Session Title:
Correlation Between Teacher Leader Innovation Levels (High – Low) and Their Use of Effectual Reasoning: Years 1-3

MSP Project Name:
EnLiST – Entrepreneurial Leadership in STEM Teaching and learning

Presenters:
Anita M. Martin, University of Illinois
Fouad Abd-El-Khalick, University of Illinois

Authors:
Anita M. Martin, University of Illinois

Project Session

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Summary:
Effectual Reasoning is thought to be a kind of reasoning that entrepreneurs in business use as opposed to causal reasoning. This study looks at entrepreneurship in the K-12 public school system and accomplishes three main goals: (1) to submit a working definitions of “entrepreneurial teacher leaders” by presenting their innovations in the world of education; (2) to present the development of a instrument to measure effectual reasoning; and, (3) to present three years of data that demonstrates a correlation between the teachers’ level of innovation (high-low) and their effectual reasoning scores. We discuss the role of the perception and propensity for risk and how this affects entrepreneurial teacher leaders’ decisions to innovate which informs our work on the grant.

Section 1: Questions framing the session:
The research questions that framed this study were (a) what is the relationship between science teachers’ effectual reasoning skills, their perception/propensity for risk, and level of innovation of their implemented projects? (b) Is there a difference in perception/propensity of risk by innovator level?

Section 2: Conceptual framework:
Entrepreneurial concepts and practices often are associated with independent, highly innovative individuals and/or nimble and highly flexible organizations. At first, such concepts and practices seem incompatible with, even foreign to, the rather conservative and often rigid organizational structure and culture that typify K-12 schools. To articulate our thinking about pathways to progressively engage EnLiST teachers with entrepreneurial thinking and practices, we discuss a theoretical model (see Figure 1) that differentiates three contexts—personal, relational, and organizational, within which innovation can be effected. To be sure, we welcome EnLiST teachers’ success at any of the three levels. Nonetheless, through helping teachers develop the requisite
understandings, skills, and attitudes, and through seeding opportunities for collaboration and innovation, we hope to enable EnLiST teachers to successfully negotiate the decreased control and increased challenges often associated with taking innovation beyond their own classrooms toward impacting student learning in their school building or district.

Successful teacher leaders are those who utilize entrepreneurial skills to overcome the challenges they face when attempting to create and implement transformative changes in their classrooms, buildings, districts, and across districts.
Section 3: Explanatory framework:
CHARTS OF INNOVATOR LEVELS AND EF SCORES - RAW; BY FACTOR; BY YEAR

<table>
<thead>
<tr>
<th>ER Mean Scores by Innovator Levels -Years 1-3</th>
<th>Mean</th>
<th>Range</th>
<th># of Scores</th>
<th>%age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>58.12</td>
<td>50-66</td>
<td>8</td>
<td>24</td>
</tr>
<tr>
<td>Medium</td>
<td>62.36</td>
<td>50-69</td>
<td>11</td>
<td>32</td>
</tr>
<tr>
<td>Medium high</td>
<td>68.5</td>
<td>64-69</td>
<td>8</td>
<td>24</td>
</tr>
<tr>
<td>High</td>
<td>72.86</td>
<td>69-77</td>
<td>7</td>
<td>21</td>
</tr>
</tbody>
</table>

Effectual reasoning represents a different approach from causal reasoning. Causal reasoning says that if one wants to be a successful entrepreneur, one must determine what the market for a product is “out there in the world.” The future is out there to be earned. Effectual reasoning says that through strategic partnerships and networks of visionary leaders, one can ‘create’ the future. For example, Sarasvathy (2008) describes a game where the goal is to get as many red balls as one can from an urn with red and blue balls. The causal thinker uses probability statistics to determine the ratio of red to blue balls, which then defines his/her probability of success and subsequent planning.

Effectual thinkers approach the problem differently. If the game is to get the most red balls, they bring strategic partners into the vision of change that have red balls. They keep adding red balls to the urn until almost every time they draw out of the urn, they pull out a red ball. If they cannot get red balls, they change the rules of the game to include the color of balls they have or can get. The future is theirs to create by marshalling resources and bringing the right people onboard with contributing means.

Extending this idea into the arena of education, then, would suggest that teachers who implement innovations using effectual reasoning do not subject themselves to the same rules that others adhere to. Instead, they are able to control their future by inviting strategic partners onboard, who have a shared vision of the innovation and who bring with them additional resources that then increase the chances of success and minimize the perceived level of risk. These partners bring their own means to the task, such as alliances with administrators, additional funding sources, or teacher networks in other districts who have implemented similar innovations. When an entrepreneurial teacher meets with an administrator with strategic partners in place, having been guaranteed matching funding, and can articulate an achievable vision, the response from the administrator is altered and doors open that might have otherwise been closed. Effectual reasoners take what occurs and use it in positive ways by leveraging contingencies, exuding a persistence that is uncommon and often leads to success. To summarize then, causal reasoning is based on the following logic: to the extent that we can predict the future, we can control it. Effectual reasoning is based on a different logic: to the extent that we can control the future, we do not need to predict it. To be sure, prediction, risk, and uncertainty play a role in the decisions that teachers face when deciding to implement innovations.
Section 4: Discussion:
These findings inform our work with teacher leaders in our 5 core partner school districts. We are able to partner with certain teacher leaders who have a high propensity for innovation and risk. The instrument would have been helpful in the recruiting phase of our work so that we would be able to use the ER scores of applicants in determining acceptance into the program.

Other MSP’s (Project Directors, PI’s, and Co PI’s) might find using the ER Survey a valuable tool in determining which teachers are more likely to implement higher levels of innovation in their districts, across districts, and across state and country boundaries. K-12 Administrators might be interested in using the ER survey as a hiring tool thereby potentially hiring teachers who may be more willing to implement reform in their classrooms.

Section 5: How will you structure this session? What is your plan for participant interaction?
The research will be presented and a paper will be handed out detailing the research. Questions will be answered with the remaining time. We will also make ourselves available during the two days of the conference for longer more specific discussions.