Creating Puzzlement and Perseverance: A Productive Failure Problem-Solving Model

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This session engaged participants in thinking about how Kapur's (2012) productive failure model can promote student thinking and promote perseverance during a problem solving task. The productive failure model for problem solving is centered upon the premise that students have a deeper understanding of new concepts when they are given opportunities to solve problems that are just outside their reach (Kapur & Bielaczyc, 2011). Productive failure tasks must provide students with a problem situation to activate prior knowledge and utilize multiple methods; promote students to critically analyze the targeted concepts, and encourage students to make connections between failed attempts and successful advancements. This model is intended to delay initial instruction of a new concept so that students will experience puzzlement. This delay of instruction affords students with extra time to grapple with the concepts, assemble their prior knowledge, and better understand why the new concepts – representations and methods- are connected in the way that they are (Kapur & Bielaczyc, 2011).

Presenter explained the productive failure model, explained findings from current research, provided examples of tasks, and shared how the productive failure model created puzzlement and promoted learning in a ninth-grade mathematics classroom (Author, 2014). This current research showed how students persisted during a productive failure modeled task and revealed three main themes: (a) the group's processes of interaction, (b) the roles of group members played during the task, and (c) the problem solving approaches the group utilized during the task. The interactive model in *Figure 14* shows how the these three components worked together as a model of persistency (Author, 2014).

Participants learned how the productive failure model works and how to use the model through three tasks. The tasks provided context for deeper level of learning systems of linear inequalities, analyzing one variable data for consistency, and learning the four centers of triangles. Participants were shown how to celebrate student errors as part of the learning process and were challenged to go forth and create their own tasks using this model to afford students with context and puzzlement.
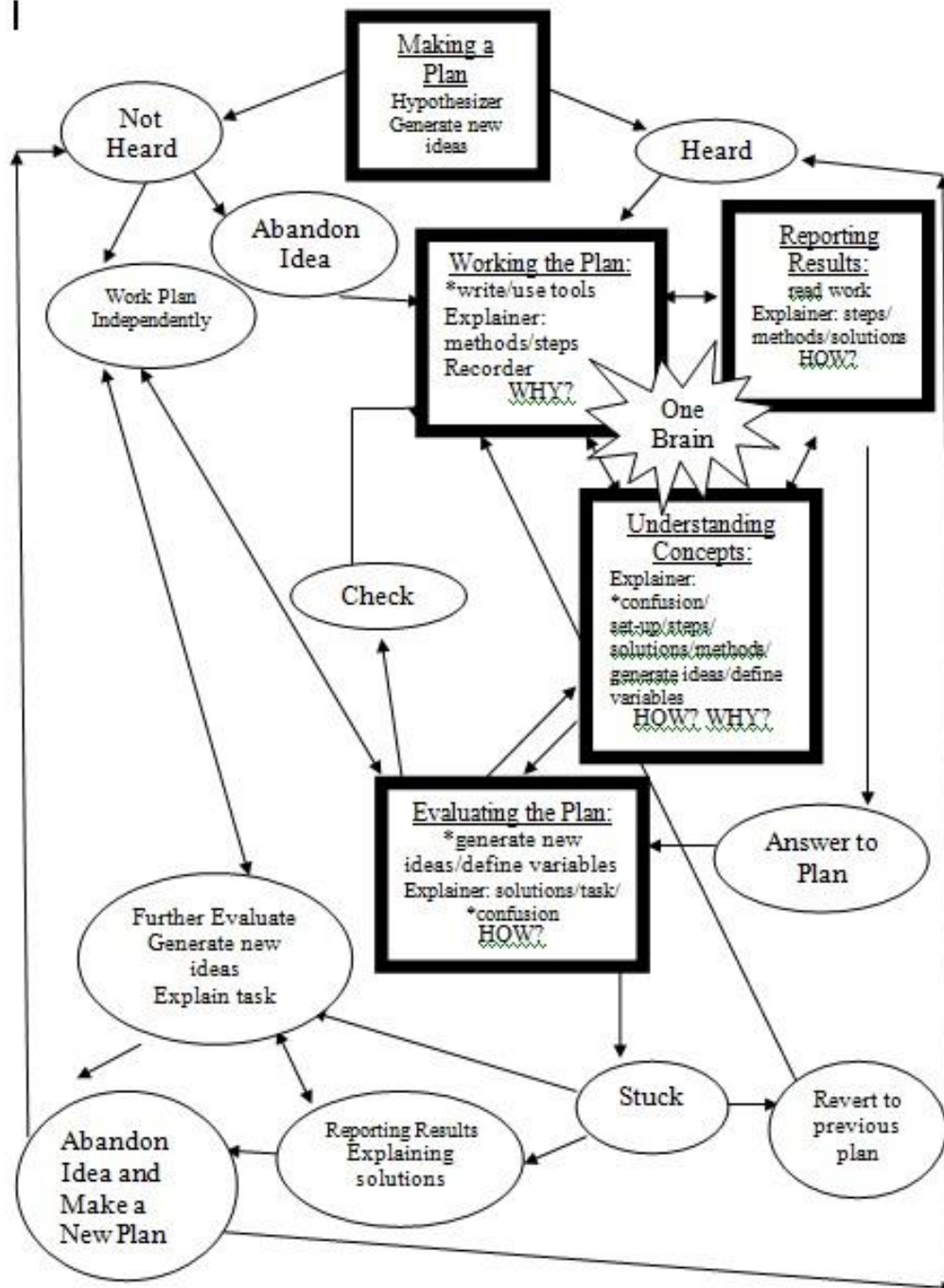
Figure 14. Model of Persistency during a Productive Failure Modeled Task

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