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SOLVING STRATEGY

Instructional Leadership: How Expertise and Subject Matter
Influence Problem Solving Strategy.

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Abstract

Principals are increasingly expected to be the instructional as well as administrative leaders of their schools. Moreover, their instructional leadership matters for student success (Hallinger & Heck, 1996). However, little is known about how principals reason through the instructional issues that they face. An analysis of principal reasoning in instructional contexts is critical. Drawing on interviews with 33 urban school principals, we found evidence of classic expert and typical problem solving strategies, differences in affect, and differences in language between subject matter.

Instructional Leadership: How Expertise and Subject Matter Influence Problem Solving Strategy

Policymakers, school reforms insist that school principals be instructional leaders. Meeting this challenge will depend on school leaders who can effectively lead instructional improvement (Barth, 1986; Leithwood & Montgomery, 1984). Research has continued to document that school leadership is essential for the development and maintenance of those school level conditions that have been shown to contribute to improving instructional practice and student achievement (Hallinger & Heck, 1996; Newmann & Wehlage, 1995; Purkey & Smith, 1983; Sergiovanni, 1996 ; Sheppard, 1996).

Principals spend the lion's share of their time solving the instructional problems that arise in the day to day running of the school (Glasman, 1995). An example of an instructional problem would be how a principal handles a group of teachers who are having difficulties working with a new mathematics curriculum. Moreover, research has repeatedly shown that principal leadership is important for promoting the school conditions that lead to improved instructional practice and student achievement (Hallinger & Heck, 1996; Liberman, Falk, & Alexander, 1994; Rosenholtz, 1989; Seashore-Louis & Kruse, 1995). This is despite the fact that very little is known about the way that principals think about and solve problems. Cognitive research on leadership has traditionally limited itself to studying how a leader's decision making influences their actions and behavior and largely ignored how principals work through and solve the problems they encounter (Green & Mitchell, 1979; Newmann & Wehlage, 1995; Pfeffer, 1977; Simon, 1976; Weick, 1979). There is little recent empirically supported literature on principal problem solving. For example, a search on the ERIC database for references to principal problem solving reveals six studies, none of which date past 1998. This represents a grossly overlooked yet

important topic. In order to improve instructional leadership, we need to understand the strategies that expert principals are using to solve the problems they encounter in the hope that we can teach these strategies to improve principal leadership.

Expertise is defined in different ways in the literature. Leithwood uses measures of expertise as determined by peer review and a keyed interview (Leithwood & Stager, 1989). He relies on nominations from central administrators of the district and a subsequent interview that focuses on principal effectiveness measures. Principals who fail to pass through these two screens are termed 'non-expert' or typical principals. Allison & Allison (1993) use graduate students and professors to rate the expertise of principal's responses. Although both approaches to defining expertise can be defended, they are not without problems. Specifically, they are not sensitive to the actions of the principals in the schools. Although a central administrator and interview may provide a method of screening, they provide a poor picture of the efforts of the principal over the long term from the perspective of the school in which they work.

This paper builds on the previous principal problem solving literature and extends it in several ways. First, rather than using a peer selected group of principal experts or relying on years of experience, we draw our pool of expert and typical principals from a large urban school district using measures of leadership and organizational processes obtained from teacher questionnaires over a five year span. Schools with increasing measures of, for example, 'teacher-principal trust', 'principal leadership', or 'collaboration', and 'focus on student learning' were determined to have expert principals. Those with stable or slightly declining measures of the same variables were grouped as the typical principals. Second, we administer instructional scenarios across two subject areas whereas previous research focused solely on administrative scenarios, leaving the question of how principals solve instructional problems in their school

overlooked. Third, we look at the personality of the principals in our study to investigate whether the strategies we are investigating could be partially derived from personality traits instead of being a learned skill. Finally, we analyze the language that school principals use when working on scenarios to see whether any differences in affect can be found between scenarios with different subject matter.

Cognition

In their discussion of administrative decision making in schools, Davis & Davis (2003) cite the Garbage Can model of organizations (Cohen, March, & Olsen, 1972), which argues that they are much like “organized anarchies, [where] goals, problems, alternatives, and solutions are often ill-defined and ambiguous.”. Davis & Davis argue that in this type of environment the best strategy is to rely on heuristics, or unconscious mental shortcuts to quickly make decisions and move on. Although they go on to detail the tendencies of expert decision makers, Davis & Davis do not attend to how principals, in particular, will work through the administrative problems as opposed to merely making decisions about them. This is in contrast to Leithwood & Stager (1989), who point out that a focus on decision-making can only reveal simple cognitive structures of the ‘black box’ that is the principals’ mind, leaving a detailed understanding of the process of how principals reason through problems undiscovered. Leithwood & Steinbach (1992) go as far as to argue that efforts to truly understand effective administration would be better served by a cognitive understanding of problem solving over behavior and action because a principal’s actions may be particular to their school, whereas their problem solving strategies are more likely to be particular to their level of expertise, and therefore something that could be used in development programs to make leaders more effective. They reiterate this argument in a later

study of principal group problem solving (K. A. Leithwood, Steinbach, & Raun, 1995) where they again stress the importance of bringing a cognitive perspective to bear on improving instructional leadership practice. Furthermore, recent research has highlighted that principals do spend the majority of their time working on solving problems (Glasman, 1995).

Significant progress has been made in detailing the particular strategies that expert and typical individuals seem to rely on when solving problems. It is important to note that this is not an issue of content knowledge, but rather that experts have access to or use different cognitive strategies that inform their understanding of the problem as compared to typical individuals. Typical individuals, though they may have the same factual data, do not have access to these strategies and so are not as successful at solving problems in the domain. Some examples of expert strategies are better regulation of one's thinking process, better organization of memories so as to facilitate retrieval and application, and being more skilled at representing the problems they are faced with in more abstract terms (Glaser & Chi, 1988). Therefore, when an expert individual is presented with a problem, they can bring these resources to bear to assist them in solving the problem. For example, an expert principal might question the underlying assumptions of a given scenario because of an incompatible representation of the situation. A typical principal, with a weaker representation, might not question the scenario being given. It is our position that spread over countless instructional problems solved during the course of a principal's job, an expert's ability to use particular strategies helps that school to be more successful.

Leithwood & Stager's (1989) work provided the necessary framework from within which we could start our own course of research. Drawing on the findings from the research literature, Leithwood & Stager looked for evidence of several expert strategies in the principals they

interviewed. They found evidence of several strategies, detailed in Table 1 below. The present paper extends their work by specifically investigating principals' problem solving strategies in instructional scenarios, as opposed to the chiefly administrative ones that Leithwood & Stager looked at. In addition, we conducted a research program to assimilate the findings of several different papers investigating principal expertise to arrive at a set of expertise and typical strategies that we coded for in the data, represented in Table 1. One will note that some of these strategies have direct counterparts whereas others do not, representing the lack of that particular strategy in the other expertise category. For example, an expert strategy is to have some sort of plan of action to solve the problem, whereas a typical strategy would be the opposite: providing different solutions with little regard for planning. In comparison, the expert strategy of facing conflict vs. the typical strategy of avoiding conflict represent two distinct strategies rather than an expert strategy and the lack of it.

[insert table 1 here]

Leithwood & Stager (1989) looked for evidence of these expert strategies through the use of structured and unstructured administrative scenarios that were given to principals of different levels of expertise, as determined by a two-step screening process consisting of a central administrator's nomination and a principal effectiveness interview. They were able to draw parallels in the problem solving traits of principals who failed the screening process and typical individuals in the many other domains that the problem solving literature had studied. However, Leithwood and Stager also found that this effect was not seen across all the scenarios that they gave. Scenarios that had been rated as the most 'unstructured' in terms of the clarity of the course of action to be taken in responding to the scenario were best at revealing these classic

differences between typical and expert principals. This finding echoes the Garbage Can Model that stresses the messiness of organizations and how their leaders are often faced with poorly structured problems. Unstructured or 'ill-structured' problems, as they are known in the problem-solving literature, are particularly well suited to gaining insight into the mechanics of cognition for two reasons. These problems are so termed because they force one to structure the problem before being able to answer it, as well as come up with a solution based on that structure. In fact, as Simon (1973) points out, structuring an ill-structured problem is often harder than finding the solution. Leithwood & Stager's experiences with ill-structured problems therefore provided the starting point for our research into understanding how principals of varying levels of expertise solved instructional problems.

The Subject Matters in Leadership: Affect and Language

Differences between experts and typical principals may carry over into the instructional problem that they are working on. In the leadership scholarship, instruction is generally treated as a generic variable (Spillane, Halverson, & Diamond, 2001). This is surprising considering that scholars have argued for some time that subject matter is an important context for teachers work (McLaughlin & Talbert, 1993; Siskin, 1991; Stodolsky & Grossman, 1995). If findings from this work are roughly right, one might expect that subject matter would be a critical consideration in leadership for instruction. Recent research suggests as much, indicating that principal's views of subject matter both shape and are shaped by their leadership strategies (Burch & Spillane, 2003).

The words that people use to construct sentences are often a window into their general affective state regarding the topic being discussed (Pennebaker, Mehl, & Niederhoffer, 2003).

Further, these affective states are largely dependent on our cognitive abilities to understand the world around us. For example, one could imagine a typical principal not being sure of how to handle disciplining a teacher effectively, and thus revealing nervousness and stress. Pennebaker et al. argues that the language that we use when describing situations such as these reveal the affective states that surrounding those situations. Therefore, we use linguistic analysis software to compare our math and literacy scenarios responses to a dictionary of words that have emotional valence attached to them. The software uses these valences to calculate for example, how 'tentative' a principal's response to a particular scenario is. Combining Pennebaker et al.'s (2003) research on language with Burch & Spillane's (2003) findings about differences between subject matter, we predict that we will find differences in language between principals solving the literacy and math scenarios.

Personality

In addition to differences in cognitive strategies, there is some research to suggest that individuals who score highly on particular personality dimensions are more effective leaders by implementing particular leadership styles. Hogan (1994) offers a review of several studies that implicate higher levels of extraversion and conscientiousness in successful leadership, suggesting that the success of any leadership initiative may be in some respect subject to the personality of the leaders involved. For example, a more extroverted leader might be more proactive in discussing matters with their staff rather than waiting until those matters were unavoidable. In addition, one would expect the conscientiousness dimension to be related to being able to plan more of one's progress through a problem because one would be more innately aware of the subtle issues that would need to be prepared in advance. That said,

showing no findings between personality dimensions in the two groups would also be of value because it would suggest that these expert strategies are not derivatives of personality traits, and therefore have a higher chance of being able to be instilled through professional development programs.

Hypotheses

In summary, this paper has two distinct hypotheses. First we hypothesize that we will be able to replicate previous study's findings with regard to the differences in problem solving strategy between expert and typical principals. Second we hypothesize that a look at the language and affect that is used when principals are working on scenarios dealing with math or literacy will differ, thus revealing a difference in leadership approach between subject matter. Third we hypothesize that there will be some personality differences between the expert and typical principals.

Methods

Participants

Before any work can be done analyzing strategies or solutions of principals with varying levels of expertise, one needs to know whether one is looking at the strategies of a novice, an expert, or a typical individual. Previous research on expert problem solving strategies in principals has used a nomination system to deduce who the experts were in a pool of principals (Leithwood & Stager, 1989). In contrast, the present paper classified experts and typical principals based on a combination of leadership and organizational measures collected from teacher surveys distributed to teachers in a large urban school system. Leadership and organizational measures

were selected based on their inclusion in previous research as indicators of successful school principals. Leadership measures used were ‘teacher-principal trust’, ‘principal leadership’, and ‘instructional leadership’. Organizational measures used were ‘reflective inquiry’, ‘focus on student learning’, ‘collective responsibility’, ‘collaboration’, ‘collegiality’, ‘innovation’, ‘school commitment’ (Bryk & Driscoll, 1985; Hallinger & Heck, 1996; Newmann & Wehlage, 1995; Purkey & Smith, 1983; Sergiovanni, 1996; Sheppard, 1996). These measures were chosen because school leadership in general, and principal leadership in particular, is important in promoting these conditions (Rosenholtz 1989, Lieberman et al., 1994). Principals whose schools revealed improving leadership and organizational measures during the tenure of the principal (over a 5 year period) were grouped as ‘experts’ whereas schools with flat or slightly declining performance over time were classified as ‘typical’ principals. At the time of this paper 19 expert principals and 14 typical principals from a large urban school district had been interviewed. We worked to match the expert and principal groups so that they were similar in terms of the ethnicity and socio-economic characteristics of the student population served by the school, thus avoiding external factors that may have influenced the organizational and leadership measures listed above. Schools with high student mobility were excluded from the study. Expert principals had a mode of 14 years experience and principals and typical principals had a mode of 10 years experience.

Apparatus

Interview appointments were made over the phone and took place in the office of the school principal. The principals were interviewed for one hour, approximately 30 minutes of which were spent with the six scenarios that are the focus of this paper. Two scenarios were

presented for general (e.g. working on the school improvement plan), math, and language arts instructional issues, and can be found in the appendix of this paper. Two scenarios were chosen for each subject because we wanted to minimize the possibility of any one scenario suggesting particular strategies that would be an artifact of the particular scenario rather than the subject matter addressed by the scenario.

The scenarios were roughly modeled after Leithwood & Stager's (1989) scenarios, the two critical distinctions being that our scenarios were all designed to be ill-structured problems to take advantage of Leithwood & Stager's findings, and that we presented subject-specific instructional leadership scenarios as opposed to the more generally administrative scenarios that Leithwood & Stager used. The scenarios were designed to be as open as possible as well as to offer two different conditions for each subject to increase the chance of the scenarios giving enough opportunities for the principals to detail the problem solving strategies that they might use. The remaining time of the interview was spent discussing other questions pertaining to leadership, organizational change, and their relationship with their employees, but will not be addressed in the current paper.

The principals were then given a survey to fill in immediately or return to us. The survey consisted of several demographic questions as well as a 50-item personality survey from the International Personality Item Pool (Goldberg, 1999). The survey provides reliable pre-constructed questionnaires of 50 ($\alpha=.84$) items. Upon receipt of the survey the participants were mailed a book certificate of \$50 for their school.

Procedure

The recorded interviews were sent to an independent transcriber who was blind to the purpose and conditions of the study. Individual scenario sections were then categorized and read through to identify instances of the typical or expert strategies that previous literature had identified. This consisted of creating codes for each of the strategies detailed in Table 1 and then highlighting the relevant section of text. Coding was done with Weinstein's (2003) Text Analysis Markup System (TAMS), an open source qualitative coding package. TAMS was chosen because it is fast, economical, and easy to learn.

For our initial coding approach, we sought to code each complete thought of a principal for a particular code, thus arriving at several repeat codes per section. We soon realized that this approach was unnecessarily complex and also heavily benefited people who might talk more and repeat themselves. Further, it would be practically impossible to achieve any kind of inter-rater reliability because everyone has a different idea of what a complete thought unit is. A more useful approach would be to assess each scenario against the expert and typical strategies, but only allow one instance of a particular strategy per scenario. We reasoned that as we were looking for the existence of particular strategies, once a particular principal had used a particular strategy, it would not really matter how many of those were used repeatedly in response to a particular scenario, so the strategy would only 'count' once. TAMS was then used to do a preliminary analysis that would give us the number of instances of each code per scenario. This data was then opened in SPSS for further statistical analysis.

In a separate procedure, the text from the interviews was stripped of any interviewer comments (e.g. "Could you go into more detail about that?") and then put into Pennebakers' Linguistic Inquiry and Word Count (LIWC) software that uses a dictionary to determine

emotional differences in different word choice across passages. We hope to be able to find differences in the way that the principals talk about different subject matter. LIWC's output was then opened in SPSS for further statistical analysis.

Analysis

There were a total of 1271 codes assigned across the 33 cases and 6 scenarios per case. Because of the uneven distribution between the two groups (14 typical, 19 experts), the codes were assimilated by condition and by scenario, yielding an N of 12 (6 scenarios x 2 conditions). The count of codes as then divided by the number of participants in each condition to display the codes as a percentage of the total possible codes, rather than a raw count that would be different because of the difference between experts and typical principals involved at this stage of the study. T-tests for the independence of means were then run to compare the expert to typical conditions across all codes. The same was done for the results of the linguistic analysis with LIWC. A nonparametric Mann-Whitney test was also done and yielded similar significance levels to those reported in Table 2 and 3.

Results

Overview of Results

The paper has three distinct findings. First, the paper finds that the principals who were identified as experts using the school measures were found to exhibit more of the classic expert problem solving strategies over the typical principals, who were found to have more of the typical problem solving strategies. Table 2 highlights the statistically significant results as well as reporting the results of the strategies that were not found to be significant.

[insert table 2 here]

It is first interesting to note that not all the significant results existed in the pairs that the strategies exist in. For example, the typical strategy of recounting poor anecdotes was found significant, but its expert counterpart of recounting relevant or successful anecdotes was not found to be. In contrast, the identifying and overcoming constraints vs. perceiving constraints and not attempting to overcome them were both found to be significant, highlighting the stark difference between these two strategies across the expert and typical groups. Delegation, planning, and analyzing the scenario expertise strategies were also found to be significant, along with the typical strategy of being concerned with feelings. The remaining strategies were not found to significantly differ between the two groups. The most likely reason for this is the vastly different selection mechanism we are using in comparison to previous studies. Where previous studies were able to quite clearly determine expert/ typical, our approach requires an understanding of expertise along a continuum rather than a binary variable. In other words, although we tried to separate the different principals as much as possible, it is quite possible that some of the principals who were deemed as typical principals may have been successful at one of the several measures from which they were determined a typical principal to be included in the study. Other factors for consideration are that the dataset is unevenly divided between the two groups, and that our scenarios fail to distinguish accurately between the two groups.

[insert table 3 here]

The second group of findings from the linguistic analysis software reveals several items of interest between subject matter, reinforcing Burch & Spillane's hypotheses about differences between subject matter with respect to school leadership. The results of this t-test can be seen in Table 3. Principals (both experts and typical) were found to harbor more negative emotion

when discussing math solutions as compared to literacy solutions. They also used more tentative language when discussing math and more certain language when discussing literacy. In addition, they also used the first person plural much more when discussing literacy as opposed to math, suggesting a more internal, participatory approach to the literacy scenarios that were administered. In the math scenarios, the principals tended towards a third person perspective suggesting that they were pushing their solution to the problem away from themselves, and perhaps the school.

[insert table 4 here]

Third the paper found that the personality test did not reveal any significant differences between the groups, although the direction of the data is consistent with the literature on the dimension of extraversion being higher in experts than in typical individuals. These results can be seen in Table 4. As mentioned earlier in the paper, this non-finding is still of interest because it suggests that the leadership expertise that we are investigating is not something that is likely to be the result of long-term personality traits.

Discussion

Conclusions

School reformers and policy makers press principals to take responsibility for the instructional decisions being made in their school. Moreover, those decisions have been shown to have an important impact on student outcomes (Hallinger & Heck, 1996). The importance of understanding how principals think through problems and making sure that they have the necessary tools to work through the problems that they will face is a lofty but important goal. This paper's findings revealed differences in leadership strategy across levels of expertise.

In our view, this is important for two reasons. Primarily, it suggests that there are expert problem solving strategies that could perhaps be taught to novice or typical principals that will make them more effective leaders, and therefore have a positive outcome on the performance of their students. Secondly, since the principals were selected based on organizational and leadership measures that the literature has highlighted as being important for student success, the current findings highlight the need for more research into how these expert strategies are related to those measures, for example whether the expert strategies bring about higher organization and leadership measures.

Our paper also raises the question of whether instructional leadership is the right level of analysis to understand expertise. Our linguistic analysis suggests that principals are more tentative when dealing with math than literacy, as well as using more participatory language for literacy over math. This suggests a qualitative difference across the scenarios in the approach of the scenarios that warrants further investigation.

Future Directions

The research we have presented here is still in progress. We hope to increase the sample size to 60 principals by incorporating the data from 20 novice principals as well as increasing the typical principals group to 20 participants, thus evening out the data from the two groups presented here. Furthermore, although we will continue to analyze the additional data within the framework detailed in this paper, we also plan to expand our research to incorporate several new angles from which we can better understand principal cognition and problem solving.

The first of these new angles is to look within the subject matter to see whether the strategies are being used equally between subjects. For example, an expert may be using certain

strategies for the math scenarios (such as facing conflict) but we do not know whether those same strategies are being used for the literacy scenarios or whether a different suite of strategies is being used. This is slightly more methodologically complex because it involves tracking the individual strategies used by individual rather than in aggregate. The results of the linguistic analysis detailed in this paper show differences in the certainty and tentativeness of language that the principals use between subjects, so a more detailed analysis of expert and typical strategies between subjects is clearly warranted.

The second of these new angles is to gain a deeper understanding of the way that the principals are solving the problems that we give them. In the current scenarios, the principal's strategies are analyzed to search for expert strategies that the expertise and principal problem solving literature had previously identified. We extended the previous work by analyzing instructional scenarios. However, this methodology has limitations in that it does not address strategies or approaches that may emerge from the data. In other words the coding is not grounded in what the principals say, it is instead just matched to the strategies that we researched in the previous literature. There may be strategies in the data that the previous literature and our current study have not highlighted because we were not looking for them.

We propose to conduct this grounded coding in a novel way that we believe captures a deeper understanding of how principals solve problems. Our future work will accomplish this by graphically represent the way that a principal solves the problem. To clarify, what we are attempting to do is to represent the 'problem space' (Newell & Simon, 1972) that a principal constructs when they solve instructional scenarios. The 'problem space' is composed of the different elements that principals bring to bear on the solution, for example particular actions such as calling a meeting, interacting with the parents, gathering data about grades. What is

novel is that instead of just cataloguing these items the graphic representation allows us to connect these elements and reveal how principals believe that certain elements may impact or interact with each other. For example, it is quite possible that a principal mentions a meeting and then separately goes on to detail a particular course of action that results from the meeting; the action may instead result from ‘their vision’ or some other element. This cannot be easily coded by just highlighting different parts of the response because the individual elements may be scattered and repeated throughout the response. A graphic representation allows for repeated elements to be situated in the larger context of the actions that surround them rather than just coded in the order they appear in the response. This methodology is detailed in Brenninkmeyer, Sherin & Spillane (2004, June)

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Appendices

Interview Scenarios

1. After your first day as principal of your school, you realize how poorly the previous school improvement plan was done. Apparently, the previous principal used last year's plan and changed a few paragraphs. As the new instructional leader of this building, how do you approach this situation?
2. While reviewing the lesson plans of one of your best teachers, you realize she has not been teaching mathematics based on the philosophy of your building. Instead, she uses a "drill and kill" style of teaching. Teachers in your school know to use manipulatives and other strategies to reach students. However, this otherwise proficient teacher has not complied. What steps will you take to bring this teacher on board?
3. A majority of the students in the school where you are principal speak Spanish as their primary language. However, the school district insists that a majority of your students read, speak, and write in English. While most of your students' parents are supportive, many of them do not speak English either. How will you meet the needs of your students in the face of the demands by your district?
4. A large number of the elementary teachers in your school have admitted to you they are not comfortable teaching mathematics. Your mathematics test scores demonstrate a weakness in this area. However, the school district in which you work uses both mathematics and literacy test results to determine how well a school is doing academically. How will you address this situation?

5. *Interviewee has elementary background:*

During most of your professional career, you worked in an elementary school. You were a 5th grade teacher as well as an assistant principal at an elementary building. Recently, you were selected to be a high school principal, and you are eager to get to work. Unfortunately, you are hearing that many of your teachers, parents, and students have strong concerns about your elementary background. What steps will you take in this situation?

- OR -

Interviewee has high school background:

During most of your professional career, you worked in a high school. You were a 9th grade history teacher as well as an assistant principal at the high school. Recently, you were selected to be an elementary school principal, and you are eager to get to work. Unfortunately, you are hearing that many of your teachers, parents, and students have strong concerns about your high school background. What steps will you take in this situation?

6. As you review your school's reading test scores, you realize they are significantly lower than the district average. Your teachers, however, explain to you they are working extremely hard to meet the literacy needs of their students. When you visit their classrooms, you see teachers working very hard. However, you do not see evidence of effective teaching strategies that will better serve the students' needs. You also do not see the spirit of the district's literacy initiative being implemented in your teachers' classrooms. As the new principal, how will you address this situation?

Author Note

The authors graciously thank the National Science Foundation for their support. This material is based upon work supported by the National Science Foundation under Grant No. 9873583 and the Spencer Foundation under grant No. 200000039. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation or the Spencer Foundation.

Table 1

Coded Expert and Typical Strategies

Expert Strategy	Typical Strategy	Source
Relevant Anecdotes -Recounts good or successful experiences	Poor Anecdotes -Recounts poor or unsuccessful experiences	Leithwood, Steinbach & Raun (1995) Leithwood & Stager (1989)
Identifies and Overcomes Constraints. -Observes and details how to overcome perceived constraints.	Perceives Constraint -Accepts constraints or does not detail how to overcome it.	Leithwood, Steinbach & Raun (1995) Leithwood & Stager (1989)
Face Conflict -will face up to and learn from conflict	Avoid Conflict -will try to avoid conflict if possible	Bullock, James, & Jamieson (1997)
Student Program Quality -mentions implications for student and program quality/consequences for school and academic growth of large numbers of students.	Staff Oriented Goals -Focuses solution on staff with little regard for students.	Leithwood & Stager (1989)
Gather Data -indicates wanting to gather data before or during the solution.	Assumptions -Makes an assumption instead of gathering data.	Leithwood & Stager (1989)
Parents Informed -Stresses keeping the parents informed.	Parents Happy -Stresses keeping the parents happy.	Leithwood & Stager (1989)
Delegation -Strategies for delegating authority -identified tasks for delegation -will transfer authority	[no corresponding strategy]	Bullock, James, & Jamieson (1997)
Planning -Demonstrates some order and structure to solution.	[no corresponding strategy]	Leithwood, Steinbach & Raun (1995) Leithwood & Stager (1989)
Long Term Outlook -Cites long-term implications or direction.	[no corresponding strategy]	Leithwood, Steinbach & Raun (1995)
Stress Follow-up -Stresses the importance of following up on action or decision to make sure it is occurring.	[no corresponding strategy]	Leithwood, Steinbach & Raun (1995) Leithwood & Stager (1989)
Scenario Analysis -Questions assumptions of or otherwise critiques scenario structure. -'Frames' Problem	[no corresponding strategy]	Copland (2003) Bullock, James, & Jamieson (1997) Glaser & Chi (1988) Carter, Sabers, Cushing, Pinnegar, & Berliner (1987)
[no corresponding strategy]	Concern for Feelings -Has concern for feelings of employees over making decisions.	Leithwood & Stager (1989)
[no corresponding strategy]	Consequences for Self -Details concerns for personal success, appearance, or failure.	Leithwood & Stager (1989)

Table 2

Problem Solving Strategies

<u>Variable</u>	<u>N</u>	<u>Mean Expert</u>	<u>Mean Typical</u>	<u>t statistic</u>	<u>p-value</u>
Relevant Anecdotes (Expert Strategy)	12	0.254 (.039)	0.119 (.071)	1.673	.063
Poor Anecdotes (Typical Strategy)	12	0.018 (.011)	0.155 (.043)	3.095	0.006**
Identifying and overcoming constraints (Expert Strategy)	12	0.325 (.029)	0.143 (.026)	4.698	0.001***
Perceive Constraint (Typical Strategy)	12	0.105 (.033)	0.286 (.041)	3.405	0.004**
Face Conflict (Expert Strategy)	12	0.175 (.054)	0.083 (.054)	1.214	.127
Avoid Conflict (Typical Strategy)	12	0.351 (.018)	0.095 (.040)	1.382	.105
Student Program Quality (Expert Strategy)	12	0.518 (.101)	0.429 (.058)	.762	.232
Staff Oriented Goals (Typical Strategy)	12	0.167 (.044)	0.301 (.075)	1.639	.066
Gather Data (Expert Strategy)	12	0.684 (.122)	0.595 (.126)	.508	.311
Assumptions (Typical Strategy)	12	0.132 (.035)	0.250 (.058)	1.753	.055
Parents Informed (Expert Strategy)	12	0.246 (.114)	0.226 (.107)	.124	.452
Parents Happy (Typical Strategy)	12	.061 (.052)	.060 (.039)	9.280	.489
Delegation (Expert Strategy)	12	0.307 (.074)	0.083 (.039)	2.686	0.012*
Planning (Expert Strategy)	12	0.658 (.070)	0.369 (.054)	3.27	0.004**
Long Term Outlook (Expert Strategy)	12	0.474 (.087)	0.321 (.080)	1.289	.113
Stress Follow-up (Expert Strategy)	12	0.360 (.101)	.250 (.063)	.919	.190
Scenario Analysis (Expert Strategy)	12	0.386 (.040)	0.190 (.057)	2.796	0.010**
Concerned with Feelings (Typical Strategy)	12	0.035 (.018)	0.107 (.031)	2.044	0.034*
Consequences for Self (Typical Strategy)	12	0.026 (.018)	0.095 (.054)	1.205	.128

()= Standard error of the mean.

*= significance level $p < .05$

**= significance level $p < .01$

***= significance level $p < .001$

Table 3

Language Differences between Subject Matter

<u>Variable</u>	<u>N</u>	<u>Mean Math</u>	<u>Mean Literacy</u>	<u>t statistic</u>	<u>p-value</u>
1 st Person Plural (e.g. 'We', 'Our', 'Us')	209	1.643 (.145)	2.174 (.202)	-2.13	0.034
Total Third Person (e.g. 'She', 'Their', 'Them')	209	3.986 (.229)	3.119 (.184)	2.946	0.004
Negative Emotions (e.g. 'hate', 'worthless', 'enemy')	209	.551 (.060)	0.335 (.039)	3.025	0.003
Tentative (e.g. 'maybe', 'perhaps', 'guess')	209	3.65 (.227)	2.731 (.157)	3.329	0.001
Certainty (e.g. 'always', 'never')	209	0.718 (.060)	1.284 (.095)	-5.063	0.000

()= Standard error of the mean.

Table 4

Personality Differences Between Groups

<u>Variable</u>	<u>N*</u>	<u>Mean Expert (n=17)</u>	<u>Mean Typical (n=12)</u>	<u>t statistic</u>	<u>p-value</u>
Surgency (Extraversion)	29	34.588 (1.463)	31.417 (1.983)	1.317	.199
Agreeableness	29	42.706 (1.892)	45.833 (.952)	-1.304	.203
Conscientiousness	29	40.647 (1.263)	39.750 (1.862)	.414	.682
Emotional Stability	29	36.647 (1.772)	37.25 (1.733)	-.235	.816
Intellect (Imagination)	29	38.882 (.931)	37.583 (1.34)	.823	.417

()= Standard error of the mean.

* = 4 surveys were not returned