

Understanding Co-production in Urban Ecological Design: Design processes to support “Designed Experiments”

Christopher A. Sanchez¹, Paul Coseo², Chingwen Cheng²

¹ASU School of Sustainability, ²ASU Herberger Institute for Design and the Arts, The Design School

Introduction

• *Designed experiments* are urban design projects as ecological tests to improve our understanding of how urban ecological infrastructure (UEI) performs (Felson & Pickett, 2005).

• The co-production of designed experiments links urban ecologists, practitioners, stakeholders and students to collaboratively generate designs, monitoring and maintenance for designed experiments.



Figure 1. Example of a designed experiment streetscape

• How this process unfolds in UEI-based projects is not well understood.

Goals

- 1) Understand how co-production processes contribute to CAP LTER designed experiments, and how they can support equitable, sustainable, and resilient UEI design outcomes
- 2) Develop, pilot, and refine a survey instrument to function as a reflexive feedback mechanism for future CAP LTER designed experiment projects

Experimental design and methods

- We surveyed students and researchers that participated in three (3) different UEI projects in Phoenix, Tempe, and Buckeye, AZ
- These projects were associated with one (1) undergraduate and two (2) graduate landscape architecture studio courses.
- Survey content was developed to identify challenges and opportunities in the co-production process

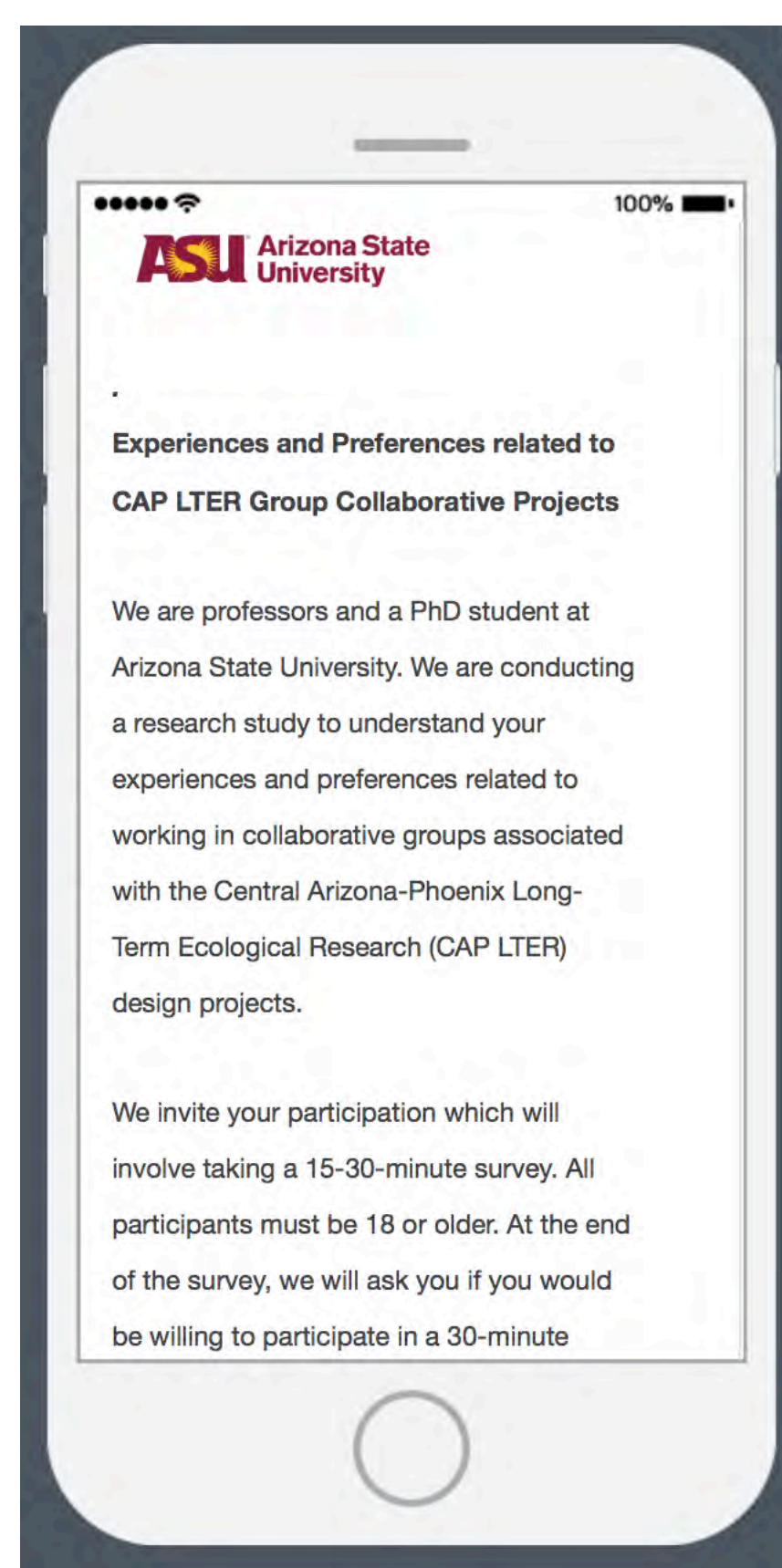


Figure 2: Online, IRB approved, Qualtrics-driven pre- and post-survey instrument applied to participants in the three (3) UEI projects.

Conceptual Frameworks

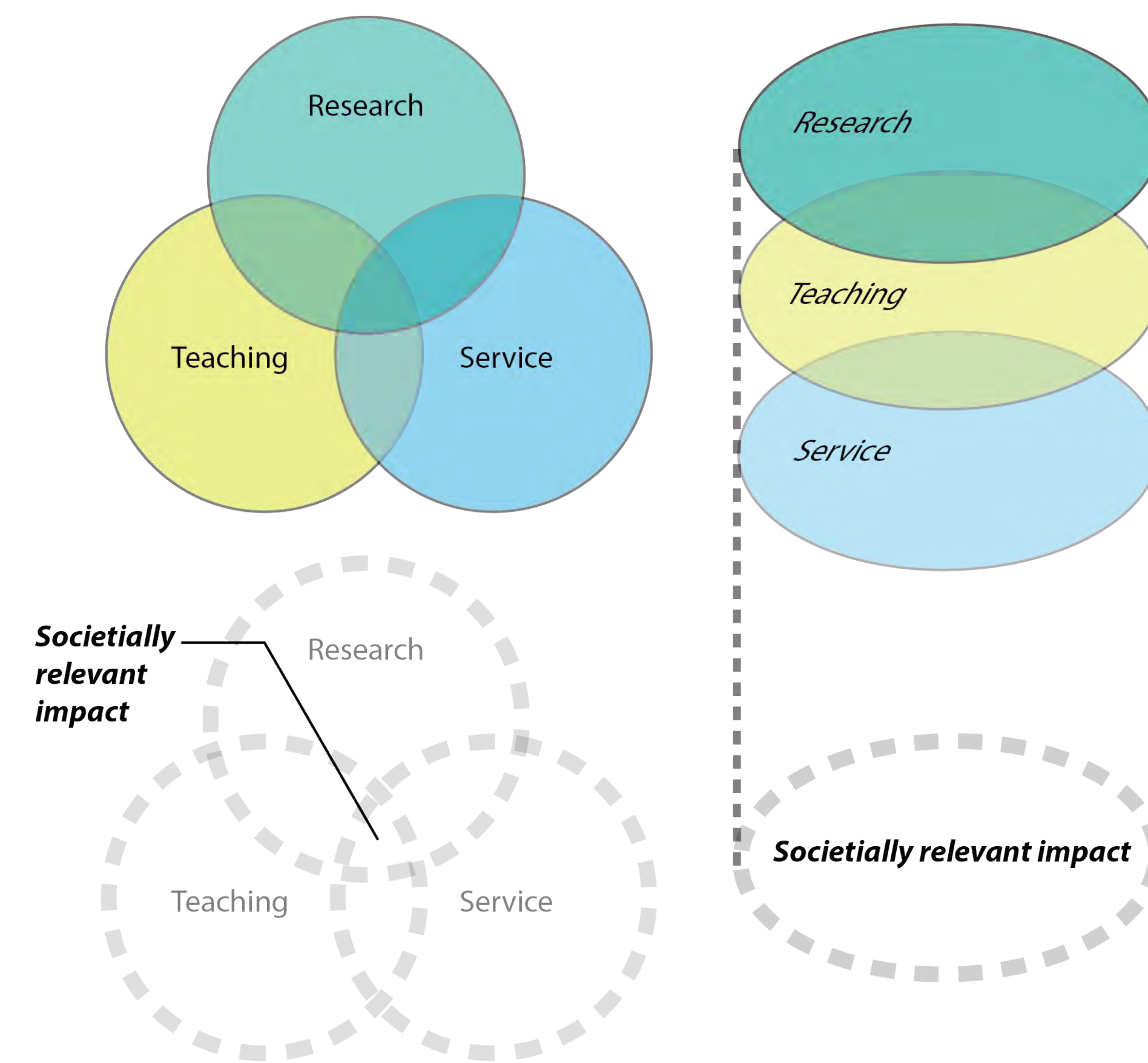


Figure 3: The diagram above illustrates the conventional overlap between academic research, teaching, and service activities. In the conventional arrangement societally relevant impacts are located at the intersection of the three activities. The diagram on right illustrates a conceptual realignment of research, teaching, and service to create more bandwidth space in academic activities for societally relevant UEI projects. Bandwidth refers to the personal time, energy, and mental capacity individuals have to work on a project or problem.

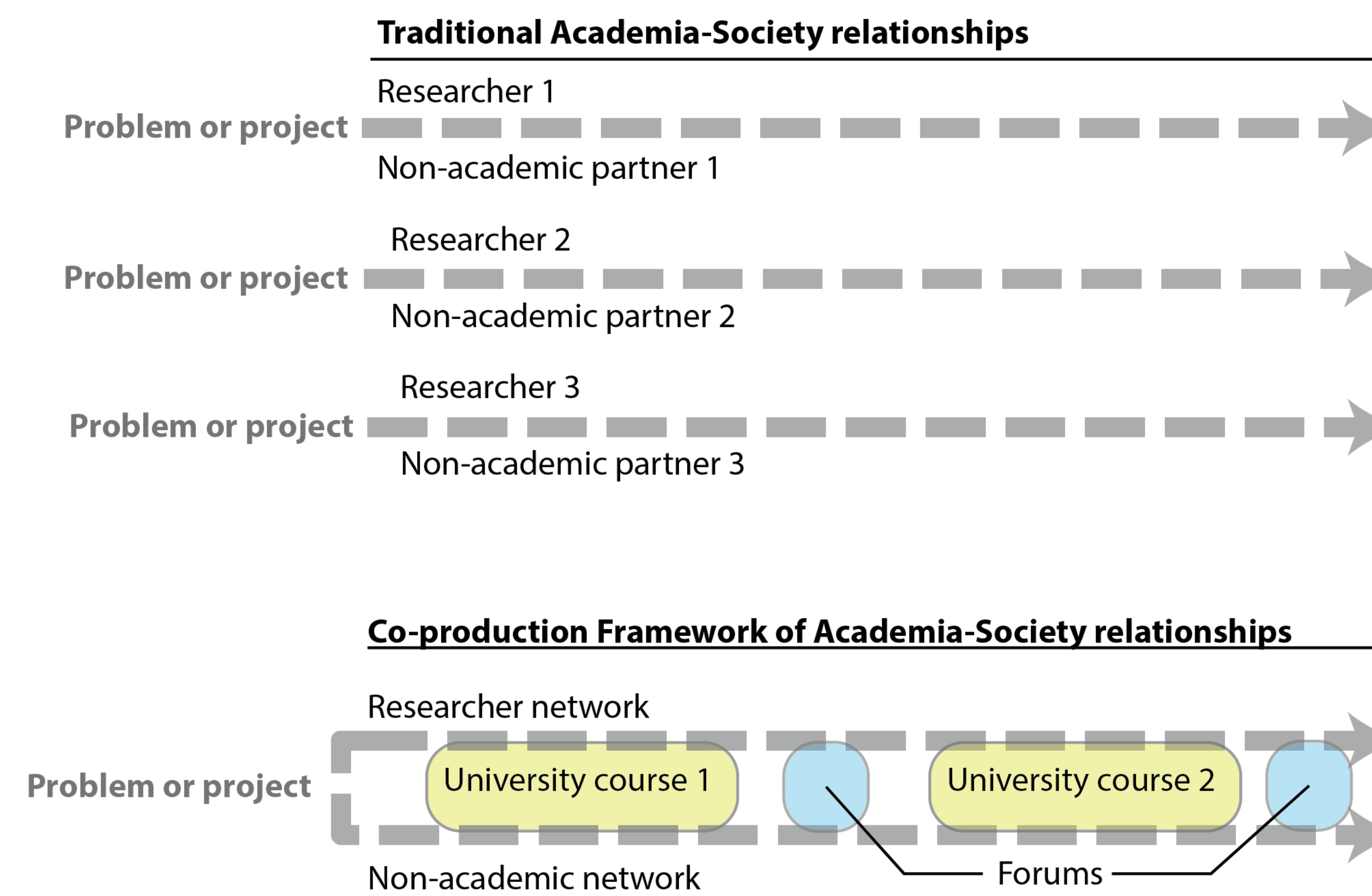


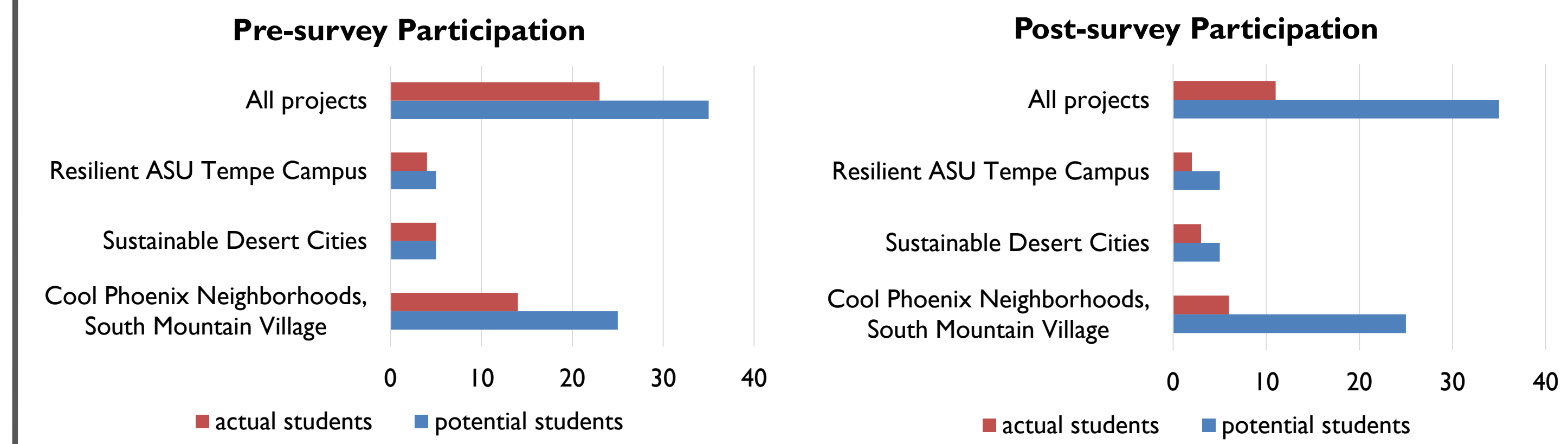
Figure 5. Co-production Framework aligning research, teaching, and service around design studio courses to create more space for societally relevant UEI projects. University courses serve as the main driver of the academia-society relationship with design forums between courses to bridge course activities and maintain longer-term academia-society relationships.



Left photograph: Participants from Chispa AZ lead a discussion on social and environmental justice issues. Center photograph: A Postdoc from the Urban Resilience to Extremes Sustainability Research Network (URExSRN) discusses concepts of resilience. Right photograph: Representatives from the URExSRN talking with students about their UEI proposal.

Results

1. Student Response Rates



Across all projects surveyed, 66% (n=23) of students responded to the pre-survey, while 32% (n=11) responded to post-survey

2. Key themes: defining urban ecological infrastructure (UEI)

Question: “From your past experience and perspective, what does urban ecological design mean to you?” (student and researcher responses from post-survey)

Ecological function	Human outcomes	Sustainability & resilience	Systems thinking
“Integrating natural processes in the design of an urban environment.” - Student	“Design that encourages healthy urban lifestyle: promotes walking, and use of public transit without compromising well being...” - Student	“Sustainable and resilient design through NATIVE ecology and the processes nature imposes onto them.” - Student	“taking a systems approach to design that includes built elements, social influences, and the natural or ecological system, such that all aspects are considered in some way.” - Researcher
“Design that respects natural ecological function by either preserving ecological linkages or creating them in an urban context.” - Student	“Urban ecological design tries to transform the urban space into a space where human and natural environment interact with one another and provide a sense of learning and literacy towards ecology.” - Student	“Urban ecological design means to me is to design for the urban environment with sustainable methods.” - Student	“I envision urban ecological design as a hybrid system of thinking, where urban design is informed by a comprehensive understanding of various ecological issues/solutions specific to a context/area.” - Researcher
“The functionality of the land and its environment based in the “new age” of urban life.” - Student	“To design urban spaces with an eye on the ecology” - Student	“Urban ecological design considers the interaction between and among people, communities, the built environment, and ecosystem processes to produce designs that are sustainable, attractive, and multi-functional.” - Researcher	
“Designing with consideration to the ecology whether it is through revitalization or preservation.” - Student			

3. Key themes: challenges and opportunities associated with UEI-based projects (students and researchers from pre-survey)

Accessing science	Temporal and spatial mismatches	Conceptual mismatches
“Finding, understanding and pulling the appropriate data from journals” - Student	“The temporal scales at which academia and cities work is often a challenge. Research can be slow but it is often time dependent (e.g., coursework, masters/dissertation, grant funded research) and practitioners have enormous responsibilities so building the relationships and launching the research takes a lot of time and effort. I think it is really hard to align goals and time constraints.” - Researcher	“Sometimes researchers may spend time exploring and refining ideas and concepts in overly academic language. Most practitioners want much more practical outputs from research. Likewise, a lot of outputs that may be useful for practitioners lack the rigor to be considered valid pieces of research.” - Researcher
“How do I even know what kind of science is out there that’s relevant?” - Student	“finding a venue to interact with relevant practitioners” - Researcher	“sometimes I could not know clear the model” - Student
“From my perspective, there doesn’t seem to be a lot of research on how it relates to my profession, or rather it is not integrated part of my education so far.” - Student	“Just that searching for and reading academic papers can be tedious and time consuming.” - Student	“Science often concentrates on problems and does not offer practical solutions that are ready to apply” - Student
“Science articles and be difficult to connect directly to green infrastructure, if not already pertaining to it, making those links is necessary to make science “Accessible” across disciplines.” - Student	“The time frame for finding the facts and figures.” - Student	

Discussion and conclusions

- UEI definitions vary in scope (project- to city-scale) and outcome focus
- Going forward, this pilot study will be refined to more specifically assess co-production processes and learning exchange
- Survey will continue to be administered to students, researchers, and practitioners associated with UEI-based CAP LTER projects

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