

Enacting Co-Designed Socio-Scientific Issues-Based Curriculum Units: A Case of Secondary Science Teacher Learning

Patricia Friedrichsen¹, Li Ke²,
Troy Sadler², and Laura Zangori¹



¹ University of Missouri

² University of North Carolina-Chapel Hill



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Socio-Scientific Issues

Definition: Contentious social issues with conceptual ties to science that include societal influences.

(Sadler & Zeidler, 2004)



Rationale for SSI Teaching & Learning

Increased student
interest & engagement

(Ekborg et al., 2013; Lee & Yang,
2019)

Promotes learning of
science content

(Lewis & Leach, 2006; Sadler et al.,
2016)

Promotes reasoning
skills

(Zeidler et al., 2013; Zohar &
Nemet, 2002)

Promotes nature of
science understandings

(Eastwood et al., 2012; Khishfe &
Lederman, 2006)

Supports Vision 2
scientific literacy-
science in context and
informed decision-
making (Roberts 2011)

Rationale for Study

- SSI teaching is challenging for teachers: (Bossér et al., 2015; Lee & Yang, 2019)
 - Selecting a good socio-scientific issue (Hancock et al., 2019)
 - Lack of comfort with non-scientific dimensions (Lazarowitz & Bloch, 2005)
 - Lack of instructional time (Cross & Price, 1996)
 - Pressure of high stakes assessments (Lee & Yang, 2019)
 - Lack of readily available SSI curriculum (Ekborg et al., 2013)
- We know little about effective ways to support teachers in using SSIs.

Context: Collaborative Curriculum Design PD

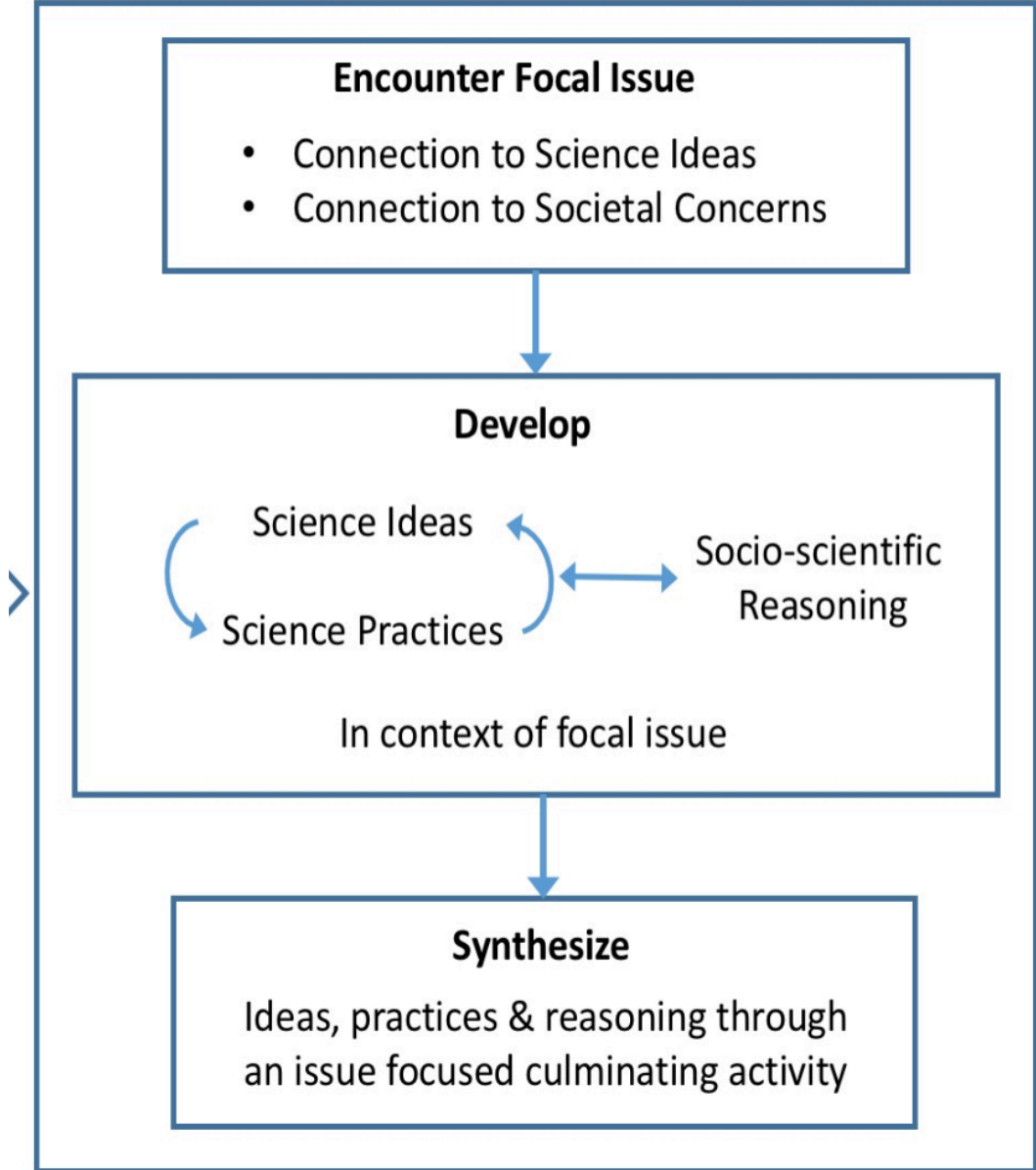
PD participants: 18 Secondary teachers of biology, chemistry, and environmental science

35-hour workshop in two sessions:

- Spring Workshop (2 days)
 - SSI framework, Sample SSI units, Curriculum design scaffolds
 - Team selection and initial design process
- Summer Workshop (3 days)
 - *NGSS* overview & practices workshops
 - Design time with support.

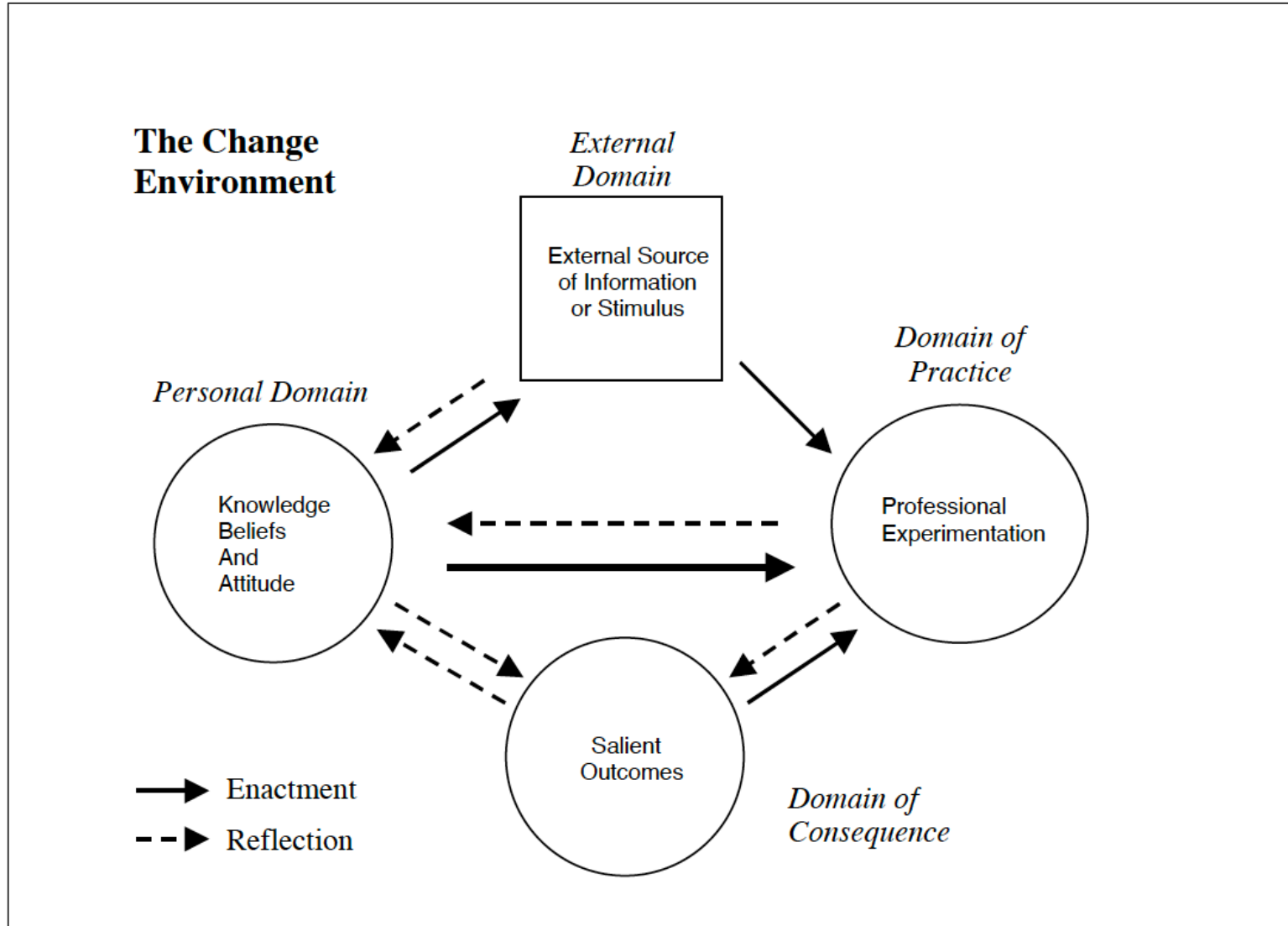
Implementation of units during following school year

SSI Teaching & Learning Framework



Sadler, Foulk & Friedrichsen, 2017

Theoretical Framework: Clarke & Hollingsworth's (2005) Interconnected Model of Professional Growth (IMPG)



Research Questions

- 1) Which elements of SSI do the PD participants enact in their classrooms? (*Domain of Practice*)
- 2) What do participants identify as salient outcomes when they enact their SSI units? (*Domain of Consequences*)
- 3) What is the nature of participants' beliefs about teaching and learning? (*Personal Domain*)
- 4) What do participants learn in the PD? (*External Domain*)

Participants: 8 teachers implemented SSI units and agreed to participate in the study

Pseudonym	SSI Unit
Harry	Performance Enhancing Drugs
Margaret	Performance Enhancing Drugs
Jess	Clean Air
Tonya	Clean Air
Jemma	Diabetes
Judith	Mars Colonization
Rebecca	Junk Food Tax
Suzanne	Flood Control

Methods

Multiple case study (Yin, 1994) of teacher learning about SSI-based teaching and learning.

Bounded by the PD and teachers' enactment of their SSI unit.

Data Sources

Primary:

- Individual semi-structured interview (~1 hr)
- Design team semi-structured interview (~1 hr)
- Follow-up Implementation interview (~1 hr)

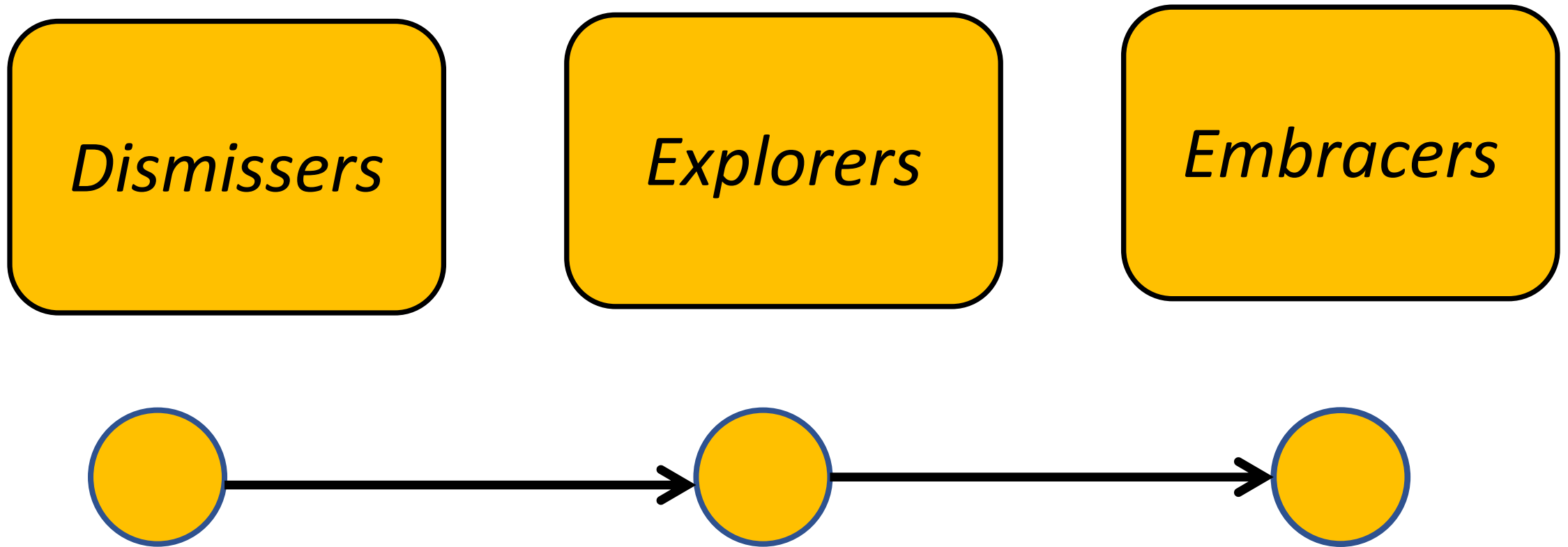
Secondary:

- PD Field notes
- SSI Curriculum Unit Draft

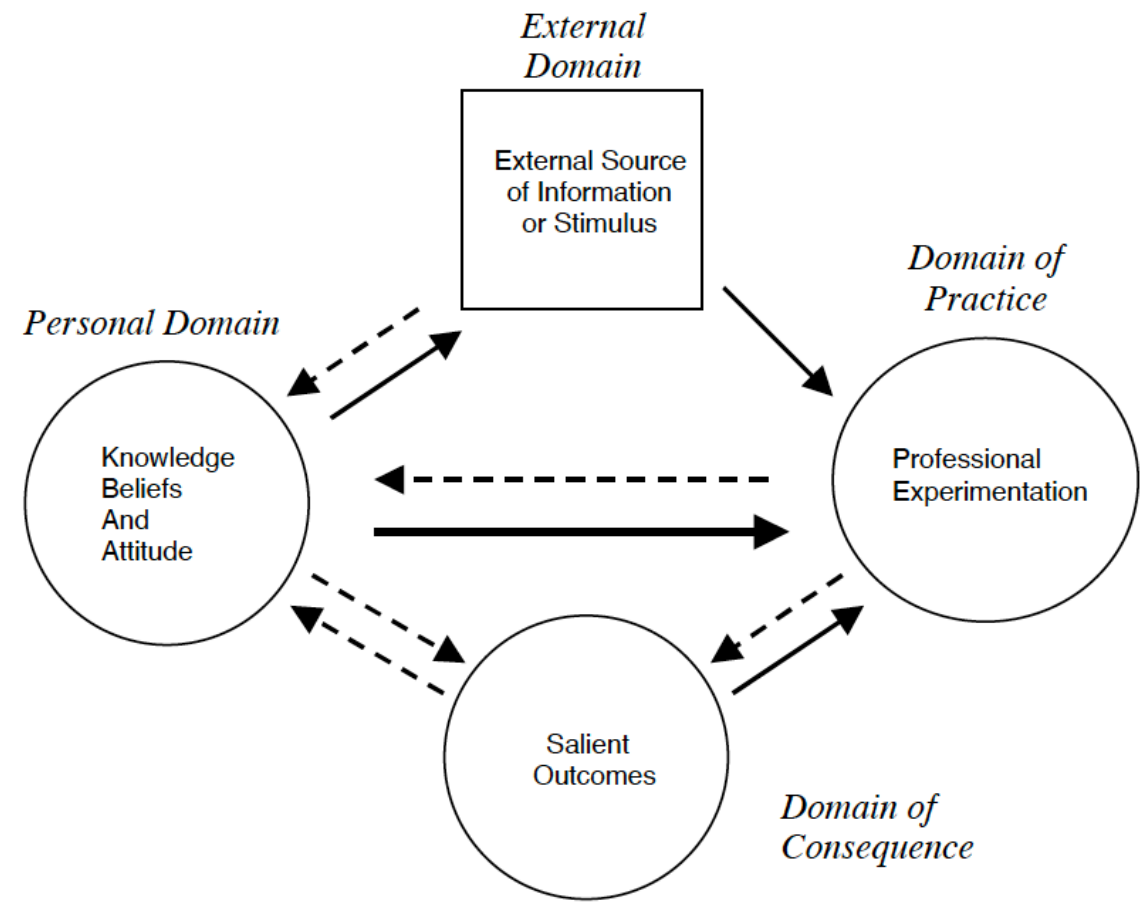
Data Analysis

- Multiple coding rounds (Miles, Huberman & Saldaña, 2014)
- 1st Round: Deductive coding using IMPG Domains: Practice, Consequences, Personal, and External
- 2nd Round: Inductive coding within domain codes
- Multiple participants shared same inductive codes -> Profile analysis approach.
- Created in-depth profiles using inductive codes.

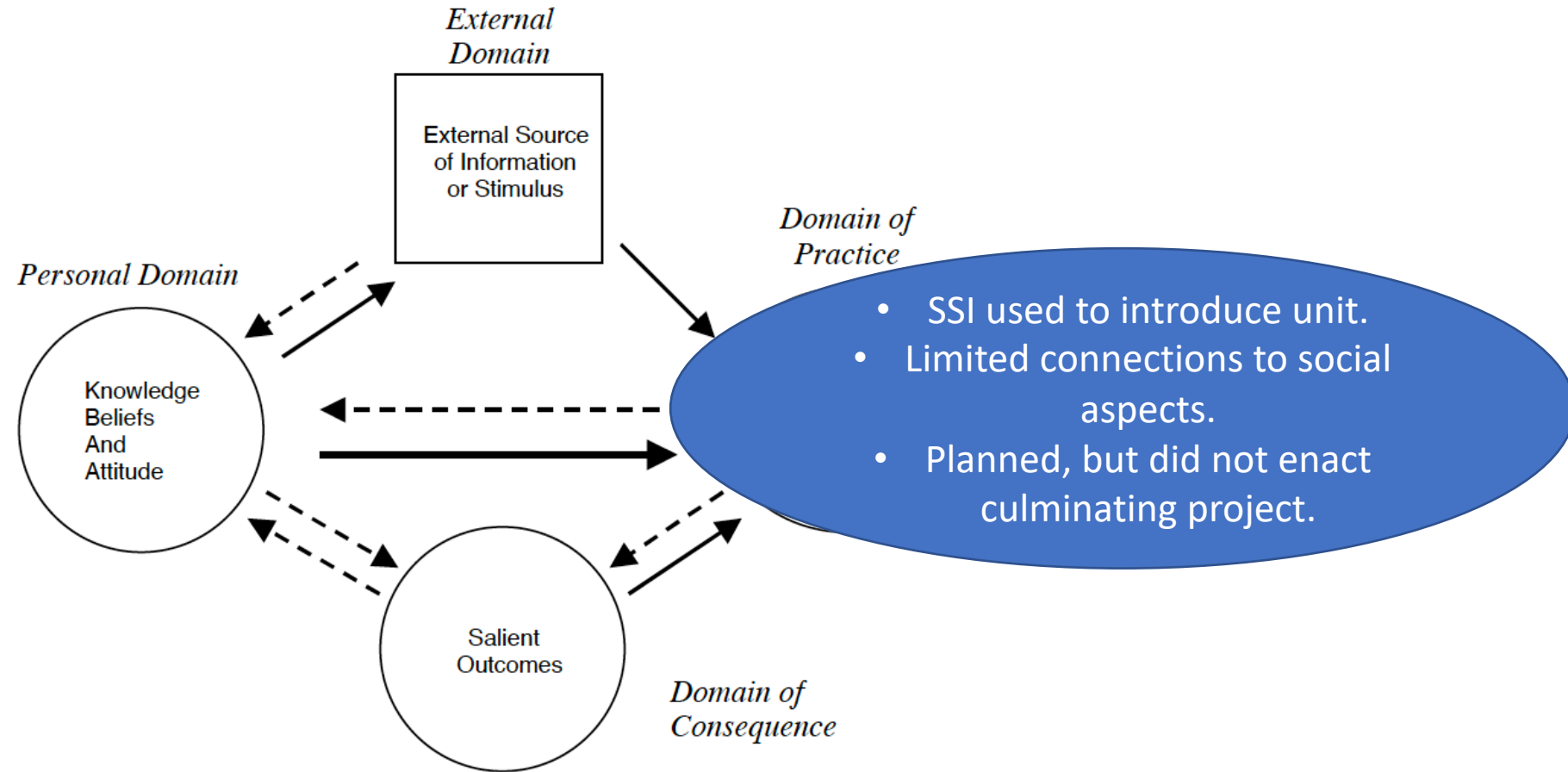
Findings: Implementation Profiles Continuum



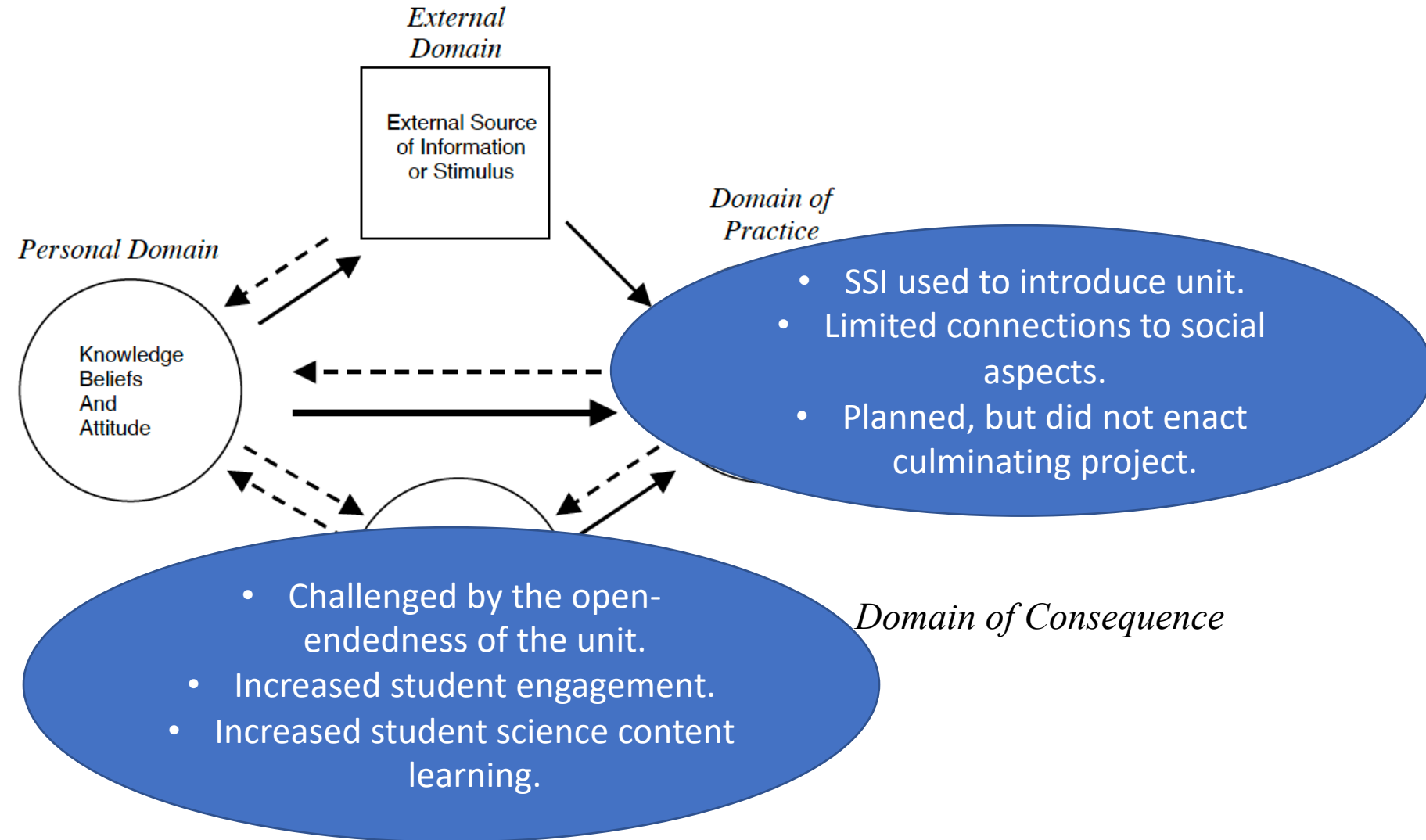
The Explorers



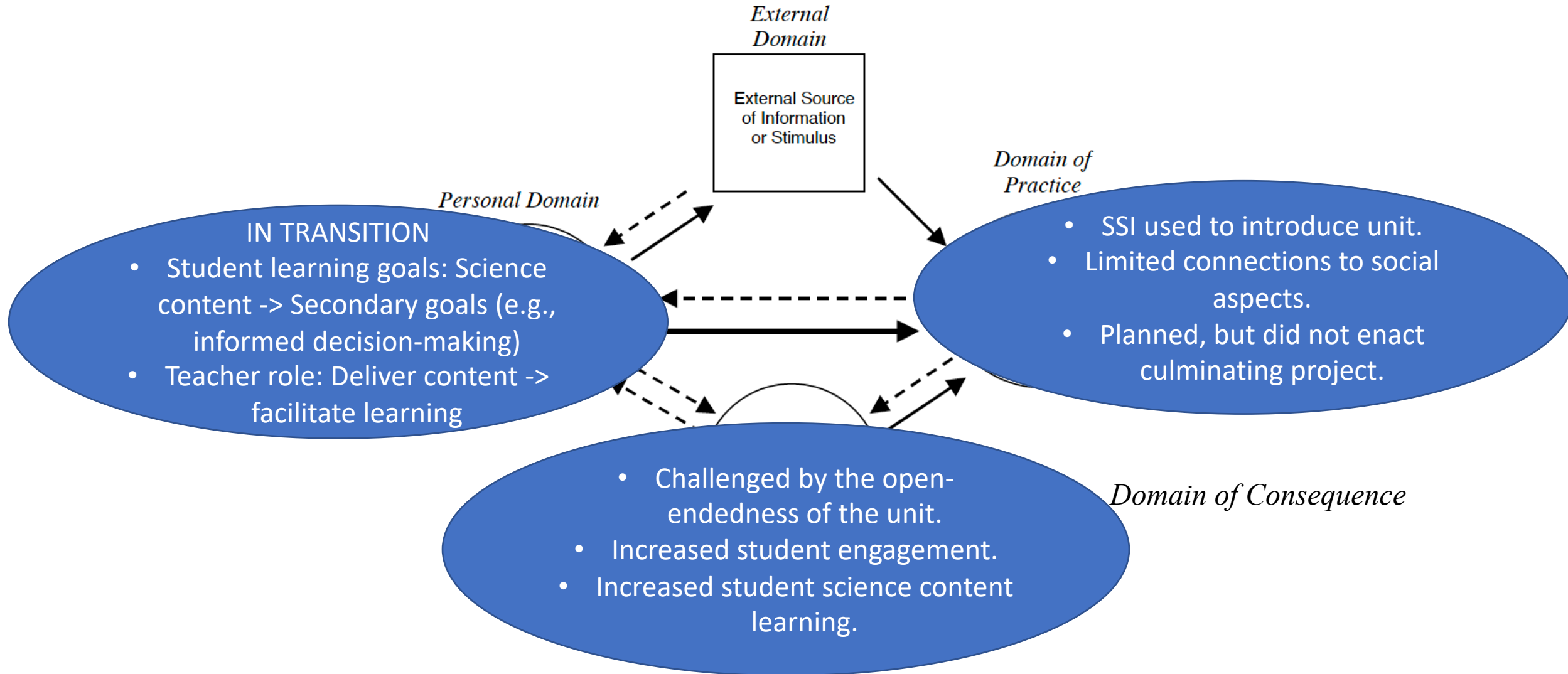
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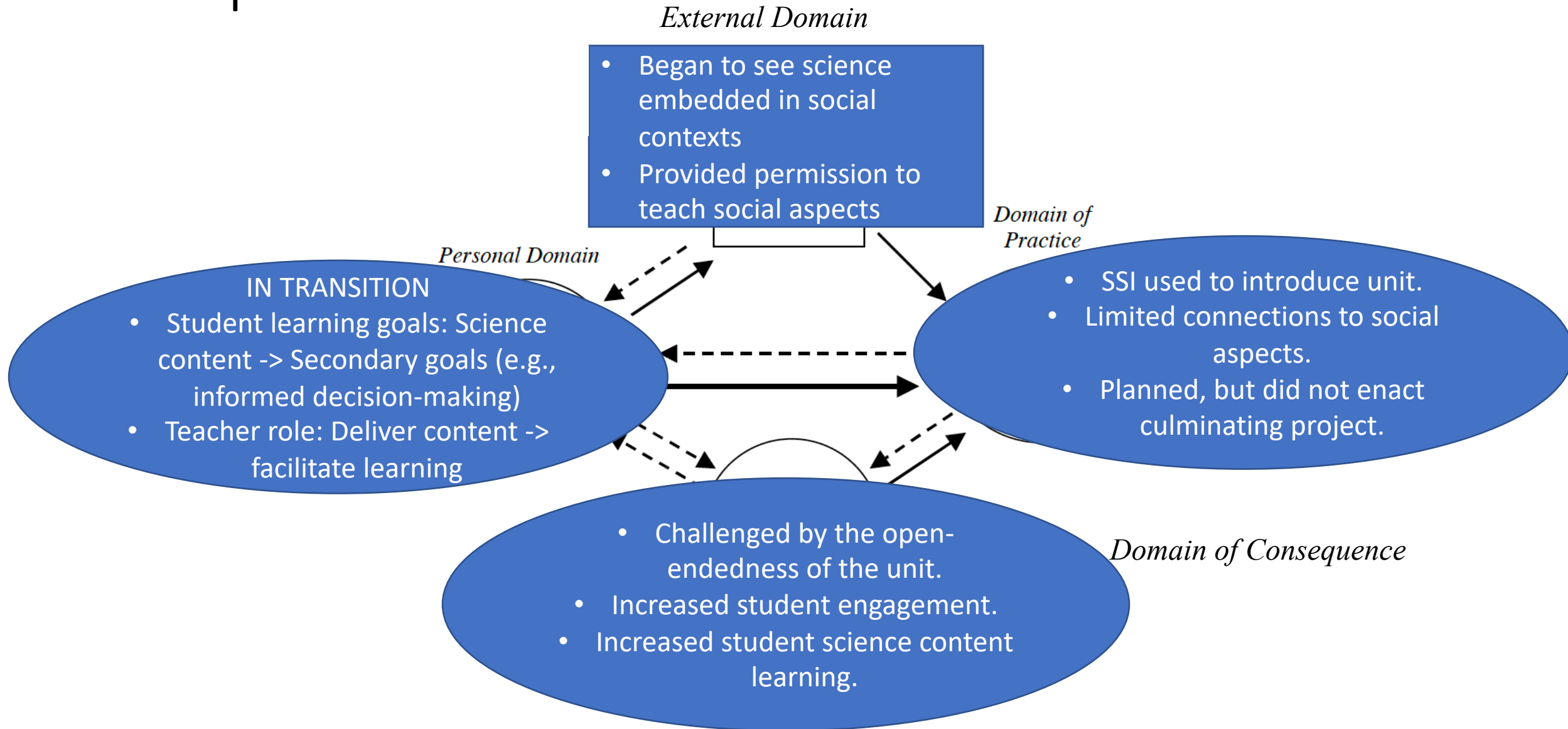
The Explorers



The Explorers



The Explorers



External Domain across Profiles

External Domain

- Began to see science embedded in social contexts
- Provided permission to teach social aspects

Dismissers

Explorers

Embracers

External Domain across Profiles

External Domain

- SSI is something we already do—nothing new here
- Design teams struggled to collaborate

- Began to see science embedded in social contexts
- Provided permission to teach social aspects

- Drew on PD activities to design coherent units
- Provided tools to achieve SSI aligned goals

Dismissers

Explorers

Embracers

Key Inferences

Dismissers: Misalignment between Personal and External domains was a significant barrier

Explorers: SSI (External Domain) was seen as a way to support motivating & engaging students (Personal Domain). Experience supported their transitional process.

Embracers: Strong alignment across IMPG domains

PD Implications

Profiles	PD Implications
<i>Dismissers</i>	<ul style="list-style-type: none">- Member of larger design teams- More PD support for struggling design teams- Critical feedback on SSI unit design
<i>Explorers</i>	<ul style="list-style-type: none">- Need for facilitator support during implementation- Need for more SSI instructional and assessment tools- Need to work with PLCs
<i>Embracers</i>	<ul style="list-style-type: none">- Experienced SSI teachers and exemplary SSI units were useful resources

Implications for Research

- Further investigation of PD supports that help teacher move across the continuum.

- Investigation of supports during enactment.

Paper available:

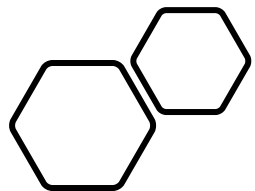
Friedrichsen, P., Ke, L., Sadler, T. D., & Zangori, L. (2021). Enacting socio-scientific issues-based curriculum units: A case of secondary science teacher learning. *Journal of Science Teacher Education*, 32(1), 85-106.

DOI: [10.1080/1046560X.2020.1795576](https://doi.org/10.1080/1046560X.2020.1795576)

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Thank you

This work was supported in part by the National Science Foundation under Grant IIA-1355406. Ideas expressed in this material are those of the authors and do not necessarily reflect the views of the NSF.

