge to a practical situation, or engage in the desired behavior while receiving feedback on how to improve and change this behavior or knowledge to become more effective. Accordingly, SBT is most appropriate for developing and improving complex managerial competencies, including entrepreneurial skills, bargaining skills, leadership skills, interpersonal skills, communication skills, problem-solving skills, and conflict resolution (Faria, 2001: 103).

### **Guideline 3: Take the Students' Characteristics Into Account When Choosing the Simulation**

Like most things in life, management education and simulation are not one-size-fits-all. When making decisions regarding an SBT intervention to be included in a management course, the characteristics of the students need to be taken into consideration. For example, MBA students will likely need to be more challenged than undergraduate management students with nearly zero real-world experience. Supporting this idea, it has been found that less skilled students learn more from simulations than do students with greater skills (Faria, 2001: 103). Therefore when deciding upon the type of SBT to implement in the classroom, the student population should be considered in terms of their existing skill levels and prior experience. It may be that most of the MBA students in a certain class have plenty of experience communicating, and therefore, may not benefit as much from a communication-focused simulation, but have very little experience dealing with strategic decision-making situations, making that a more appropriate choice for the content of a simulation. This also suggests that, in general, undergraduate management students, with their relative lack of management experience, may be the ideal population for taking full advantage of management SBT interventions.

### **Guideline 4. Fidelity in Management SBT: More Isn't Always Better**

In general, the prevailing belief regarding fidelity in simulations is that higher fidelity is associated with better outcomes, such as higher transfer of training or better research findings (e.g., Forsyth, 1990). Higher fidelity is not necessarily better, however. Bowers, Salas, Prince, and Brannick (1992) reviewed several studies and concluded that low-fidelity simulations can indeed be just as useful as

higher fidelity simulations, and often at a relatively low cost. In fact, low-fidelity simulation can often provide several advantages over more complex simulations, and provide just as rich of a learning opportunity. For example, low-fidelity simulations have a higher level of experimental control, and although this may sacrifice the generalizability of the findings to any particular setting, it increases the rigor of hypothesis tests (Bowers et al., 1992). Raia (1966) found that a simple business simulation was just as effective at improving performance on examinations as a more complex one. This makes low-fidelity simulations quite useful for supplementing a management curriculum. For example, interpersonal communication skills can be trained effectively using a simple role-playing exercise in which students are given an opportunity to practice professional communication. This type of low-fidelity simulation requires nothing more than the students themselves. The key to a simulation technique being successfully implemented in management education is that it must be matched in terms of fidelity to its specific purpose.

Furthermore, cognitive fidelity is more critical in terms of SBT for management education than mundane physical fidelity. Cognitive, or psychological, fidelity is the extent to which information processing demands placed upon the trainee and stemming from the task and operational equipment are represented in the simulation (Freda & Ozkaptan, 1980; Kinkade & Wheaton, 1972). Given that management tasks are often not heavily dependent on any physical equipment or particular settings, but instead are heavily decision-making and judgment-based, it is more crucial that any SBT designed for management education appropriately represents the information-processing demands of the simulated situation than the mundane environmental aspects (e.g., conference room furniture). In other words, as long as an appropriate level of cognitive fidelity is achieved, physical fidelity does not necessarily need to be high for SBT to be an effective educational tool.

#### **Guideline 5. Provide Detailed Learning-Focused Feedback, Often**

Feedback, a topic closely related to performance measurement, is a fundamental aspect of developing and reinforcing behavior in any learning situation. The students need to know what they are doing right, what they are doing wrong, and in which areas of their performance there is room for improvement (Geister, Konradt, & Hertel, 2006). In order to achieve the ultimate goal of management education, to develop more effective employees,

the SBT must provide specific direction for how students must change or adapt their performance in order to improve. If the student is performing incorrectly in the first place, it's unlikely they are aware of their deficiencies and will be able to correct them without any guidance. Therefore, to achieve the highest levels of effectiveness, it is important that detailed, constructive feedback is provided to the students multiple times throughout the training event.

For example, imagine a class of MBA students participating in a strategic management simulation. Based on the previously described principles, an effective simulation would be designed based on the needs of the students and would include multiple scenarios in which the trainees can practice making strategic decisions of their own. It is critical that as the students engage in this decision-making process they are given prompt, concrete feedback regarding the appropriateness of their choices, as well as the underlying reasons why those choices are good or bad. It is not enough to inform the students of their "correct" and "incorrect" decisions. Explanations regarding why they were correct or incorrect, as well as suggestions for how to improve their decisions will allow them to start building a deeper understanding of the principles underlying strategic management. As this knowledge deepens, they will be able to see immediate improvements in the quality of their choices as the simulation progresses.

#### **Guideline 6. Evaluate SBT: Directly Measure Students' Learning Outcomes**

Finally, using a training program of any kind is not very helpful unless it can be shown that the training program was effective. Once the training is complete, the SBT should be evaluated at multiple levels. First, training outcomes can be categorized into four categories based on the degree of separation between the simulation and the desired outcome: reaction, learning, behavior, and result levels (Kirkpatrick, 1976). Reactions are the immediate subjective responses of the trainees to the training program, such as whether they enjoyed the training or felt as if it was helpful. The ease of collecting of reaction measures makes them an enticing, and therefore, a commonly utilized measure of training effectiveness. Learning goes a step beyond reactions by assessing the objective learning gained by the trainees rather than their perceptions of learning. For example, if the SBT was intended to impart a particular set of knowledge regarding communication skills, measures of learning could include a paper-and-pencil declar-

ative knowledge test. *Behavior* refers to whether the trainees apply the learned competencies to the job. This could be measured using supervisor ratings of performance on the job once students enter the workforce. Finally, results measures assess the impact of the training on the organization as a whole. For example, did overall profits change? Did customer satisfaction change? Clearly, the last two categories (behavior and results) would be difficult to gather in a management education setting since it would require the educator to track each student over time as they are placed in jobs and gain access to the organization's records. Therefore, in the specific case of SBT in management education, reaction and learning outcomes are the most appropriate and most convenient training outcomes to collect. Furthermore, because the goal of SBT is to impart new knowledge, skills, and attitudes to the students, learning outcomes are critical for assessing the effectiveness of the simulation.

Learning outcomes, as defined above, can be further categorized into three basic categories that correspond to the knowledge, skills, and attitudes just mentioned: cognitive-, skill-, and affective-based outcomes (Kraiger, Ford, & Salas, 1993). *Cognitive-based outcomes* include learning related to knowledge such as the quantity and type of knowledge and relationships among elements of knowledge. *Skill-based outcomes* are concerned with the development of behavioral skills, both technical and motor. Finally, *affective-based outcomes* include changes in the trainees' attitudes, affect, or motivation. Any given SBT intervention may be aimed at achieving learning objectives that fall into multiple categories. For example, if the goal of a management training program is to inform students about the consequences of unethical business practices, the learning objectives of the simulation may include improving knowledge regarding the consequences of unethical behavior (i.e., cognitive-based outcome) as well as the development of a positive attitude toward ethical behavior (i.e., affective-based outcome). It is important that when measuring learning outcomes of the simulation, all three categories are considered to ensure that the full range of learning objectives is assessed.

#### **Guideline 7. Performance Measures: Embed and Automate Within the Simulation**

As a training technique, the primary goal of SBT in management education is to develop knowledge, skills, and abilities in students and to improve their subsequent performance, both in the classroom and on the job. However, SBT cannot impart useful competencies unless the learning process is

carefully guided. In order for the learning process to be guided, student performance must be measured throughout the simulation. Simply stated, SBT must be accompanied with appropriate performance measures in order for the training to be effective. Without accurate performance measurement to guide feedback and trainee learning, SBT is nothing more than a simulation. Performance measures allow for detailed feedback to be generated and for the training to be adjusted as the trainee learns.

There are several issues to consider when implementing performance measurement in SBT (Salas et al., 2008). First, it is important that the simulation scenarios are or chosen to elicit the desired behaviors and competencies. In SBT, trigger events are often scripted into the scenarios that require the trainees to respond in a particular manner. These trigger events serve as an opportunity to measure and assess the competencies trainees have learned. In the case of management education, for example, this means that communication training should include scenarios in which the trainees engage in communication and this communication can be measured.

Second, it is critical that the SBT captures both performance outcomes and performance processes. While outcome data is critical for providing feedback to the students, without measurement of the processes leading to that outcome, it is impossible to provide diagnostic information regarding why and how the student arrived at a particular outcome. Restated, it is not enough for a measure to identify a problem—the measure must also provide information regarding what exactly the problem is and how to correct it (Rosen et al., 2008). For example, a strategic management decision-making simulation might include performance measures of the decision-making and communication processes leading to the final decision, as well as a measure of the effectiveness of the final decision. By capturing both process and outcome data, the SBT can provide management students with specific information regarding why they were successful or unsuccessful, such as exactly what miscommunication or bad decision led to an ineffective final decision. Finally, performance measurement should ideally occur at multiple intervals throughout the training experience. Measuring at multiple instances allows for in-progress feedback to be developed and also for an understanding of how processes and performance are changing over time. The aforementioned issue of feedback will be discussed in detail next.

### **Guideline 8. Before, During, and After: Adopt a Systems Approach to Management SBT**

There is more involved in making SBT successful than just designing and implementing an appropriate management simulation. Attention must be paid to the context surrounding the simulation program as well; the simulation is not independent of the system in which it is embedded. In other words, what happens before, during, and after the training intervention are all equally critical in making SBT for management education successful. Before training occurs, the management educator must ensure that the students are prepared for training, are enthusiastic toward the training, and that the organizational culture is supportive of the training. Several studies have shown that business simulations are more successful when the instructor is heavily involved and the students are committed (Faria, 2001). Without a supportive environment surrounding the SBT intervention, the students may be less committed to the training, and therefore, may sabotage their performance or enter with preconceived biases that influence their levels of learning. This could refer to departmental support, or just support within the classroom for the utility of the simulation. During training, accurate performance measurement and timely feedback are critical. Finally, after the simulation has concluded, the educator must also provide opportunities to practice and refresh the developed competencies, and transfer of the learned skills to the work environment should be actively encouraged. By taking this before, during, and after approach to the SBT intervention, management instructors can facilitate more active learning and transfer of developed skills.

### **FUTURE DIRECTIONS FOR SBT IN MANAGEMENT EDUCATION**

We have provided some practical guidance for management educators hoping to improve their curriculum with the use of simulation. However, much more research is necessary if we are to truly take advantage of simulation technology for management education and training. While SBT has been a topic of discussion in management education for decades, there is still a relative lack of empirical studies examining the context under which SBT is most effective compared to other training approaches. Research has demonstrated that SBT is usually more effective at imparting knowledge than case-based educational methods (Faria, 2001; Feinstein, 2001) and learners, in general, tend to react more positively to simulation-

based methods than other methods (Raia, 1966; Slotte & Herbert, 2007). However, there is much left to be understood regarding the use of simulation in management education.

One critical issue regarding SBT in management education that is in need of further investigation is the relative utility of simulation for developing different management content areas. Research has summarized what content areas have been taught using business simulations (e.g., mathematical modeling, evaluation skills, problem solving, Faria, 2001), but research demonstrating which topic areas are most effectively developed using simulation techniques is lacking. In addition, there is still room to expand on our understanding of the conditions under which SBT becomes most effective in the management classroom. While several environmental variables have been related to business simulation success (e.g., instructor involvement, student commitment; Faria, 2001), there are myriad other factors that have yet to be investigated. For example, do differences in culture or gender relate to simulation performance? Is SBT more effective when combined with other specific educational approaches? Further examination of the contextual factors influencing the effectiveness of simulations in management education would provide a clearer understanding of how to implement SBT interventions.

Another area of constant discussion in management education is the issue of ethical decision making. Business schools are being criticized for not being responsible and are even blamed for training executives deficiently. Moreover, this training deficiency is, to some extent, seen as the culprit for some of the recent corporate scandals (Bendell, 2007). SBT represents an innovative opportunity for business schools to take a more active approach toward training ethical decision making by not only informing their students about the issue regarding business ethics, but also by having their students actually practice making decisions regarding ethical dilemmas and receive feedback on the potential consequences of their actions. Simulation-based training could be used to make students more actively aware of the individual, organizational, and societal ramifications of unethical business conduct.

Pierce and Aguinis (1997) argued that highly immersive virtual reality could be used to improve the quality of organizational behavior research. Several advantages of virtual reality were described, including enhanced internal and external validity, the ability to manipulate naturally occurring variables, and the ability to simulate dynamic environments. Virtual reality also is advantageous

as a learning environment because it is experiential, it allows for more natural interaction with information, environment, and others, and it can be used to simulate a shared experience (Bricken, 1991). We propose that virtual reality may also present an intriguing opportunity for management education as well. Although some research has suggested that simple simulations are just as effective in management education as more complex games (Raia, 1966), further research is needed to determine if there are certain conditions under which virtual reality could serve as an effective training tool for management education. In other words, are there certain skills or experiences which can be taught more effectively using highly immersive, mundanely realistic settings? The application of virtual reality to management education is an untapped area of research with the potential for much discovery and impact.

## CONCLUSION

We have addressed a very important and timely issue—the use of simulation-based training in management education. To be more specific, we have suggested simulation-based training as a particularly advantageous approach for management training. In support of this argument, we first provided a concrete definition of SBT and a description of the most critical issues to consider. We also enumerated the unique advantages that SBT can provide to enhance management education. Finally, in an effort to guide and encourage the appropriate use of SBT in management education, we provided a set of practically oriented principles for its effective use. Our hope is that these principles and this article will increase the use of high-quality SBT interventions in management education, and consequently, improve the performance of management and organizations alike.

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