Use of Task Clarification, Feedback, and Recognition to Increase Desired Behaviors within an Organization's Permit to Work System - Analysis of Data Previously Collected as an Organizational Consultant

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by

Tarek Abousaleh

A dissertation submitted to the Graduate College in partial fulfillment of the requirements for the Degree of Doctor of Philosophy Psychology April 2014

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USE OF TASK CLARIFICATION, FEEDBACK, AND RECOGNITION TO INCREASE DESIRED BEHAVIORS WITHIN AN ORGANIZATION’S PERMIT TO WORK SYSTEM - ANALYSIS OF DATA PREVIOUSLY COLLECTED AS AN ORGANIZATIONAL CONSULTANT

Tarek Abousaleh, Ph.D.
Western Michigan University, 2014

The term ‘culture’ can be used to describe both a ‘social culture’ and a ‘work culture’. A social culture can be defined behaviorally as a pattern of overt and covert behaviors that are consequated by the verbal community and the contingency specifying rules that facilitate behavior independent of any first hand experience. It is this community that defines which behaviors are reinforced, extinguished, or punished. Similarly, a work culture can be defined as a pattern of overt and covert behaviors that are consequated by the work community (leadership, employees, self, etc.) and the contingency specifying rules that facilitate behavior/performance independent of any first hand experience. Behavioral techniques such as the use of task clarification, and feedback have been utilized in many organizations and within a number of industries to change behavior and transform work culture. The current study used these tools and techniques to change behaviors determined to be key to the success of the organization’s Permit-to-Work System. The same checklist was used to obtain data on these key behaviors in both baseline and intervention phases. During intervention the researcher provided task clarification, feedback, and recognition to participants regarding their
performance on the key checklist behaviors. The results demonstrate the efficacy of the behavioral tools and techniques in changing behaviors and improving performance. The success and opportunities for improvement are discussed with regard to changing the work culture as well as the work behaviors within. Also, recommendations are provided for future research and future practitioners.
ACKNOWLEDGEMENTS

The researcher would like to extend his gratitude to the following people for their efforts to help and support the design and completion of the current dissertation study:

Dr. Ron Van Houten
Advisor and Dissertation Committee Chair

Dr. Heather McGee, Dr. Brad Huitema, and Dr. Laura Methot
Dissertation Committee Members

Dr. Terry McSween
Source for the data analyzed in the current study.

All of the participating employees and leaders of the organization in the study

WMU Psychology Department Staff, Faculty, and Student body

Western Michigan University Graduate College

Tarek Abousaleh
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INTRODUCTION

Introduction to Culture

Culture and what culture encompasses have been points of debate for well over a century, as different fields have attempted to take on the task of defining and understanding what makes humans think, feel, and act as they do towards themselves and others. Regardless of the view taken regarding culture itself and how individuals coexist within and between cultures, it is widely agreed that our relationships with each other are important not only in advancing the human race as a species but also in creating the society within which individuals and groups of individuals can live and flourish.

Anthropology states that people adapt to their environment in non-genetic ways through culture. Thus, culture dictates which behaviors should occur in order to succeed in any given environment. Much of anthropological theory focuses on the relationship between the local or particular cultures and the global (a universal human nature) or the web of connections between people in distinct places (Angioni, 2011).

A Behavioral Perspective of Culture

Although a behavioral psychologist would agree that humans adapt to the environment in non-genetic ways, he or she might argue that an anthropological approach serves only as a descriptive account of how a culture has influenced its individual members’ behaviors. In addition, the acceptance of culture (whether local or global) as having its roots in “human nature” conflicts with the philosophical and theoretical
foundations of behavioral psychology. Instead, “human nature” can be viewed behaviorally as a set of shaped behaviors that have come to occur often enough under certain circumstances that they may be predicted with a level of confidence and thus may be discussed broadly, generalizing to a number of individuals whom are likely to engage in the same or similar behaviors. In his 1953 book, *Science and Human Behavior*, B.F. Skinner discusses human nature and the difficulties transitioning from a traditional view similar to the anthropological one discussed here to a scientific behavioral approach:

> Prevailing philosophies of human nature recognize an internal "will" which has the power of interfering with causal relationships and which makes the prediction and control of behavior impossible. To suggest that we abandon this view is to undermine what appears to be a stimulating and productive conception of human nature… Regardless of how much we stand to gain from supposing that human behavior is the proper subject matter of a science, no one who is a product of Western civilization can do so without a struggle. We simply do not want such a science.

(p. 7)

Skinner makes a clear point that while it may be difficult for humans to adopt a behavioral view of human nature, there can be significant benefits for doing so.

Rather than perceiving a culture only as a construct with the power to dictate the manner in which individuals behave, behaviorists define culture as “a pattern of behavior that is encouraged or discouraged by people and by systems over time” (Jacobs, 2013).
This definition frames culture as an entity dependent upon the frequency of specific measurable behaviors. Clayton, Mawhinney, Luke, and Cook (1997) also include a discussion of the main factors determining the survival of a culture. They state that a culture’s survival is contingent upon the behaviors within and the consequences reinforcing or punishing those behaviors. Thus, culture may be manipulated by changing any given behavior’s frequency of occurrence based upon whether it is desired or undesired. An advantage in defining culture in this way is that the amount of transformation a culture undergoes can be manipulated by altering the frequency of key behaviors within. In fact, according to the previous discussion regarding cultural survival by Clayton et al. (1997), it is possible to eliminate a culture by manipulating consequences in such a way that behaviors that make up said culture that were once reinforced are now severely punished and vice versa. This represents a stark difference between a descriptive approach to culture taken in the field of anthropology/sociology and the more functional approach in behavioral psychology. For the purposes of this study, the above definition can be worded to more explicitly account for not only the observable behaviors whose patterns over time dictate the makeup of a culture, but also the rules that are put into place which specify how specific behaviors will be consequated.

Mawhinney and Ford (1977) discussed the importance of including rules in any discussion of work culture. They state that a leader’s responsibilities include the planning, implementation, and maintenance of contingencies in the work place. A leader may accomplish this in two ways. The first is to consequate behaviors directly. This would involve observing a behavior and either punishing or reinforcing it depending on
whether the leader’s goal is to increase or decrease its future frequency of occurrence. While this method does work to change behavior in the work place, it does present a logistical barrier to success. This barrier stems from the impossibility of a leader being able to observe, record, and consequate every instance of a targeted behavior. For example, a supervisor cannot be expected to utilize all of his or her time in order to “catch” each and every employee wearing eye protection in a hazardous work environment in order to reinforce that behavior. Instead, Mawhinney and Ford point to leaders’ use of contingency-specifying rules in order to provide a means of passing on what has been already learned by others in the work community. This means that once a rule is created, future frequency of the occurrence of a behavior may be manipulated without the behavior ever having been consequated. One of the drawbacks of the utilization of rules is the fact that their effect on behavior depends largely on the consequences involved, as well as the delay of said consequences. Braam and Malott (1990) discuss the fact that there are a great number of studies supporting the notion that direct-acting contingencies will more effectively control behavior than delayed indirect-acting contingencies. Yet they also note that with normally functioning adult humans, indirect-acting rules seemed to exert more control on behavior than direct-acting contingencies. These differences may come down to humans’ utilization of verbal behavior. Verbal behavior, according to Skinner (1957), is behavior that is reinforced through the mediation of others. Essentially, a person’s behavior may be reinforced through the actions of another person. This could include a request made of a person to engage in a specific behavior. It may also include a question asked of a person, who’s answer to said question both consequates the behavior of asking and
possibly presents a novel rule to the person asking the question. An example of this
may be a newly hired employee asking another how tardiness is consequated. The
answer to this question may serve as both a consequence for asking, and as a rule
specifying an indirect-acting contingency. The new hire may never be tardy to work,
but is aware of the consequences associated with it. Thus, his or her behavior may be
controlled by the consequence and by a learning history that has in the past either
punished or reinforced behaviors that lead to tardiness. Of course, just as a rule may
be effective in controlling behavior through indirect-acting contingencies, the lack of
a rule or a rule that is too vague or too weak may also reduce if not eliminate any
effect on behavior. Malott (1993) discusses the idea that an undesired behavior may
occur both because immediate negative effects of the behavior are too small, and the
more sizeable negative results are too delayed. With regard to the previous example,
a new hire may learn about the rules regarding tardiness but that does not guarantee
he or she will not be tardy to work. The rules specifying the contingencies relating to
tardiness must ensure that the consequences are neither too small when immediate
nor too delayed when large enough to effect the behavior. Malott also discusses the
fact that while some negative outcomes of behaviors may be small, they may be
cumulative. For example, each instance of tardiness to work may not on its own have
a large negative impact. When the impact of each instance is added together over
time, it may result in larger negative outcomes that do have a significant negative
impact. Unfortunately, as mentioned, these negative results and outcomes are too
delayed. The manner in which rules are formulated may help to avoid such issues. A
rule may be stated such that it specifies specifically what the immediate results and
consequences will be, as well as informing the behaver of the cumulative but delayed
consequences. Tying the delayed outcome to the more immediate consequences may help to more effectively control behavior.

In addition to the inclusion of rules, it is important that a definition of culture reflects those behaviors that cannot be observed yet do nonetheless occur alongside overt responses. While Jacobs makes a point to exclude unobservable behaviors such as internal thoughts, B.F. Skinner (1957) discusses what is termed “response reduction” in his book *Verbal Behavior*. The term refers to the reduction of an organism’s response to both overt (external) and covert (internal) stimuli, from measurable and observable behaviors to private responses that only the subject may be able to reliably observe and measure. This provides further insight into the advantages of the behavioral approach to defining culture by indicating that while thoughts and other private events may not be observed and measured reliably, they often have roots in measurable overt responses. The knowledge that many private events are the result of overt behavior that has been reduced over time provides an opportunity to shape the resurgence of those private behaviors back into their unreduced forms. This resurgence may be shaped through communication skills training and the manipulation of contingencies in order to reinforce overt behaviors that were previously punished or extinguished. This would allow practitioners to manipulate the frequency of these newly shaped overt behaviors in a manner that results in a positive effect on the culture.

Although traditionalists and anthropologists agree with behaviorists that there is indeed a relationship between culture and behavior, the behavioral approach asks, “Why should the design of a culture be left so largely to accident? Is it not possible to change the social environment deliberately so that the human product will meet more acceptable
specifications?” (Skinner, 1953, p. 426-427). These questions point to the fact that humans need not simply accept the cultures and the behaviors that exist within. Instead, humankind may work to utilize the environment’s influence in order to change behavior and systematically transform and improve culture. It would fall upon the community of individuals to determine the magnitude of behavior change needed to demonstrate culture change.

As mentioned, changes in behavior can lead to a change in the culture. However, in order to change behavior, one must understand the environment within which responses occur. This includes the contingencies that either encourage or discourage any given behavior. Most behaviors do not occur in a metaphorical vacuum. Instead they occur as discrete responses within a network of socially connected contingencies. Thus, it is often a challenge to parse out individual key behaviors along with the stimuli that encourage and discourage them. Gilbert made the point that being able to understand the origins of social contingencies provides a means to understanding the processes governing the evolution of work cultures (Gilbert, 1978). This means that only after a practitioner is able to understand how key behaviors relate to one another and to the stimuli that accompany them, he or she will be able to understand how the current culture came to exist as well as how a change in said culture may be enacted.

The term ‘culture’ can be used to describe both a ‘social culture’ and a ‘work culture.’ A social culture can be defined behaviorally as a pattern of overt and covert behaviors that are conseuated by the verbal community and the contingency specifying rules that facilitate behavior independent of any firsthand experience. It is this community that defines which behaviors are reinforced, extinguished, or punished.
Similarly, a work culture can be defined as a pattern of overt and covert behaviors that are conseuated by the work community (leadership, employees, self, etc.) and the contingency specifying rules that facilitate behavior/performance independent of any firsthand experience.

Because work culture as defined above involves both rule-governed and contingency-based behaviors, one may transform a work culture by changing the consequences that follow behaviors and by specifying rules that alter the reinforcing value or punishing effect on any given behavior. Changing how current behaviors are conseuated and the ability to alter contingencies to reinforce novel behaviors means that once leadership has determined which behaviors the work community deems desirable, consequences that serve as reinforcers may be altered or removed to either punish or extinguish any undesired behaviors. This in turn will eventually alter the work culture in a manner that supports success.

**Changing Behaviors within Work Cultures**

Behavioral tools and techniques such as task clarification and feedback have been utilized in many organizations and within a number of industries to improve performance in the work place. Some of these industries include food services, aviation, manufacturing, individual and team sports, and the extraction and production of natural resources. Alvero, Bucklin, and Austin (2001) reviewed 68 applications of feedback in applied organizational settings. Their findings revealed that the most consistent effects were produced by interventions utilizing feedback along with antecedents (excluding goal-setting). The review also found mixed effects when using feedback alone. In one study, the desired cleaning behaviors were increased by 13% after the use of task
clarification. These behaviors increased by an additional 37% after feedback was introduced in the form of individual posted data (Anderson, Crowell, Hantula, & Siroky, 1988). Mason and Redmon (1993) compared both immediate and delayed feedback on behaviors associated with quality control. The study demonstrated that immediate and frequent feedback results in a greater improvement in performance than does the delayed and infrequent feedback. It is important to note as Agnew and Redmon (1993) do, that feedback often violates the behavioral definitions given to discriminative stimuli and reinforcers. This is due to the fact that feedback often immediately follows a behavior, eliminating it as a discriminative stimulus for the following occurrence. In these cases feedback may act as a contingency specifying rule increasing the likelihood of the response occurring in the future.

The utilization of behavioral tools and techniques often involves an initial shaping of behaviors using feedback of different types. The control over a behavior may then shift to more naturally occurring contingency. Alavosius and Sulzer-Azaroff (1990) discussed this with regard to newly shaped safe behaviors. While feedback initially increased safe behaviors in the study, they “were probably reinforced intermittently by natural contingencies” (p. 160). This is an important advantage with regard to changing culture due to the fact that if behavior change is achieved in a manner such as the study above, the newly formed culture and the behaviors within will be sustained and maintained by newly formed contingencies requiring less direct management and manipulation.

In another study, video modeling and feedback was utilized to improve the performance of gymnasts. Video modeling and feedback reduced the time and number of
sessions needed to improve a difficult physical skill (Boyer, Miltenberger, Batsche, & Fogel, 2009). An organization manufacturing baked aluminum anodes saw a reduction in rejects being produced using a treatment package including goal setting, feedback, and incentives. Reject rates fell from around 150 per week to less than 60 rejects per week during the final phase of intervention. During post-intervention, reversal rates returned to near baseline levels, demonstrating the efficacy of the intervention package in reducing the rate of rejected anodes manufactured (Jessup & Stahelski, 1999). Another study showing the efficacy of video modeling was conducted in a lingerie store (Loughrey, Marshall, Bellizzi, & Wilder, 2013). The behavior of focus was the promotion of a store credit card by point-of-sale employees. In addition to video modeling, the intervention added a prompt in the form of a small discrete card near the register. Managers were tasked with delivering feedback regarding employee performance as immediate as possible. Guidelines were created to ensure feedback was given in a similar fashion each time. The results demonstrated that adding video modeling to feedback and prompting effectively increased performance.

The effectiveness of behavioral interventions in changing behavior has been demonstrated in a variety of scopes. While many interventions focus on the behaviors of just a few, some are designed to influence the behavior of many. Van Houten, Malenfant, Blomberg, Huitema, and Casella (2013) increased driver yielding to pedestrians on a citywide basis from 45 to 83% using a behaviorally designed enforcement program that included prompts and feedback. This demonstrates the efficacy of a behavioral science in changing the behavior of a great number of individuals, leading to a greater chance of achieving culture change in any given
environment.

In addition to instruction, task clarification, and social consequences, feedback has also been paired with monetary incentives in order to improve performance. Bucklin, McGee, and Dickinson (2004) studied whether feedback would supplement individual incentives’ effects. Participants earned points for correct responses in a computer-based task. The study showed that feedback did increase performance when added to incentives. However, a lack of reversal suggested to the authors that increases in performance resulted in increases in incentives which maintained or increased said performance. Buyniski (1995) discussed the lack of feedback present in organizations that utilize incentive programs. The results of the Bucklin et al. (2004) study suggest that feedback should be made a component of an initiative even if monetary incentives are already involved.

The use of these behavioral tools and techniques in such a wide range of industries demonstrates the generality and efficacy of behavior analysis techniques in improving performance and changing behavior.

*Changing Safety Behaviors within Work Cultures*

Behavior Based Safety (BBS) is a field that has come to show that a safer work environment can be achieved through engagement of employees and leaders in an organization as well as a focus on critical behaviors that are decided upon by both the organization and the behavioral practitioners who are assisting in the implementation of a BBS process. Krause (1999) assessed the success of 73 separate behavioral safety interventions and found the average reduction in recordable injury rates from baseline to intervention amounted to 26% after the first year and 69% by the fifth year. This
demonstrates the efficacy of behavioral interventions in reducing incidents and injuries and increasing safety in the work place. Alavosius and Sulzer-Azaroff (1990) showed how a combination of written instruction and various frequencies of feedback resulted in increases in desired behaviors in a patient-care setting. The study showed that continuous feedback resulted in the greatest improvements in performance. Komaki, Barwick, and Scott (1978) increased the percentage of tasks completed safely using both training and feedback in two separate departments from 70% and 78% to 96% and 99%, respectively. Individual feedback was delivered in a metal fabrication plant to inform employees about their temporary hearing loss. The intervention increased earplug usage from 35% to 50% during the intervention and continued to increase to a level to 85% after a 5-month period. The results suggest that work culture had changed in addition to just the work behaviors, leading to a continued improvement rather than either a gradual or immediate return to baseline (Zohar, Cohen, & Azar, 1980). In addition, the results may be indicative of the intervention having reached a tipping point, at which the cultural shift is not only dependent upon the changes of individuals’ behaviors but may also function as an independent variable, influencing the likelihood of occurrence of future desired individual behaviors. This could occur through modeling and rule governance. The behaviors engaged in by those already employed may provide a means of learning for new members of the work community that would not require any direct contact with reinforcers or punishers. They may either witness others’ behaviors being consequated, or may be informed of rules specifying contingencies related to the safe (or unsafe) behaviors. In either case, new employees and members of the work community will be afforded the opportunity for a shaping of desired behaviors that can play a key role in
sustaining an initiative. Other research indicates that behavioral safety initiatives are capable of imbedding themselves within a current culture. Fox, Hopkins, and Anger (1987) introduced a token economy intervention aiming to reduce injuries and incidents by offering trading stamps to those who stayed safe and were not involved in incidents or injuries. The intervention resulted in both a decrease in safety related incidents and an adoption of the token economy and the behavioral safety initiative post-intervention.

While much of the research involving behavioral safety has been conducted in settings such as factories and refining facilities, the tools and techniques have also been shown to be effective in settings less likely to be the focus of safety initiatives. The Bureau of Labor Statistics states that for the year 2012 in the category of financial activities, a recordable rate of 1.3 was measured per every 100 full time employees. While this number is far less than the recordable rates found in other more labor-intensive industries, it still demonstrates that incident and injuries do occur in an office setting. Additionally, these injuries resulted in the longest average number of days (23 days) required away from work and accounted for 36% of all injuries in the work force (Bureau of Labor Statistics, 2013).

Moon and Oah (2013) compared the effects of prompting and feedback on sitting posture in an office environment. They found that the use of feedback improved posture to a greater extent than the use of prompting. Their suggestion is the use of a combination of both in order to increase and maintain higher levels of safe posture in an office setting. These results replicate the success of prompting in conjunction with feedback as demonstrated by other studies discussed above. Another study in an office setting demonstrated the efficacy of self-monitoring in increasing safe posture (Gravina, 2013).
Austin, Schoedtder, & Loewy, 2008). The intervention required participants to determine whether a specific item on a list relating to their posture was safe or at-risk. Five of the 17 items included in the self-monitoring intervention showed significant improvement, while another 6 items showed improvement of at least 10% when compared to baseline. This suggests that feedback, even when delivered to oneself, can be effective in increasing safe behaviors.

When working to improve safety at work, it is important to note that while behavioral techniques such as feedback can decrease unsafe behaviors, these methods may also help reduce injuries and incidents by addressing behaviors that may lead to both unsafe behaviors and conditions. These behaviors usually serve as preventive measures lessening the likelihood that an incident will occur by removing a potential hazard from the workplace. An example of this is the preparatory surveying that a work crew might engage in so that the area is cleared of electrical wiring and other hazards prior to breaking ground. While a hazardous environment does not mean a safety-related incident would occur for sure, conducting the survey remains important in order to lessen the likelihood of such an incident. Thus, it is evident that many hazardous conditions as well as unsafe behaviors may be remedied through behavior change. Hermann (1978) conducted a study in a manufacturing plant with an intervention package that consisted of the identification of unsafe conditions, the pinpointing of key behaviors using a job safety analysis (JSA) technique, discussions with employees regarding each (JSA), and group recognition. Medical and disabling injuries were reduced by 55% and the number of days lost per month was reduced from 52.2 during the baseline to 1.2 during the intervention. This suggests that even when key behaviors are not directly linked to
possible injuries, safety may be improved with the use of behavioral techniques. The current study was conducted similarly as the behaviors on the checklist were not themselves hazard-ridden duties but instead behaviors that if completed correctly could reduce the likelihood of an incident or injury in the future.

The tools and techniques of BBS, although proven to work in a number of industries, must be tailored to each implementation in order to account for differences from one work culture to another. Welsh, Luthans, and Sommer (1993) conducted a study to determine whether behavioral interventions that produced performance improvements in the United States could be replicated in a Russian textile mill. Functional and dysfunctional behaviors were pinpointed and measured in this study. The Russian intervention successfully replicated the U.S. intervention in both increasing functional behaviors and decreasing dysfunctional ones. While the study itself was not designed to improve safety, it demonstrated that the success of a behavioral intervention in the U.S could be replicated in another country located thousands of miles away. It was noted that after termination of the intervention, there was no return to baseline for either measure. The authors mentioned the short duration of the study (due to constraints) may have accounted for the lack of complete reversal after intervention was terminated.

Al-Hemoud and Al-Asfoor (2006) utilized a behavioral safety intervention consisting of training and feedback in an office setting. Percent safe rose from 74% during baseline to 100% during intervention. This demonstrates the efficacy of a behavioral intervention within a social culture similar to the one within which the current study was conducted. While the social culture may be similar given this study and the current one were both conducted in the same region of the Middle East, the work culture
cannot be considered inherently similar due to the differences in work settings.

A discussion of culture is relevant to workplace performance and safety because both social and work communities shape many of the behaviors occurring at work through the rules and consequences previously discussed. Bumstead and Boyce (2005) make this argument by stating, “Although the effectiveness of a behavior-based safety process may influence cultural and environmental variables, behavior-based safety itself may be influenced by cultural and environmental variables” (p. 45). While both client and practitioner must work to change culture within an organization by changing the behaviors within, it is important for all parties to understand how the current system or culture (including the behaviors, rules, and direct-acting contingencies) may influence how effective an intervention will be. In order for an implementation to have the greatest positive effect on behaviors and thus on the work culture, it needs to be catered to each specific work community. This topic will play a key role in the current study and will be discussed at length in the coming sections.

**Multiple Work Cultures**

In order to change behaviors in the workplace, one must understand why current levels of behavior exist. This means understanding what environmental stimuli reinforce and punish certain behaviors at work. Unfortunately, leaders in organizations often spend much of their time implementing initiatives based heavily on antecedents alone or rules that are not consistently backed up by consequences. While adequate instruction is necessary for behavior change, it is not sufficient on its own (Daniels, 2004). It must exist as a component in a larger contingency involving consequences that exist to either increase or decrease the likelihood of the behavior occurring in the future. To recall, the
definition of a work culture has been stated as a pattern of overt and covert behaviors that are conseuated by the work community (leadership, employees, self, etc.) and the contingency specifying rules that facilitate behavior/performance independent of any firsthand experience. Unfortunately, the fact that patterns of behavior may be formed either through rule governance or through direct-acting contingencies means that the community should be unified in determining which patterns of behavior should be reinforced and which should be extinguished or punished. Unfortunately, there often exists a lack of open communication between members who occupy different levels of an organization. This lack of communication allows for two or more separate work cultures (or subcultures) to develop instead of a single unified culture. Mawhinney and Gowen (1991) discussed this issue stating that expected effects often do not materialize due to the more immediate reinforcement of undesired alternative behaviors. Thus, variations in patterns of behavior are exhibited by the different work cultures within the same organization. Once there is enough variation in these behavioral patterns, leadership can no longer govern its members due to a lack of knowledge regarding the patterns of behavior that have emerged. This lack of governance means there is less opportunity to control and predict behavior, performance, and ultimately safety. Stokes and Baer (1977) argue that a critical component of the generalization and maintenance of culture is the identification of reinforcers that already control behavior in a specific setting. While they were discussing the reinforcers that are indigenous to a specific social community, the quote holds true for a work community as well. A leader must work to manage not only a single contingency at a time, but the complex network of concurrent behavioral contingencies often referred to as metacontingencies. “Metacontingencies are relations
between cultural practices and outcomes of those practices” (Glenn, 1991, p. 62).

Redmon and Agnew (1991) suggest that leaders should work to create metacontingencies that reinforce behaviors that are linked to the organization’s key mission. That is, to ensure that all members of the work community are engaging in behaviors that are linked to results that will provide the organization the greatest chances of success. Camden and Ludwig (under review) discuss at length the notion that a single undesired behavior may form a metacontingency involving multiple members of a work culture. The example discussed is absenteeism in a hospital setting. When one person is not present for their work shift, another must take their place. This often results in a drop in quality of patient care, and an increase in stress and other aversive conditions for those filling in. Each person’s absence from work changes the contingencies previously encouraging and discouraging certain behaviors of others. The authors utilized both public and private individual feedback in order to increase attendance among nurses. The study demonstrated significant drops in absenteeism in two of the three hospitals involved as well as demonstrating the efficacy of a behavioral intervention in changing behaviors within metacontingencies.

A leader should indeed work to understand how and why certain patterns of behavior were established and the reinforcers maintaining those behaviors. Only then can a leader understand how to manipulate those reinforcers in order to create behavior change leading to culture change. Bumstead and Boyce (2005) discuss some of the variables that might affect how a behavioral intervention is implemented and how successful it becomes. Their study focused on the design and implementation of a behavior-based-safety process within two different work cultures. They discussed the
influence of unions, stating that in many cases unions have learned to criticize the behavioral approach as one that simply blames the workers and disregards the hazardous conditions that exist in the work place. This is a common misconception as behavioral methodology involves ensuring safe behaviors are reinforced both individually and as a group rather than focusing on the punishment of unsafe actions of individuals. The authors also mention reliability as a variable in how successful a behavioral intervention may be. In their study, they considered the lack of integrity checks for the dependent and independent variables to be a limitation. This is because it is difficult to fully understand how and why a specific level of success was reached (or not reached) without a knowledge of whether intervention implementation followed intervention design adequately. Leadership has the responsibility to ensure that behaviors that are being reinforced and punished as part of a new intervention have a means of being shaped throughout the organization. This will assist in avoiding the creation of subcultures among different groups of individuals within a greater work community.

Unfortunately, leadership often ignores the unintended creation and existence of these subcultures and the patterns of behavior that are involved, and simply dismisses them as the “wrong way” of completing a task. While leadership may have clear and concise rationale as to why a behavior that employees engage in frequently is from their perspective an undesired one, it is important that leadership understand that in the context of direct-acting contingencies the behavior is neither right nor wrong, but is simply one that is reinforced and thus is maintained in those engaging in it. As such, the work community may not view the undesired behavior as wrong, but as the method best suited for their needs.
Other Factors Affecting Safety

In addition to discussing how work culture may be affected by manipulating patterns of behavior and performance, it is important to also understand other factors that affect safety at work. Not all work environments are alike, and as such, some offer greater protection against injury and illness while others make it more difficult to remain healthy and safe. The United States is considered to be one of the leaders in occupational safety worldwide. In 2011, according to the U.S. Bureau of Labor Statistics, there were 2.3 incidents of injury and illness per 100 oil and gas employees. U.S. offshore operations boasted an even lower rate of 0.8 incidents per 100 full-time employees. The International Labour Organization (ILO), based in Geneva, reported in 2003 that in Established Market Economies the reported versus estimated work fatalities were 14,608 and 16,170, respectively for the year 2000. This means that about 90% of the fatalities were reported. In contrast, The Middle Eastern Crescent region had an estimated 28,019 fatal accidents at work with only 1,876 of those deaths reported to the ILO. Thus, the percentage of accidental work deaths reported in that region in the year 2000 was 7%. Other developing regions had similar percentage rates of reporting. The report by the ILO reported that on average, the rates of occupational fatalities, accidents and illness are declining in the industrialized countries while either holding steady or rising in developing regions. Some of the reasons for this discrepancy mentioned in the report are the more labor-intensive work trends in developing countries. In addition, climatic conditions are usually more demanding in the developing regions of the world. Another factor may be the less sophisticated machinery and equipment used in developing countries. While working to change patterns of behavior is key to a sustainable safety
initiative, it is imperative that these factors be kept in mind as they too influence the health and well-being of those at work.

The current study was conducted in order to determine to what extent the work culture and the patterns of behavior that make up the work culture may be influenced by a manipulation of the consequences surrounding key behaviors that are currently not emitted or are emitted incorrectly. The objective of the study was to utilize behavioral tools and techniques to increase behaviors deemed desired and safe by leadership within the organization. In addition to documenting any changes in behavior and work culture due to the intervention, strengths and opportunities for improvement in future work are discussed, as well as recommendations based on the data and the experiences of those involved in the current study to provide a set of guidelines that can aid future practitioners in their efforts in closing gaps between patterns of behavior as expected by leadership, and those behaviors that members of the work community actually engage in.
METHOD

Participants and Setting

The current study was conducted at three separate oil and gas gathering centers located within about 5 miles of each other in the Middle East. A gathering center is an upstream station within which crude oil and gas that has previously been pulled from the ground using oilrigs is collected, stored, processed and pushed out on its way to downstream facilities. These facilities house massive oil tanks and machinery used to compress gas from a gas to liquid form. Each gathering center has a control room within which the personnel monitor gauges and perform day-to-day operations required to maintain the facility. Participants were contracted employees, contracted supervisors, foremen, and the employees who supervise any work being done in and around the gathering centers of those who were applying for work permits. Participant ages ranged from 18 years and older, representing a variety of countries around the world. Participants’ proficiency in spoken and written English was on average satisfactory, allowing the researcher to communicate with them during sessions with little assistance from others.

Screening

Participants were chosen for the study based on their job requirements and their presence in the control room during times when the data collector was also present. The data collector’s presence in each facility could not be predicted with regard to the time of day. Often, multiple trips to each facility would occur in a single workday based upon
required duties that were not related to the current study. Thus, from the perspective of the participants, visits to each facility appeared random. The presence of the data collector at each of the facilities from day to day was also random and based upon the need to be at each one intermittently for other duties needing to be fulfilled under the work contract. The data collector visited the facilities randomly and unannounced on a daily basis. This resulted in the participants becoming comfortable with his presence in their work area. The researcher never recorded data regarding participant performance and behavior in their presence. This was done in order to minimize subject reactivity and ensure their behaviors did not change simply due to the presence of the researcher. The exclusionary criteria for participants included individuals not employed by the contracted companies, and individuals working in or around the gathering centers who were not involved in the permit-to-work process.

*Duration*

The study was completed between November 2011 and July 2013.

*Data Collection*

The graduate student investigator collected relevant data for the current study. The data were collected using a checklist for pinpointed permit-to-work behaviors. This checklist can be found in Appendix A. The checklist was used for each separate permit application. It served both as a permanent record of observed behaviors for future analyses and as a work aid for the student investigator, providing a list of items that were to be focused upon. A stack of blank checklists was kept in close proximity at all times while working in each facility. When an opportunity for the observation of relevant behaviors was present, a single blank checklist was obtained from the stack and attached
to a clipboard for greater ease of mobile use. The investigator then proceeded to record the observed data before placing the filled checklist in a secure folder along with other previously completed ones. The same checklist was used during both baseline and intervention in order to determine the efficacy of task clarification, feedback, and recognition on the frequency of the permit-to-work behaviors. Any data that were collected and utilized during the current study were kept anonymous and confidential. Information gathered using the checklist excluded the applicant’s name and contracted company in order to ensure anonymity. Due to contractual agreements made between the consultants and the client prior to the design and implementation of the program, only the individual practitioner was given approval by the client to be at the three facilities during the current study. Because most electronics were not allowed into the facility, the researcher was unable to utilize video equipment to record behaviors for later analysis by another party. Furthermore, using recording equipment would violate the agreement stating that all data recorded would remain anonymous and confidential. Thus, no means of verifying data collected and sessions conducted by the researcher were possible via inter-observer agreement. The implications of this limitation are reviewed in the discussion section of this study.

*Experimental Design*

The current study utilized time-series multiple-baselines across behaviors and facilities in order to determine the intervention’s influence on the frequency of pinpointed desired behaviors over time.
Procedure

Checklist Creation

Following introduction to the gathering centers chosen by the organization, information regarding permit-to-work was gathered through discussions with the organization’s leadership. In addition, permit-to-work system procedures were reviewed to determine the key behaviors necessary to complete the permit-to-work process successfully. The permit-to-work system was comprised of a series of checks and balances that are in place to ensure any work that is being done within and around the gathering centers is done so without placing any personnel, contractors, or the facility itself at risk. The system involved the contractors using a permit template provided by the personnel inside the control room to conduct a survey of the hazards and dangers of the area of intended work. Once this was completed and someone had checked the work area to ensure the conditions listed on the permit matched the area, one of the personnel in the control room signed off and the permit was then considered “open.” Once the work had been completed, the contractor returned the signed permit in order to close it out. Closing the permit completed the permit-to-work process. The checklist was then created using these key pinpointed behaviors.

Baseline Data Collection

Baseline data were obtained using the created checklist. During baseline, the data collector gained access to information through interaction with each permit applicant who came into the gathering center’s control room. Prior to applying for their permit, the collector asked each applicant if he could see their permit. After briefly reviewing the
permit, the data collector was able to fill out the checklist accurately on site in a short period of time (several minutes). These on-the-spot reviews of permits were necessary due to the fact that once the applicant left the control room to begin work; the researcher was unable to reliably gain access to the signed permits. Employees working within the control room were regarded by applicants as persons with authority. Thus it would not be extraordinary for one of these authoritative figures, in this case the data collector, to ask them questions regarding their presence in the control room. Further, since the data collector worked within each gathering center on a regular basis, his presence and interaction with permit applicants did not confound data regarding their behavior during baseline.

Intervention Data Collection

The inclusion of each item during baseline was a result of agreement between the researcher and the client organization as to which pinpointed behaviors best represented the rules and procedures of the Permit to Work (PTW) system. Prior to beginning intervention, data obtained during baseline were reviewed to determine which behaviors occurred least often and which were most vital to a successful and efficient permit-to-work process.

Two checklist items were chosen for intervention based on the above criteria: Item 1. Created a Job Safety Analysis (JSA) document specific for current work, did not use a generic template; and Item 5. Presented authorization card to Permit Issuer. Due to constraints, data obtained for items 6 through 9 was insufficient to determine the severity of deficit, if any. Item 1 was deemed important to the success of the PTW system because the JSA was the applicants’ main opportunity to identify hazards related to the
specific task that if uncorrected could lead to damage of machinery, time lost, injury, and death. During baseline permit, applicants were observed either utilizing a pre-filled JSA which did not consider individual risks, or not presenting a JSA when seeking permit approval. After discussions with site leaders, it was agreed that during intervention the criteria for Item 1 would be considered met if the applicant used the backside of the pre-filled JSA to identify 2 or three hazards relevant to the work being done as well as a behavior work crews would engage in to eliminate each hazard. This was done because having the applicant fill out a one-page-long JSA would conflict with the need to keep site operations moving in a timely manner, while at the same time shaping the applicants to actively identify hazards that may cause work crews harm. Item 5 was chosen because applicants rarely presented their identification card along with the permit and JSA to the permit issuer. This item met the criteria for intervention not only because of its extremely low occurrence, but because safety and security are closely related in work environments such as the ones in the current study. Failure to check the badges of individuals entering or beginning work could result in the presence of unauthorized people in the facilities.

During intervention, the data collector engaged permit applicants as they entered each gathering center’s control room. The same method was used to review the permits as was used during baseline period. After review of the permit, the data collector asked questions regarding the two chosen checklist items. During this interaction, the data collector clarified why and how to engage in the two checklist behaviors correctly and completely. This component of the intervention was the ‘task clarification’ of the intervention. This process included demonstrations of the key behaviors relevant to the
two chosen checklist items and any products of the behaviors where relevant. In the case of Item 1 on the checklist, the applicant was shown how to use the backside of his pre-filled JSA to write two or three hazards relevant to the work his crew was going to perform. The applicant was walked through the process of deciding what action best eliminated or reduced the hazards chosen. These were written down under the hazards themselves on the paper. It is important to note that while data were collected on all relevant and observable checklist items during both baseline and intervention, only the above-mentioned items (Items 1 & 5) were included as part of the intervention. Interactions with applicants who had previously received task clarification also received feedback regarding their most recent permit applications. This feedback served as a second component of the intervention and involved the data collector delivering specific information regarding the quality and occurrence of the chosen behaviors. In addition to task clarification and feedback, the data collector recognized the permit applicant for engaging in the chosen behaviors on the checklist. Recognition included any of the following: Shaking the applicant’s hand, vocal public recognition in the presence of other employees and contractors, involving gathering center leadership in thanking the applicant for engaging in the desired behavior(s). All recognition occurred within 10 minutes of the observation of a correctly completed checklist item.

HSIRB and Organizational Approval

The researcher was a member of a contracted behavioral consultation firm independent of the current study who completed the data collection. In order for the student investigator to utilize the data for purposes of this study, approval was requested and provided by the Western Michigan University Human Subjects Institutional Review Board.
Board. In addition to HSIRB approval, a letter of approval was obtained from the behavioral consulting firm that owns the data utilized in the current study.

Data Analysis

Once approval was obtained, the investigator organized all raw data from the checklists into spreadsheet form. From this spreadsheet, graphic depictions of the data were created. These visual depictions are presented and discussed below. In addition to visual depictions demonstrating changes in frequency of behavior over time, comparisons were made in order to determine if the task clarification, feedback, and recognition contingent on targeted checklist items produced any transfer to the completion of non-targeted checklist items.
RESULTS

Results of the current study include: 1) visual depictions and discussions of the data collected using the permit-to-work behavior checklist at three gathering centers, 2) statistical analyses of the significance of transfer effects from intervention checklist items to items not involved in the intervention.

Baseline Checklist Data

Following the baseline phase, data were plotted as the percentage of completion for each behavior on the checklist during each session. In order for the behavior to be counted as having been completed the task had to be accomplished in its entirety. For example, if the behavior was filling out a form, the applicant had to completely fill it out correctly in order to be counted as having been completed. The visual depiction of the baseline checklist data presented in Figure 1.

Figure 1 represents data from all three gathering centers and demonstrates that the 2 items that were completed the least during baseline at all centers were Items 1 and 5. Following analysis of the data used for Figure 1, the decision was made to remove items 6 through 9 from further graphic representations of the data. This was decided because there were too few observations made to determine whether the data represented the behaviors accurately. Because these checklist items represent behaviors that occurred after the permit has been issued to the applicant the researcher was often unable to accompany the applicant to the actual work area in order to gather reliable and accurate
Figure 1. Percent completed for each checklist item during the baseline phase.

behavioral data. When data were obtained, it was done so in circumstances that led to false positives. One anecdotal example of these false positives relates to Item 7 (Supervisor is on site during random check, with approved Permit to work). During the few times these random checks were possible, supervisors were usually in the vicinity of the work being done, but were usually overseeing projects being done by more than one separate work crew. When asked for the PTW, they could usually provide it but had to determine which permit was relevant to which worksite. Due to these and other confounds, the decision to focus on Items 1 through 5 was made with the approval of site leaders. One site leader anecdotally commented that Items 1 through 5 were the most important at the time of this study because if behaviors needed for starting work safely were met, failure to complete the remaining checklist items was less worrisome to him.
In order to ensure that data from one gathering center is not confounding those from another, the data disaggregated by center are depicted in Figure 2.

![Applicant Baseline (GCs Separated)](image)

**Figure 2.** Percent completed for each checklist item during the baseline phase separated by gathering center.

Figure 2 demonstrates that Items 1 and 5 represent key behaviors that were typically completed at all three gathering centers.

**Checklist Item 1**

**Gathering Center 15**

Baseline and intervention data from Gathering Center 15 for Item 1 are presented in Figure 3 below. The graph shows an increase in completion from an average of 4.2%
during baseline to 90.6% during intervention. The red numbers accompanying each data point represent the number of permits included in the percentage depicted.

**Figure 3.** Percent completed for Item 1 on the behavior checklist for GC-15.

Figure 3 depicts a significant increase in checklist Item 1 completion from baseline to intervention. While it is clear that the intervention had an impact on behavior, Figure 3 does not show whether the applicant required task clarification in order to complete the item. Figure 4 depicts the same data shown above in column form. Each column is divided into three parts: Percent correct without task clarification, percent correct with task clarification, and percent incorrect.
Figure 4. Percent completed correctly with and without task clarification for Item 1 on the behavior checklist for GC-15.

Figure 4 provides a more detailed depiction of the process of moving applicants from almost never engaging in any effort to identify hazards during baseline, towards identifying 2 or three hazards with the assistance of the researcher, and finally towards identifying hazards for each specific work permit without any prompting or assistance from anyone in the control room.

Gathering Center 23

Baseline and intervention data from Gathering Center 23 for Item 1 are presented in Figure 5 below. The graph demonstrates an increase from a completion average of 0% during baseline to 100% during intervention.
Figure 5. Percent completed for Item 1 on the behavior checklist for GC-23.

As seen in Figure 5, applicants never completed a JSA on their own. During intervention, applicants completed JSAs for each observation made. As shown in Figure 6, all instances of Item 1 completion at this gathering center occurred with task clarification. Due to time constraints, the intervention at this facility was shorter in duration than at the other two facilities. It is not known whether a continued intervention phase at GC-23 would have yielded high percentages of completion of Item 1 without the need for task clarification. The results shown for GC-15 suggest there was a reasonable chance of achieving this, had the intervention been longer.
Figure 6. Percent completed correctly with and without task clarification for Item 1 on the behavior checklist for GC-23.

Gathering Center 25

Baseline and intervention data from Gathering Center 25 for Item 1 are presented in Figure 7. The graph demonstrates an increase from a completion average of 0% during baseline to 94.2% during intervention.

Figure 7. Percent completed for Item 1 on the behavior checklist for GC-25.
As with the other facilities, completion of Item 1 during intervention was significantly higher than during baseline. Figure 8 below depicts the same data in column form. This has been done to specify the percentage of completion with and without task clarification.

![Figure 8](image)

**Figure 8.** Percent completed correctly with and without task clarification for Item 1 on the behavior checklist for GC-25.

Figure 8 shows a large increase in completion of Item 1 following intervention. The duration of the intervention in this case may have been too short to produce checklist completion without task clarification. Although this hypothesis is merely speculation, the possibility is evident by the fact that near the end of data collection for GC-25 an instance of completion without task clarification was observed. This instance is depicted in the graph.
Checklist Item 5

Gathering Center 15

Baseline and intervention data from Gathering Center 15 for Item 5 are presented in Figure 9. The graph demonstrates an increase from a completion average of 7.5% during baseline to 78.1% during intervention. A visual inspection of the graph reveals that they were able to achieve a consistent 100% completion rate during the final three data points of the intervention. There was also a clear decrease in variation in percent completion throughout the intervention phase.

Figure 9. Percent completed for Item 5 on the behavior checklist for GC-15.

The increase from baseline to intervention can be seen in more detail including the use of task clarification in Figure 10.
Figure 10. Percent completed correctly with and without task clarification for Item 5 on the behavior checklist for GC-15.

Figure 10 presents results indicating that over the span of the intervention applicants began completing Item 5 more often without task clarification. The results also show that consistency may be obtained when considering behaviors in the work place.

Gathering Center 23

Baseline and intervention data from Gathering Center 23 for Item 5 are presented in Figure 11. The graph demonstrates an increase from a completion average of 5% during baseline to 100% during intervention.
Figure 11. Percent completed for Item 5 on the behavior checklist for GC-23.

The increase from baseline to intervention can be seen in more detail including the use of task clarification in Figure 12.

Figure 12. Percent completed correctly with and without task clarification for Item 5 on the behavior checklist for GC-23.
Gathering Center 25

Baseline and intervention data from Gathering Center 25 for Item 5 are presented in Figure 13. The graph demonstrates an increase from a completion average of 0% during baseline to 61.4% during intervention.

![Graph](image)

*Figure 13.* Percent completed for Item 5 on the behavior checklist for GC-25.

The increase from baseline to intervention can be seen in more detail including the use of task clarification Figure 14.
Multiple Baseline across Items at GC-15

The intervention at Gathering Center 15 was identical to those at Gathering Centers 23 and 25 in all aspects except one. At GC-15 the interventions for Items 1 and 5 were not initiated concurrently. This allowed the researcher to analyze data from both items to determine if trends exist regarding the efficacy of the intervention. Figure 15 depicts the multiple baseline across checklist Items 1 and 5.
Figure 15. Percent completed correctly across Items 1 and 5 at GC-15.

Task Clarification began for Item 1 approximately three weeks prior to Item 5. During those three weeks, Item 1 completion increased significantly more than Item 5. This demonstrates the efficacy of the intervention as it was only implemented with Item 5 during that period. There was an increase in completion of Item 5 during that time, although not as significant change as Item 1. This suggests that intervening on one key behavior involved in the PTW process may have effects on other checklist behaviors. However, once the intervention was directly implemented with Item 5, levels of completion increased to a steady high level similar to the level achieved with Item 1.
Effects on Non-intervention Checklist Items

In order to determine if the interventions had similar effects on checklist items that were not involved in the intervention, data from these other items were analyzed and graphically depicted in Figure 16.

Figure 16. Percent completed for all items at GC-15.

The above graphic shows the percent completion of all items on the checklist. Items 1 and 5 are shown in red and green respectively. The graphic demonstrates a concentration of the data towards a higher completion percentage during the intervention phases. A similar concentrating of completion percentage data was seen for the other Gathering Centers. Figures 17 and 18 depict this finding.
Figure 17. Percent completed for all items at GC-23.

Figure 18. Percent completed for all items at GC-25.
To further examine whether the completion percentages of items on the checklist that were not involved in the intervention were affected during the current study, separate graphic depictions of each item for each facility are shown in Figures 19-36.

**Figure 19.** Percent completed for Item 2 at GC-15.

**Figure 20.** Percent completed for Item 2a at GC-15.
Figure 21. Percent completed for Item 2b at GC-15.

Figure 22. Percent completed for Item 2c at GC-15.
Figure 23. Percent completed for Item 3 at GC-15.

Figure 24. Percent completed for Item 4 at GC-15.
Figure 25. Percent completed for Item 2 at GC-23.

Figure 26. Percent completed for Item 2a at GC-23.
Figure 27. Percent completed for Item 2b at GC-23.

Figure 28. Percent completed for Item 2c at GC-23.
Figure 29. Percent completed for Item 3 at GC-23.

Figure 30. Percent completed for Item 4 at GC-23.
Figure 31. Percent completed for Item 2 at GC-25.

Figure 32. Percent completed for Item 2a at GC-25.
Figure 33. Percent completed for Item 2b at GC-25.

Figure 34. Percent completed for Item 2c at GC-25.
Figure 35. Percent completed for Item 3 at GC-25.

Figure 36. Percent completed for Item 4 at GC-25.

**Baseline vs. Intervention**

In Figure 37 below, completion percentages for each item during baseline at GC-15 are compared with those during intervention.
In addition to a visual analysis of the data in Figure 37, a mean paired-t statistical analysis was conducted to determine if any changes in non-intervention checklist items (Items 2-4) were significant. The analysis resulted in a p-value of 0.015 demonstrating that changes were significant.

Figures 38 and 39 below depict the same comparison between baseline and intervention data for GC-23 and GC-25 respectively.
Figure 38. Baseline VS Intervention percent completion for all items at GC-23.

Figure 39. Baseline VS Intervention percent completion for all items at GC-25.
Similar mean paired-t statistical analyses were conducted for the data in the above figures. The analysis of data from GC-23 resulted in a p-value of 0.010, demonstrating significant changes from baseline to intervention for all non-intervention items. A p-value of 0.007 demonstrated changes from baseline to intervention at GC-25 were also significant.
DISCUSSION

This section of the study examines and discusses the successes achieved and hardships encountered by the practitioners while designing and implementing the intervention discussed in the methods section above. In addition, recommendations for practitioners in the field for future implementations are discussed.

Successes

Increase in Targeted Behaviors

As demonstrated in the results section, both checklist items subjected to the intervention showed very significant increases in completion rates from baseline to intervention. Item 1 on the checklist requested the permit applicant to fill out a JSA that specifically addressed hazards and dangers that may be encountered during the upcoming work. While this item was almost never completed during baseline, the use of task clarification, feedback, and recognition increased the completion rate to above 80 percent at all three facilities. The same significant increase in completion occurred with checklist Item 5. During baseline, permit applicants very rarely presented their identification cards along with their work permits. During intervention, completion rates rose to above 60 percent at two facilities and 100 percent at the third. These results demonstrate that the intervention was successful in achieving increases in behaviors the client deemed pivotal to a successful permit-to-work process. While these increases do not guarantee an increase in safe behaviors while actually conducting the work described in the permits, it
serves as a vital stepping-stone moving those involved in a positive direction away from expectations of compliance towards a deeper understanding and acceptance of the rationale behind some of the safety initiatives in place.

Increases in Non-targeted Behaviors

In addition to significant increases in completion rates of the two targeted checklist items, statistically significant increases were also observed in the completion rates of checklist items that were not involved in the intervention directly. Contractors in all three facilities involved in the study showed statistically significant increases in compliance for non-targeted items during the intervention phase. When working to remove barriers to success, practitioners often find that these barriers are often multifaceted. These positive results demonstrate that while a practitioner may not have the capabilities to resolve each of the issues that comprise a barrier to success immediately, intervening on one or a few of these issues can change the work environment in a manner that makes the resolution of remaining problems more attainable. Items chosen for intervention based on their importance and their low percent completion rates, were completed more often than those that were not. During the intervention, participants became very comfortable engaging in the key behaviors required for completion of Items 1 and 5 on the checklist. They also became accustomed to receiving public and personal recognition for their success in completing those items. Each occurrence of recognition served two purposes for each participant. First, it was presented as a consequence that followed the targeted behavior. Because the recognition was a consequence and was part of a treatment package that increased desired behaviors it is likely to have acted as a reinforcer. However, because a component analysis was not
completed as part of the study, it is unknown whether the recognition served to increase the occurrence of desired behaviors. The behavior may not only be reinforced by the recognition itself, but also the sight of the practitioner who delivered the feedback as well as all of the personnel present in the facility's control room. In addition to reinforcing the specific occurrence of the behavior, all of these stimuli served to prompt the participant to engage in the behavior the next time he entered the facility. The environment thus not only reinforces the targeted checklist behaviors, but also signals to the participant that engaging in these behaviors will result in the further positive consequences. In essence, seeing the practitioner and the control room personnel prompted the participant to write a custom JSA and reach for his ID card. Because all behaviors on the checklist were part of the same overall process, it can be said that completion of the other items on the checklist may have been adventitiously reinforced by the recognition as all checklist behaviors tended to occur within the same ten-minute period. Although not enough data were obtained to merit the inclusion of checklist Items 6 through 9 in the final analyses, it should be noted that on the rare occasion when behaviors relating to these items were observed they supported the above theory regarding adventitious reinforcement. While there were marked improvements in Items 1 through 5 during intervention, no evidence of an increase in the occurrence of behaviors related to Items 6 through 9 was observed. Although these items involved behaviors within the same permit to work process, the behaviors occurred during the actual work and after the work was completed on site. Thus, they could occur several hours after the permit applicant had left the control room. If the participant completed Items 1 and 5 on the checklist he would receive recognition within 10 minutes. Because Items 2 through 4 would occur during the same 10 minute
time period, they would likely be adventitiously reinforced along with the intentional 
reinforcement of Items 1 and 5. On the other hand, there was no opportunity for 
adventitious reinforcement for Items 6 through 9 because of their occurrence outside of 
the 10-minute period discussed previously and the fact that the intervention did not 
involve providing task clarification, feedback, and recognition to any of these later 
checklist behaviors that may occur within close time proximity of each other. As 
mentioned, the opportunities to collect data in a scientific and reliable manner on 
checklist Items 6 through 9 were few and far between. For this reason, it must be noted 
that the conclusion that there was little or no increase in checklist Items 6 through 9 is 
based primarily on anecdotal evidence. It is anecdotal in nature because the opportunity 
to observe behavior reliably was rarely available. While it was not possible to collect 
reliable and usable data for these behaviors much of the time the observer often witnessed 
and anecdotally noted the lack of completion of these checklist behaviors while on site. 
These observations often took place during a walk-about with leadership, or during entry 
and exit from the facility.

Safety Competence

One of the successes achieved by this intervention was the increased competency 
regarding safety among the participants. During task clarification it was clear to the 
practitioner that permit applicants did not understand the rationale for some of the safety 
procedures as well as the importance of some of the safety equipment. One example 
involved welding. When welding on site, a special face shield is required by all workers 
who are in the line of fire. On more than one occasion during task clarification, 
participants demonstrated a lack of this knowledge by asserting that only the individual
holding the welding tool needed to wear a face shield because the sparks do not go far enough to injure anyone else in the vicinity. Due to their involvement in the intervention, many of the applicants are aware of unsafe situations and behaviors that could lead to injury or death.

Positive Relations

During any workplace intervention, practitioners' relationships with those they interact with are as important as the tools, techniques, and experience they utilize. One of the standout successes of the current intervention was the relationship forged with employees working in the facility. The practitioners involved in the facilities were able to earn the respect and trust of the permit applicants. This is very important because most if not all of the permit applicants did not have positive relations with any of the control room personnel. Often, the permit applicants were seen as uneducated and untrained by the engineers in the control room. The applicants often feared the control room personnel due to the brusque and abrasive manner in which they were treated. The introduction of the practitioner to the environment provided a familiar smiling face whom the permit applicants viewed as a "foot in the door" when it came to dealing with control room personnel. The applicants viewed the practitioner as a link to the control room personnel. This positive relationship with permit applicants and thus participants in the study allowed for behavior that was based more on positive reinforcement than on avoidance and escape contingencies. When the intervention was initiated the participants tended to engage in the key behaviors on the checklist not to avoid punishment, but in order to receive recognition and praise from the practitioner. These relationships should be
heavily credited for the increase in completion rates as they allowed for the task clarification, feedback, and recognition to be accepted by the recipients.

In addition to positive relations with the applicants, the practitioner's time spent in the control room allowed for bonds to be made with control room personnel. On most workdays the practitioners were invited to share in the personnel's community lunches at their assigned facilities. The practitioners often shared anecdotal stories about their positive experiences with each other after work hours. A number of practitioners reported being invited by these personnel to their private homes for dinner with their families. These bonds were instrumental in breaking many of the stereotypes of a "safety professional" the control room personnel had come to expect. The practitioners discussed different aspects of safety at work with the personnel daily. In addition the practitioners spent many hours discussing items that had no relation to safety on the job. Subjects such as sports, electronics, politics, history, and food were discussed at length during any given workday. These conversations separated the practitioners from those safety professionals who dropped by occasionally to reprimand an individual or a team for a safety issue or to conduct a random audit of the safety features at the facility. The control room personnel's trust in the practitioners reached a level such that they often confided to the practitioners their discontent with the organization's internal Health Safety & Environment (HSE) department. This department is charged with overseeing all initiatives aimed at ensuring rules and regulations are adhered to with regard to the health and safety of all employees as well as those in the surrounding community directly affected by work operations conducted by the organization. These honest conversations gave the practitioners an avenue to recommend ways personnel could improve safety at
the facility. In essence, it was an opportunity to teach the employees at the facilities that they each had a duty to themselves and their teams to ensure safety is valued on a daily basis.

One of the most valuable changes in relations was observed between the permit applicants who served as participants in the current study and the control room personnel. While there was still much room for improvement at the end of the intervention, there were several occasions when public recognition of participants led to increased positive interactions between the participants and the personnel. These positive interaction encouraged the control room personnel to engage in less disrespectful behaviors towards the participants. For example, instead of yelling at the applicant for an issue detected on the work permit, the practitioner would be called over for a discussion about what was still required of the applicant before work could begin.

**Barriers to Success**

Whenever an implementation of any kind is undertaken there are barriers to success that need to be overcome in order to obtain the best results. The following is a discussion of the various barriers to success encountered by the practitioners involved in the work during the implementation.

Organizational Leadership Support

During the first meeting on site with the managing director, practitioners were given an opportunity to introduce themselves and briefly describe their approach to safety. The director then spoke about the need for increased safety at the organization. One important departure from other calls to action with regard to safety processes was the overall stated goal. In past implementation with other organizations, the practitioners
were accustomed to goals such as "ZERO INJURIES" and "1 MILLION MAN HOURS WITHOUT INCIDENT." The main goal as stated by the managing director at the current organization was to become "Number 1 in safety in the Region by 2013.

Although not immediately clear to the practitioners, throughout the course of the implementation it became evident that the organization's goal indicated a departure in motivation for increased safety. Where the ultimate goal of implementations was to "be good," the current organization seemed content to "look good". During the months after this initial introductory meeting, the director and other leaders spent very little time managing and supporting the safety process being designed and implemented. Support for any initiative by all levels of leadership is paramount to any endeavor. When frontline employees know that this initiative involves everyone from top to bottom, they are more likely to value the initiative themselves (Cook & McSween, 2000). The increase in value placed on any initiative affords practitioners greater stimulus control over not only those behaviors that are key to the success of the implementation, but also those that may be barriers to success.

It is important for leadership within any organization to understand some of the key characteristics of a good safety culture. Cooper (1998) lists some of these characteristics. They include strong senior management commitment and involvement, closer contact between all organizational levels, a stable workforce, a proper training procedure with follow ups, ongoing safety initiatives stressing the importance of working safely, and good personnel selection and placement procedures. All of these characteristics may be shaped over time in order to gradually and sustainable mature the organization’s safety culture.
Organizational Supervisory Support

It is important that those who supervise and lead be able to identify the behaviors that are key to success and to increase those behaviors. Komaki (1986) conducted a study demonstrating the importance for a leader to monitor and collect data regarding subordinate performance levels. In the case of the client supervisors during the current study, there indeed was a high level of monitoring. Unfortunately, it was neither first hand (they did not monitor behavior and performance themselves) nor was it based upon criteria linked to success of the initiative. Instead, supervisors had become accustomed to monitoring some criteria without regard as to their effect on other disregarded but critical performance measures. Their criteria included being on time to work, fulfilling daily contract obligations, and reporting progress on a regular basis. It is important that work being done on site be started and completed in a timely manner. It is also pivotal to success that all parties involved work to accomplish all obligations as specified in the agreed-upon work contract. One of the barriers to success during the current implementation was the rigidity with which the criteria were implemented. The organization, having hundreds of oil and gas facilities, was accustomed to having contracted workers complete specific objectives without much need for change in work plans. Thus, a culture of rules, regulations, and lack of flexibility had taken hold long before the practitioners had arrived to implement behavioral changes to increase safety. When shaping behavior, one must remember that there is no manual for behavior change. While the environment's effect on mechanical technology may be predicted using formulas, there is no such mathematical equivalent when working to increase or decrease individuals' behaviors. This means a practitioner needs to be afforded the ability to make
changes at a moment's notice. These changes are based on feedback from data gathered during the intervention as well as from the organization and its community of workers. During the current implementation the organization did not make a distinction between contracted manual labor, which it was accustomed to, and the practitioners' consultation efforts that required a high degree of flexibility and continuous feedback to and from the organization.

For example, each of the practitioners was charged with managing the behavioral safety implementation at three separate facilities simultaneously. Because these three facilities were relatively close to each other, in most cases the practitioners were able to visit and work with each of the three facilities on any given day. Unfortunately, members of the organization at the supervisory level were not willing to allow the practitioners to make decisions based on their best judgment. Instead, practitioners were held to the 'program of work' that was required with each previous month's work report. These programs specified which of the three facilities a practitioner was to work in during the required 8-hour day. The program set these standards for each upcoming month, sometimes a full month in advance.

While some manner of structure can help keep a project or implementation on schedule, it is very important that a practitioner be given the ability to make decisions based on daily exigencies. During work with one of the facility's leadership team members, a practitioner was asked to return at a specific time the following day for a chance to tour the facility and discuss potential behavior-related hazards. Due to the lack of flexibility given to the practitioners, he was required to be present at a different site during that time. Unfortunately, the practitioner was unable to mend the relationship
with the individual on site in the time frame of the implementation. When implementing behavioral change it is critical that buy-in is achieved at all levels of an organization. Without buy-in from the site leader, true and lasting behavioral change would be difficult to achieve.

Another case in which the implementation suffered from a lack of flexibility came early in the design phase. As there were multiple geographical locations within which facilities were clustered together, part of the organization's initial duties was to assign each practitioner three facilities to work with. A discussion involving top leaders from each geographical location was conducted to determine how these facilities would be chosen. During the initial meeting the practitioners were charged with presenting two separate methods of division of labor. One method presented would have each practitioner in a separate geographical area working with three facilities. The second method would have all practitioners working within one geographical area, each still managing three facilities. The practitioners decided the second method would provide the greatest impact on a single geographical area, thus providing a template with which to expand the implementation to the rest of the organization's facilities. In addition to simply having a greater number of practitioners working to improve safety, the second method would allow practitioners to work more closely with each other to make changes and provide input as a team. Unfortunately, in order to prevent the appearance of treating any single location as having more importance than the others, the first method was chosen. As a result of this decision, there was no opportunity for more rigorous implementations utilizing inter-observer -agreement.
Another barrier to success with regard to flexibility of the expert practitioners involves making content changes. While it is always important to fulfill contract obligations, truly devoted practitioners will always go the extra mile in order to provide the greatest positive impact on an implementation. On several occasions, practitioners were punished for applying their expertise to situations in order to exact the best possible results. Having obtained baseline data regarding behaviors involved in the permit-to-work system as discussed in the Method and Results sections, the practitioner met with supervisory level personnel to share findings and plan the next steps. After presenting the data and recommendation as to what may be done to achieve success, the practitioner’s efforts were disregarded as side work and a focus was placed on meeting contract requirements such as filled-out timesheets and correct attendance at each of the three designated facilities. It is critical that data showing both opportunities for improvement and areas of strength be communicated to all levels of an organization. In this case unfortunately decision makers within the organization did not see these data and thus actions could not be taken to sustain any behavior change that the implementation achieved. In addition to the information not being shared with those who can truly enact changes, behavioral changes achieved were left unrecognized by leadership. As reported above, all items on the checklist saw significant changes in the positive direction following the intervention. Unfortunately, other than the participants who were recognized by the practitioner for their completion of checklist items, none of the facilities received praise from organization leadership. On several occasions, the practitioners reported hearing complaints from multiple facilities regarding the lack of recognition from leaders in both Operations and HSE departments. Positive feedback to
the front-line employees from leadership is a simple and great method of engaging those who keep the organization running smoothly.

Practitioner Selection

The requirements for selection and placement of practitioners for the current implementation was specified within the contract signed by all parties prior to the start of any work. These requirements included having at least two practitioners who spoke the native language in addition to English, having at least a Master's Degree in the field of safety, and having extensive experience implementing behavioral safety initiatives. From the onset of the practitioner selection process, the above requirements were barriers to the success of the implementation. While there are a great number of practitioners who are extremely knowledgeable about the science of behavior and the methodology involved in best practices, the consulting firm was unable to find more than one practitioner with a background in behavioral science who was fluent in both English as well as the native language spoken at the organization. As the contract stated practitioners were required to have experience in safety, it was deemed acceptable to hire practitioners who spoke the native language and had extensive experience working in safety. Unfortunately, this meant that safety professionals had to be hired who were not properly trained in behavioral safety. As such, these practitioners were unable to demonstrate knowledge and mastery of the tools and techniques normally utilized to implement a successful and sustainable safety process. While only two of the required five practitioners needed to speak the native language, the others were still expected to have extensive experience in safety. While there were a handful of practitioners who could not speak the native language but were well versed in the science of behavior, they were deemed often times
as not having enough experience and being "too young" to perform their tasks successfully. It should be noted that these young practitioners held advanced degrees in Applied Behavior Analysis and Industrial/Organizational Psychology and had extensive experience with implementing safety processes with large organizations in multiple industries. The dilemma faced by those responsible for staffing was whether to push for younger practitioners with less experience, as measured in years, worked but more experience in designing and implementing a behavioral safety process, or to meet the requirements set forth in the original contract by hiring safety professionals not well versed in any form of behavioral science in hopes that the organization will allow deviations at a later date when successes in the behavioral process have been achieved. While staffers and practitioners worked tirelessly together to overcome the obstacles mentioned here, it was clear that all parties involved should have ensured that any personnel requirements set forth in the original contract were attainable.

While practitioners in the broader field of safety brought decades of experience with traditional programs, the goal for the current work was to improve safety using a behavior-based safety process. As such, it often fell to the younger yet behaviorally trained practitioners to design and develop the tools required for implementation of the behavior-based safety program. The checklist used to obtain the data in the intervention mentioned above was created first by a single practitioner with behavioral experience, then edited alongside two others with similar training in order to reduce all checklist items to specific pinpointed behaviors that were measureable and observable. While three other traditional safety professionals were present during this work, they were unable to assist in pinpointing items due to their lack of behavioral training. The science
of behavior directs practitioners to investigate what variables in the environment encourage someone to behave in a certain manner. The organization involved clearly had a history of accepting those with more experience in safety, regardless of their ability to demonstrate mastery of specific behavioral tools and techniques. Any individual or organization might naturally assume they would receive better service or a better product from someone who has been involved in the broader field for a longer period of time.

Unfortunately, this time-centric approach to measuring value added by a practitioner did not benefit either party involved. In a case such as this where the organization's method of predicting an individual practitioner's success needs to be altered, the burden of shaping this change falls to the consulting leadership. Perhaps these younger yet trained practitioners would have encountered less opposition from the organization if their value had been better communicated prior to the implementation.

Client Roles and Duties

One of the hardships encountered almost immediately after arrival at the client's sites was the lack of specifics in terms of roles and responsibilities of the client’s staff. While the practitioners were directed towards a single person who was to be the "point of contact," this individual was often unavailable and was quick to delegate his responsibilities to others. While this delegation is acceptable and even expected when matters other than the implementation require his or her attention, it is important that roles and responsibilities remain clear throughout. During the current implementation, there was a significant delay in the retrieval of vital historical safety data needed for analysis during the initial assessment phase. This delay was the result of confusion regarding which of the several client staff members had the authority to provide the data.
to the practitioners. The client’s point of contact did kindly assist by providing phone
numbers and location of the relevant staff members to the practitioners. However, often
these members either were unavailable or in one case had transferred to another
department entirely. Once again, when working in a fluid environment a practitioner
must be prepared for the unlikely. Unfortunately, due to a lack of specificity regarding
the responsibilities of the point of contact, the practitioner was unwilling to take the
initiative in determining the fastest and most efficient method of obtaining the data.
Once this had become clear to the practitioners, the client was asked for access to the
databases directly; a request to which the client agreed. As with the earlier instance, the
task of obtaining access for the practitioners was also marred by a lack of delegation and
thus took weeks and in some cases months to obtain. The practitioner involved in the
intervention discussed above never received access to the databases at all, despite
repeated attempts. It is important that all persons involved in an initiative have clear and
specific roles and responsibilities in order to ensure accountability for tasks necessary for
the success of the implementation.

Another instance of confusion due to a lack of specificity in client responsibilities
appeared when the practitioners first visited each chosen facility. While they had been
told that each facility would be informed of the new initiative, this did not occur.
Leadership at these facilities spend much of their day managing personnel, operations,
and any problem that arises during any given work shift. It is understandable to expect
these leaders to be less than welcoming when approached by a practitioner without
having been briefed prior to his arrival. It is important to the start of a good professional
relationship that the comfort and convenience of the client are not compromised.
Unfortunately, in this case each relationship began with an inconvenience to the facility leaders in the form of an unknown person presenting to discuss safety, a topic usually associated with unannounced HSE audits often resulting in friction between those working within the facility and the HSE department.

Tools for the Job

While leadership, experience, and relationships are all important components of a successful implementation, the availability of tools required for the work can be the difference between success and failure. One of the important items needed to maintain a timely design and rollout of an implementation is accessibility. It should be the responsibility of practitioner and organizational leadership to remove any barriers with regards to both physical access to work sites and access to needed information. During the current implementation, practitioners encountered several accessibility barriers while working to increase safety at the facilities. The first barrier involved the failure to obtain travel visas that would allow them to remain in the country for more than 30 days consecutively. The work required for correct travel documentation to be issued was the responsibility of a sponsor company, which would receive a certain percentage of compensation for their work. For reasons unknown to the practitioners, this sponsor company was unable to obtain this documentation. Although visitor visas allowed practitioners to enter the country, due to the 30-day limit, each practitioner was required to leave the country and return prior to the start of the following workweek. As the contract dictated a 6-day workweek for practitioners, they were forced to leave and return either the same day or the next in order to be available for work. On occasion, it was not possible to return prior to the start of the following workweek. This resulted in either a
scramble to fill that practitioner's position at the facilities or face penalty by the organization for missed attendance. It is important that travel issues be dealt with prior to arrival of practitioners to the work site. Also, understanding what travel-related tasks need to be completed and who needs to complete them should be agreed upon prior to signing of the work contract.

Once in the country the next step for practitioners is to ensure accessibility to the work sites. Because the practitioners had not obtained work visas to enter the country, they were only able to use temporary permits. These permits usually only gave each practitioner access to the facilities for a maximum of one month. At times this proved to be a significant barrier to practitioner productivity and efficiency. The permit was needed to enter the facilities, yet the organization required them to be returned prior to granting the practitioner the next permit. On several occasions the department that handled worksite accessibility was unable to provide the new permits in time for the start of the following workweek. This may have been due to handling errors, national holidays, or other such barriers. When this occurred, practitioners were forced to remain in the corporate offices, rather than the work facilities.

Technology plays a very important role in keeping the client and the practitioners connected to each other. Phone and email are used extensively during an implementation to ensure all parties are involved in decision making. While adequate technology was provided to the practitioners in the form of mobile phones, Internet access proved to be a significant barrier throughout the implementation. Practitioners were often unable to communicate via email due to the inadequacy of the connections provided by the sponsor company. In addition to communication issues, reports and recommendations to the
organization were at times not delivered on time due to the lack of a reliable connection. While online access may not be considered as large a barrier as other issues, it may cause unnecessary harm to an otherwise successful implementation.

During the current implementation practitioners were expected to deliver written reports discussing their monthly progress at each of their assigned facilities. These reports functioned as a tool that gave practitioners a means of delivering impactful feedback and recommendations to the facility leaders as well as leadership within each geographical location where the facilities were located. The practitioners’ project manager reviewed the reports. Unfortunately, the project manager often removed recommendations made in the reports prior to final delivery to the client. This was done as a precaution due to a history of the client reacting negatively to the report and not approving it, thus preventing or delaying compensation for that month's work. It is important to note that feedback and recommendations focused on opportunities for improvement rather than simply pointing out deficits. It is difficult for practitioners to make a case for change if feedback depicting both strengths and weaknesses are not allowed to reach the client.

Recommendations

The following recommendations are based on the practitioner's experiences during the current implementation. They are presented in specific categories and function as guide of best practices for future implementations.

Work Contract

The contract that is agreed upon by all involved parties prior to the start of work is one of the most important aspects of any implementation. The contract will lay a
foundation from which both the client and the practitioner will build towards shared success. First and foremost, as a practitioner one must ensure that the scope of the work does not exceed his or her professional knowledge, skills, and abilities. If a client has a specific requirement that needs to be met for the work, ensure that they can be met prior to signing of the contract. If the situation allows for it, do not hesitate to discuss with the client their rationale for the requirement. Due to a strong desire to "win the work," practitioners may at times hastily agree to work requirements without fully understanding what will be required to fulfill them. It is important to remember that no two interventions are identical and no single practitioner or consultation firm has the knowledge, skills, and abilities to resolve every single issue a client may face. Knowing this, practitioners should always be able to turn down work that they do not feel they will be able to complete to the satisfaction of the client. In most cases, this decision is more likely to be made when the practitioner, having reviewed the client's needs thoroughly, determines that the work specified in the proposed contract is better suited for someone with a different skill set.

Once a practitioner has thoroughly read and understood the contract being proposed, a decision can be made as to whether the client and the practitioner are well matched to solve the problem. As with any partnership, one must ensure that there are common goals and that the methodology used to reach these goals are agreed upon by all parties prior to accepting the work. In the event that a practitioner finds discrepancies in either the goals themselves or the methodology used to attain and evaluate progress toward the goals, it is in both parties best interest to either decline the work or propose changes that will rectify these discrepancies. Declining work may be viewed as a loss of
opportunity for the practitioner, but in cases where changes to the contract are not possible prior to signing, the practitioner should be wary of "hoping for more leeway" after the contract is signed. That is not to say one should be quick to decline opportunities for work that involve any hardship at all, only to warn practitioners of the dangers of accepting work with the knowledge that as the contract requirements currently stand, the goals set forth by the client will not be attainable.

In addition to ensuring the scope of work is within the capabilities of the practitioner, it is vital that the contract specify in no uncertain terms every role that will be required for the success of the implementation. In addition to the roles themselves, the contract should also specify who will fill those roles. This will help create an atmosphere of accountability with zero confusion as to who is charged with each task. Another benefit of this approach is that redundancies in tasks and roles will be discovered and ideally eliminated prior to the start of work. In cases where tasks are time sensitive, do not hesitate to specify clearly when a person must accomplish a specific task. In the current implementation, the practitioners would have benefited greatly from a written delegation of roles and responsibilities in the contract. For example, choosing which facilities to begin with, who would obtain the organization's historical safety data, and who would provide the practitioners with access to the databases would not have taken up valuable time during the initial assessment phase if these issues had been carefully specified and agreed upon. The project would have progressed more smoothly if someone had been delegated to brief each site leader on the implementation and announce the arrival of each practitioner. These roles and responsibilities should be clearly written into the contract prior to signing. In addition, the contract should include
the identities of those who would take on the roles and responsibilities of anyone who
could not fulfill them at any given point during the implementation.

The contract should also specify what tools and techniques are to be used during
the implementation. If the work requires one-on-one coaching with personnel for
example, the contract should explain in detail where this will take place, what materials
will be used, how the materials will be provided and by whom. It should also specify
how the client intends to ensure the contractor has the necessary space and equipment, as
well as making sure personnel are available for coaching without interfering with their
other duties. If these specifics are not already provided in the contract proposal do not
hesitate to either request that these additions be made, or present them to the client for
their approval as addendums to the contract.

Communication

The quality of both internal and external communication is a key determinant of
the success and sustainability of any implementation. Internal communication involves
any exchange of information and feedback among the practitioners within the consulting
group. External communication refers to exchanges between the consulting group and
the client.

Internal Communication

When working as a team, it is crucial that time is allotted for discussion of the
work being done. These meetings should have a scribe who is able to note important
developments and action items, as well as keep time. A single person should lead the
meeting and provide an agenda regarding the topics to be covered. A clear agenda allows
the person leading the meeting to stay on target and ensure the meeting ends on time.
There should be time allotted specifically for comments, questions, and concerns from any of the practitioners. During the current implementation, a meeting was held once a week. It was led by the project manager and usually had an agenda. While the weekly meeting was conducted to allow for an open flow of information among practitioners, on several occasions the individual leading the meetings did not appropriately acknowledge the ideas and concerns of others. This meant that meetings often concluded without consensus on the next steps or proper action items for each practitioner, alienating members of the team from each other as well as ensuring the implementation did not benefit from any internal-quality-control via practitioner expertise. One recommendation for future practitioner meetings is to rotate who leads each meeting. This method has two benefits. First, it encourages members of the team to remain engaged and aware of all developments and occurrences that provide valuable information moving forward. Second, it avoids creating circumstances where practitioners are attending the meeting with the knowledge that they can not contribute or their contribution may not be given any value.

Team meetings and technology can only provide limited support if the practitioner team members are unable to communicate in a manner that is beneficial and positive. In addition to meeting in person to move the work forward, it is important for a team of practitioners to utilize electronic management tools to remain connected. The use of cell phones, email, text messaging, and cloud servers are well suited to keep required documents and information easily accessible to the practitioners. However, as noted previously these tools were continuously at the mercy of unreliable internet connectivity, an issue that can cripple productivity in any work place. Practitioners
should ensure that all of the tools are both available and reliable, keeping the work moving forward smoothly and efficiently.

During the current implementation, the availability of cell phones meant the practitioners had access to one another even after regular working hours, allowing them to communicate and make vital changes when needed. However, on occasion the lack of a set of communication guidelines did cause some conflict among the practitioners. Prior to beginning any work, the project manager of any team of practitioners should create a set of communication guidelines that can be reviewed at any time during the implementation. These guidelines may include each member's preferred method of communication and their availability to be contacted both during and after work hours. This information will help keep interactions between practitioners positive while encouraging team members to remain open to assisting in the event that one of their colleagues needs help.

**External Communication**

In addition to having open lines of communication among the practitioners, continuous effort is required by all involved parties to relay relevant information without overwhelming them with items that are largely irrelevant. This requires all members of the team to accurately discriminate when information needs to be relayed to specific team members. During the current implementation there were few opportunities for discussion between practitioners and the client leadership due to the hierarchical manner in which the client-practitioner relationship was viewed. A practitioner gaining knowledge and experience regarding a specific facility would be reprimanded heavily for contacting client leadership directly. Instead, the practitioner would be expected to pass on relevant
feedback to the project manager who would in turn deliver the feedback to the client. As mentioned earlier, this often resulted in the elimination of much if not all of the feedback if it did not show positive results. This demonstrates the importance of providing channels for direct communication between the consultants and relevant managers. Future practitioners are recommended to establish their ability to deliver open and honest yet respectful feedback to the client in a manner that does not allow for withholding of relevant information that could be valuable to the success of the implementation.

Another point worth mentioning is that practitioners should strive to keep relationships with individuals with whom they interact on a regular basis as positive and cordial as possible throughout the implementation. The current implementation involved a rotation of practitioners as they became available or went on vacation. As such, there were instances of a practitioner having to start work in a negative environment due to being associated with a past practitioner who failed to create a positive working relationship with key individuals at the facilities. It is highly recommended that a practitioner who is entering a work environment for the first time engage the client in a very positive manner regardless of the client's history with similar practitioners. This also applies to situations where the client's only experience has been with other practitioner organizations. It is vital that a good working relationship begin with a clear demonstration of flexibility, willingness to listen, and a feeling of shared value for the goal being pursued.

Perhaps one of the most valuable skills required of consultants is the ability to deliver feedback on problems to the client in a positive manner that does not reduce the client's faith in the effort at hand. Many effective practitioners have a history of
delivering quality recommendations to their clients, however it is critical for behavioral consultants to understand that what works for one client or facility may not work for another. They will also accept that they may not always be able to achieve the desired results on the first attempt. In essence, a great practitioner is a scientist who must assess a current intervention and make changes wherever needed to achieve the best results. This creates a conflict of interest. On the one hand, a practitioner must attempt to reach the desired goals in the time agreed upon in the work contract. On the other hand, they want to deliver quality service that will solve the problems at hand.

Completing the work in a timely manner ensures the avoidance of late-completion penalties and increases the likelihood of repeat business with the client. On the other hand, the practitioner must utilize his or her expertise to deliver a service or product that will be approved by the client. With this in mind, one must determine which of the following two methods of feedback is the better approach. Should efforts be made to move the client towards an understanding that changes need to be made to a current intervention, changes that do not necessarily signify a failure on the practitioner’s part, but simply a part of the scientific process of determining what works best with the current population? Or should the practitioner work to put the current results in the best light possible, thus escaping the possibility of not completing the work on time and avoiding a situation that could cause the client to doubt the capabilities of the practitioners? Having experienced this dilemma during more than a single implementation, the recommendation being made here is for the former of the two methods.

It is unfortunate that practitioners are at times pressured into adhering to an inflexible timetable because of the danger in being honest about needing to make changes
to a previously recommended implementation plan. No client wishes to hear that money already spent has shown no result and that more money is required for the same promised result. The pressure to package null or insignificant results and the fear of having to go over budget can be avoided by clear and open discussion prior to signing the contract. The practitioner should be clear that the process requires flexibility and the need to make changes at a moment's notice. In the same light, the client should affirm their flexibility with regard to making changes. There should also be a protocol written for exigent circumstances, including changes in method and amount of payment and hours provided. Once these details have been agreed upon, the practitioner is no longer pressured into dressing up lackluster results and the client is not disappointed when the practitioner proposes necessary changes.

It is important for practitioners to remember that while they may be the expert in the science of behavior and performance improvement, it is the client’s personnel who are experts in their industry. For this reason, the practitioner should work to learn as much about relevant aspects of the operation. One can make better judgments and build a better intervention when the work that is being done on a day-to-day basis is not a mystery.

Practitioners working in the facilities during the current implementation learned a great deal from the client personnel regarding the specifics of how crude oil and natural gas go from the ground to gas pumps around the world. In addition to gaining valuable and interesting information, this gives those being taught about the science of behavior a chance to do the teaching, further encouraging a culture of equality and eagerness to learn from one another.
Roles and Responsibilities

Open communication regarding any work being done is indeed paramount to the overall success of any endeavor. Perhaps even more important is the clarification of the roles and responsibilities of those communicating together. There is little sense in a person expecting quality feedback regarding a role with responsibilities of which they are unaware. Therefore, prior to ensuring that there is an open line of communication both among the practitioners themselves and between said practitioners and a client, the specification of each person's responsibilities within the implementation is recommended. While it may be more difficult and time consuming to do so, it is highly beneficial to ensure that all roles and responsibilities be written as specific pinpointed behaviors. This will avoid confusion regarding to what extent acting on a responsibility actually qualifies as having fulfilled that duty. In essence, it helps the person understand when exactly they are able to say that a specific task is complete. Each individual or group of individuals with differing responsibilities should be written into the initial contractual details. These details should include who is involved, what behaviors they will be engaging in, when they will be engaging in them, for how long they will be engaging in them, and who is responsible for completing their work if they cannot do so themselves. It may seem like an unnecessary step during contract negotiations if attitudes are mutually positive between client and practitioner; nonetheless it is vital to protect the interests of all involved parties. During the current implementation, many of these details were not made specific. This lack of specificity became a barrier as the practitioners struggled to determine exactly what the client regarded as quality work. When continuously queried for these details during implementation the client was unwilling to discuss their
requirements any further, citing that if there was any doubt as to what the requirements for success were they should have been raised prior to the signing of the binding contract. Being as specific as possible when it comes to the roles and responsibilities of both practitioners and client personnel ensures that neither side is left unaware of what is expected of them in pursuit of the agreed upon goals. This in turn leads to an alignment between the client and the contractor, which is critical to the acceptance by the client of both the intervention as well as those who have designed and implemented it.

Tools

Tools are often overlooked when discussing what makes an implementation successful. It is highly recommended that practitioners work together to determine which tools will be needed for the work and to what degree each tool is required for success to be achieved. For example, during the current implementation a laser printer had been supplied to the practitioners so that they may have a means of printing tools such as checklists and job aids. The printer performed nearly flawlessly, without issue. In addition to this, the supply of paper for the printer was seemingly endless and always within arms reach. Another positive was that it was located in a public area within the shared house where most of the practitioners lived during the implementation. Unfortunately, once on site there was little or no means of accessing a printer.

On a number of occasions data collected by the practitioner had to be coded in real time due to the need to use a single behavioral checklist for up to three separate individuals. While there will always be unforeseen barriers to move past, it would have been highly beneficial for the contract to include a requirement that a printer be made available at each facility in which a practitioner would be working. In addition, details
regarding who would be in charge of maintaining the printers and how often they would be checked for proper operation should have been included in the contract. It is important to realize that when working without the environmental controls seen in a laboratory setting, a variable that seems trivial can have a significant effect on an outcome. In fact, because it is impossible to predict all future encounters with new variables it is wise to include a clause allowing for addendums to the contract in terms of tools required.

This addendum would include the statement that the need for any new tools be justified to the client prior to approval of any addendum. It must be made clear in the contract that any augmentation of technology does not necessarily imply a change in scope of the work. For example, if the need for another vehicle for travel between facilities becomes apparent, the acceptance by the client of such a request and provision of said vehicle does not mean another facility may be added to the list of those within which a practitioner must implement the initiative. It must be clearly stated within the contract that the need to make technological changes or additions may become a reality, and that both the client and the practitioners must be flexible in working towards a common goal in the face of a rapidly changing environment.

Techniques

The world is full of experts in a variety of fields. As a specialist in the science of behavior, a behavioral practitioner has accrued a set of skills and techniques that he or she uses to design and implement a behavior-based initiative. It is important for practitioners to keep in mind that a client's understanding of the techniques being proposed may not match the expertise of the practitioner. As an analogy, a patient cannot
be expected to understand the intricacies of a viral or bacterial infection at the level of a trained medical professional. For this reason, it is often wise for a patient to seek the advice and counsel of said medical professional. Also, this same patient may be referred to a specialist if the need arises. This is done because the specialist has a set of skills and techniques that a general physician may lack. Similarly, it is important for the client to understand that the practitioners bring with them a set of skills and techniques that may differ from someone with whom the client may have worked in the past. During the current implementation, the client often referred to past experiences with practitioners implementing behavior-based safety initiatives similar to the one being designed by the current practitioners. Upon further investigation, it became clear that many if not most of the techniques used during previous implementations not only differed but contradicted those used by the current practitioners. Yet, the differences were overlooked, as they were all considered behavioral safety by the client. This problem created difficulties in gaining buy-in from most levels of the client organization due to negative past experiences with seemingly similar initiatives.

Practitioners should strive to learn about and understand in depth any past experiences the client is willing to share. In addition, specific contrasts should be outlined regarding the current set of tools and techniques prior to the signing of any contract in order to ensure the client is aware of the differences in methodology, regardless of any superficial similarities among functionally differing initiatives.

Practitioner Selection

As discussed in a section above, the selection and hiring of practitioners for the implementation was based upon specific requirements put forth in the contract by the
client. Unfortunately, while the requirements were stated in a very specific manner in order to avoid confusion, they were so stringent that very few individuals currently working in the field met the requirements. This meant that practitioners often lacked one key skill or another required by the client. Some of these skills included speaking the native language, having a minimum number of years of experience in safety, and having extensive behavioral training. While it is important that any chosen practitioners have the necessary skills to be successful, it is also necessary for both the client and the consulting party to understand which of those skills have a higher priority and are more necessary for a successful implementation. In the event that too few individuals exist who can meet all of the requirements, all parties are able to determine the next best option when selecting personnel. Practitioners should not hesitate to inform the client prior to signing a contract in the event they cannot find individuals who fulfill all the requirements. Once this information is delivered to the client, they may either look to another consultation group or they may make changes to the contract in order to ensure the requirements for personnel are reasonably attainable. This serves to protect both the client and the practitioners. On the one hand, the client is fully aware of the manpower that is available and to what degree there exist limitations they must not disregard. On the other hand, it ensures that the practitioners either sign a contract, which has an excellent chance of success, or they avoid forcing failure by signing a contract knowing the requirements set will not be attainable.

It is always important to engage the client in any discussion of change to the scope of work, including personnel selection and placement, prior to any signing of a
contract. Once the contract is signed, the client has the right to and will assume that the practitioner is able to fulfill any and all requirements written into the agreement.

Social Aspect

While performance improvement using a data-driven approach is largely based on the quantification of key pinpointed behaviors, one cannot ignore other factors that contribute to the success of any behavioral intervention. In discussing teamwork on the basketball court, Michael Jordan stated, "Talent wins games, but teamwork and intelligence wins championships." Similarly, when involved in an onsite implementation, a practitioner cannot rely only on the science and his or her own expertise to ensure producing a significant, positive, and sustainable change in target behaviors. It is vital to also engage the client as well as others in the team of practitioners in a positive manner that creates an environment that reinforces others' engagement and cooperation as well as retains stimulus control over their behaviors. In essence, this means it is important to create a culture of trust and openness while still being able to get others to engage in the key behaviors that the practitioner has determined will lead the organization to success.

One recommendation for practitioners working in an unfamiliar cultural environment is to create a list of behaviors they would like to see themselves engage in during encounters of all kinds with the client and practitioner team. One example of a behavior that can be included on the list is to always begin a conversation by saying something positive. This includes emails, informal conversations, meetings, coaching sessions, and workshops. A positive statement does not have to be performance-based or even complimentary in nature. It is the duty of the practitioner to study those in their environment and determine how a positive start to a conversation with each individual
would sound. For example, when starting a conversation with a front-line employee it is beneficial to be seen as a humble person, unless the individual specifically engages the practitioner in friendly rivalry (sports, etc). Staying humble will allow the practitioner to be seen as an approachable and trustworthy person.

Another example worth discussing is the manner in which emails are written. By the time a practitioner is communicating with a client or other practitioners he or she will undoubtedly have learned what a ‘professional email’ looks like and how to avoid the pitfalls of informality with regard to online communication. Unfortunately, each organization has its own work culture. Thus, each organization has its own unwritten rules regarding the form and function of communication tools such as email. During the current implementation, one of the complaints mentioned by the client was the lack of formality in emails sent by practitioners. Once the practitioners developed a rapport with some of the client staff, their emails did not address the person formally (e.g., Dear Mr.) and did not end with a formal closing (e.g., Kind Regards). During past implementations, this was actually seen as a sign of progress as informal emails suggested a closer relationship between client and practitioner. However, the assumption that there was similar function in the move towards informality during the current work was an oversight on the part of the practitioners. For this reason it is recommended that the list of behaviors a practitioner creates for him or herself be exclusive to each organization and even each separate department within the organization in many cases. In essence, the practitioner should always tailor his or her efforts for the unique work and social culture he or she encounters.
All well-trained behavioral practitioners are scientists. The greatest practitioners are able to use humor and humility to create a positive environment that reinforces others' cooperation and engagement, while still maintaining a healthy level of stimulus control over work behaviors so that the goals can be met as a team.
CONCLUSION

It is evident that a practitioner should understand that no two work or social cultures are the same. Thus, he or she should approach each client with an open mind and a readiness to be flexible. With that said, it is also vital to the success of any implementation that practitioners be aware of both their limits and their capabilities. One should never agree to work they are not confident in completing successfully. Also, one should never assume that once the work has started, things would simply work themselves out. While this sometimes may be the case, no practitioner wants to experience a situation where they are unable to succeed due to a poorly negotiated contract. It is always within the best interest of both the client and the practitioners to be in full agreement on each and every detail prior to signing and agreeing on the work. If a practitioner who is not in a senior role should find an issue with an item that he or she foresees could harm the work, it should be brought to the attention of all members of the team. Also, ensure that communication remains open and honest throughout. It is better to hear all ideas and choose a few, than to punish the input of others and receive no ideas.

The client may have paid for the service of the practitioners, but the client is the expert in the industry itself. Therefore, the practitioner should learn from the client as much about the business as he or she can. This acquired knowledge will give the practitioner an edge in combining his or her expertise with the intricacies of the work being done by the employees. With regard to communication within the team of
practitioners, it is unrealistic to assume that all parties will agree all the time. It is realistic to expect all parties to behave in a manner that fosters the exchange of ideas without punishment as well as provides each practitioner an opportunity to contribute input in how the implementation or intervention is to exist and function. As mentioned above, roles and responsibilities should be written as specifically as possible in order to establish accountability and avoid confusion. These should all be written into the contract prior to its signing.

The tools and techniques used during any intervention should be available when required, and should be reliable. This should be stated clearly in the contract so there is no confusion as to the quantity and quality or tools required for success. With regard to selecting practitioners, it is always wise to do so with both the goals and the contract in mind. First, determine what qualifications provide the greatest strength in achieving the set goals. Then work to ensure the contract reflects these qualifications prior to signing on to the work. This will ensure the requirements set forth in the contract are attainable and relevant to achieving success. If possible, prior to beginning work and after having met with some if not all the individuals involved in the future work, create a list of self-monitored behaviors that are key to getting the best out of those in the workplace with the same goals.

It is important for practitioners to enjoy what they do. Their presence is meant to uplift, inspire, encourage, and shape those whom they come into contact with. The ideas and recommendations along with the stories in this work are meant to give guidance to novice practitioners as well as veterans in the field who may be entering an industry or culture they have not previously worked in. It demonstrates the efficacy of the science of
behavior in increasing safety in the workplace, while also serving as a discussion encouraging future practitioners to have adequate preparation and planning prior to a work contract being signed in order to ensure positive, meaningful, and sustainable change is created. Only after this is achieved can behavior change lead to culture change. Once the work culture consistently demonstrates an improvement in its relation with individuals’ behaviors while at work, it may itself serve as a set of stimuli for a fresh group of individuals looking to assimilate into their environment. This positive cyclical relationship between work culture and work behaviors may be the key to sustainable businesses of all sizes and perhaps a blueprint for a larger effort to create global economies reliant on the evidence-based improvement of performance in the work place.
REFERENCES


Appendix A

Permit to Work Checklist
# PERMIT TO WORK CHECKLIST - PERMIT APPLICANT

Observer: _____  Date: _____  Time: _____

Facility: _____  Permit #: _____

Permit Type: Cold  Hot  Radio  Permit Format: Electronic  Manual

<table>
<thead>
<tr>
<th>Prior to Work</th>
<th>Yes</th>
<th>No</th>
<th>Description</th>
<th>FB</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Created JSA specific for current work, did not use generic template</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. ALL fields of PTW are correctly marked (If NO, complete subfields)</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Hazards/Dangers</td>
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<td></td>
</tr>
<tr>
<td>b. Precautions Required</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. Protective/Safety Equipment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Presented/sent applicable JSAs CONCURRENTLY with PTW to the PI</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Presented all required certification (Excavation, confined space, motor vehicle entry, etc.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Presented authorization card to PI</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| During Work                                                                   |     |    |             |    |
| 6. PA/Supervisor has PTW, started the work with required PTW approval, workers answered one question correctly regarding JSA. |     |    |             |    |
| 7. PA/Supervisor is on site during random check, with hot PTW or obtained permission for cold PTW. |     |    |             |    |

| After Work                                                                    |     |    |             |    |
| 8. Presented/sent PTW to PI for renewal or close-out of permit                |     |    |             |    |
| 9. Returned all materials and tools to proper location after use              |     |    |             |    |
Appendix B

Company Approval Letter
March 26, 2012

Human Subjects Institutional Review Board (HSIRB)
Western Michigan University
Kalamazoo, MI 49008

Dear Human Subjects Institutional Review Board (HSIRB),

The purpose of this letter is to provide Tarek Abousaleh expressed written approval for the use of data obtained by Quality Safety Edge (QSE) during work conducted during the 2011 calendar year. This approval is being given with the knowledge that the HSIRB has not yet given approval to Tarek Abousaleh to begin analysis of these data. Tarek Abousaleh and QSE understand that any and all data used for the proposed study are under the exclusive ownership of Quality Safety Edge. As such, QSE approves the use of these data by Tarek Abousaleh for the purposes of a doctoral dissertation under the condition that names of individuals and the client organization involved in this study are kept confidential.

Please do not hesitate to contact me if you have any questions or need additional information.

 Regards,

Terry E. McSween, Ph.D.
President and CEO
Appendix C

HSIRB Approval Letter
Date: May 22, 2012

To: Ron Van Houten, Principal Investigator
    Tarek Abousaleh, Student Investigator for dissertation

From: Amy Naugle, Ph.D., Chair

Re: HSIRB Project Number 12-03-31

This letter will serve as confirmation that your research project titled “Use of Task Clarification, Feedback, and Recognition to Increase Desired Behaviors within an Organization’s Permit to Work System—Analysis of Data Previously Collected as an Organizational Consultant” has been approved under the exempt category of review by the Human Subjects Institutional Review Board. The conditions and duration of this approval are specified in the Policies of Western Michigan University. You may now begin to implement the research as described in the application.

Please note: This research may only be conducted exactly in the form it was approved. You must seek specific board approval for any changes in this project (e.g., you must request a post approval change to enroll subjects beyond the number stated in your application under “Number of subjects you want to complete the study.” Failure to obtain approval for changes will result in a protocol deviation. In addition, if there are any unanticipated adverse reactions or unanticipated events associated with the conduct of this research, you should immediately suspend the project and contact the Chair of the HSIRB for consultation.

Reapproval of the project is required if it extends beyond the termination date stated below.

The Board wishes you success in the pursuit of your research goals.

Approval Termination: May 22, 2013