Activated science learners are assumed to be agents of self-regulating their own learning in our study. In social cognitive theory, this assumption suggests two key characteristics of agents as self-regulation: proactively making choices and intentionally engage in choices in science learning (Bandura, 2001). Social cognitive theory believes that personal cognition (e.g., motivation) is reciprocally determined by behavioral (e.g., choice, engagement) and contextual factors (e.g., autonomy support) (Bandura, 1986). Several key aspects of self-regulated learning (SRL) are recognized: cognition, motivation, metacognition, and behavior (Zimmerman & Schunk, 2001; 2011).

The present study focuses on the roles of motivation and perception of context in influencing middle school students' SRL behaviors as outcomes of science activation. Specifically, we intend to address these questions:

1. How do you engage in science learning? (choice)
2. How are your choice preferences and engagement related to your academic achievement? (perceived autonomy)
3. How does your choice preference and engagement influence your perception of contextual autonomy support? (interest)
4. How do you foresee your choice preference related to your perceived autonomy? (value)

The following table presents the partial correlations between the variables for study 1 and study 2 (Gender and pre-test were controlled for) and the implications for design.

**Table 1. Partial correlations between the variables for study 1 and study 2 (Gender and pre-test were controlled for)**

<table>
<thead>
<tr>
<th></th>
<th>Study 1</th>
<th>Study 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Choice preference</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engagement</td>
<td></td>
<td></td>
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<tr>
<td>Interest</td>
<td></td>
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<tr>
<td>Competence belief</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived autonomy</td>
<td></td>
<td></td>
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<tr>
<td>Utility value</td>
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<td></td>
</tr>
</tbody>
</table>

**Study 1**

- **Activating Science Learners As Self-Regulation Agents**
- Li Sha, Christian Schunn, & Meghan Bathgate
- LRDC, University of Pittsburgh

**Abstract**

Activated science learners are assumed to be agents of self-regulating their own learning in our study. In social cognitive theory, this assumption suggests two key characteristics of agents as self-regulation: proactively making choices and intentionally engage in choices in science learning (Bandura, 2001). Social cognitive theory believes that personal cognition (e.g., motivation) is reciprocally determined by behavioral (e.g., choice, engagement) and contextual factors (e.g., autonomy support) (Bandura, 1986). Several key aspects of self-regulated learning (SRL) are recognized: cognition, motivation, metacognition, and behavior (Zimmerman & Schunk, 2001; 2011).

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**What We’ve Learned so Far**

- Activated science learners are assumed to be agents of self-regulating their own learning in our study. In social cognitive theory, this assumption suggests two key characteristics of agents as self-regulation: proactively making choices and intentionally engage in choices in science learning (Bandura, 2001). Social cognitive theory believes that personal cognition (e.g., motivation) is reciprocally determined by behavioral (e.g., choice, engagement) and contextual factors (e.g., autonomy support) (Bandura, 1986). Several key aspects of self-regulated learning (SRL) are recognized: cognition, motivation, metacognition, and behavior (Zimmerman & Schunk, 2001; 2011).

**Research Design & Methods**

**Study 1**

- **Location:** Pittsburgh
- **Time:** May 2011
- **Valid Participants:** 137

**Study 2**

- **Location:** Pittsburgh
- **Time:** Sep-Oct. 2011; Feb-Mar, 2012
- **Valid Participants:** 638

**Implications for Design**

These two studies conducted on two different sets of data have revealed a consistent pattern of the motivational factors underlying choice and engagement.

1. Middle school students’ science choice preference is significantly associated to interest, competence belief, and perceived autonomy in choice making.
2. Self-reported engagement in learning can be predictable by the above three variables plus utility value.
3. Study 2 found that choice preference, prior knowledge, and utility value are the significant predictors of learning.

**The implications of these findings are two-folded.**

- Comprehensive research like the present study is still lacking on behavioral outcomes of motivation and self-regulation as agency in middle school science classroom.
- Our study enriches the research in the expectancy-value theory by recognizing the importance of perceived autonomy in predicting people’s choice.
- Since perceived autonomy is a motivational construct in self-determination theory, this suggests a significant contribution to the call by Pintrich a decade ago on the necessity of integrative investigations of effects of motivation on choice, engagement, and learning from various theories (2003).

**Next Steps**

1. Explore more relations between the measures at Time 1 and Time 2. For example, how are choice preference, engagement, and learning associated with a number of sub-scales within the dimension of maintaining-focus such as regulation of cognition and emotion?
2. More sub-scales on motivation can be recognized from the dimensions such as goal orientation. It would be interesting to explore how they predict the outcomes of activation.
3. Purposively select some demographic variables such as ethnicity, family climate, to explore how learners’ dispositions and outcomes of activation vary with those demographic factors.
4. Explore a new instrument for choice preference to differentiate students’ current, activity-related and future, career/course-related choice preference. This would be a step stone for longitudinal study on science activation.