

Reimagining Entrepreneurship: Design Culture Exposure as a Positive Mediator for Entrepreneurial Capacity

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Abstract

A diverse body of literature confirms the need to better understand the antecedents of entrepreneurial capacity, especially for developing nations or similar de-industrializing *rust belt* regions within developed nations. The research intention was to test our theory that exposure to design culture and design processes would induce heightened levels of individual attributes associated with entrepreneurship capacity. Results confirmed positive mediating effects of design culture treatment (DCT) exposure on the dependent variables collaboration self-efficacy (CSE), entrepreneurial self-efficacy (ESE), and perceptions of opportunity (PO). The effects of DCT on propensity to remain (PR) and affect geopolitical (AG) were not supported.

Keywords: collaboration, design, economic development, entrepreneurship, self-efficacy, vision.

Introduction

Capitalism ... puts to work techniques for the fabrication of motivation to the point that they have become counterproductive ... there comes a moment when the source of the exploited is exhausted. (Stiegler, 2014, p. 42)

As suggested by the quote above, capitalism in its dominant institutional form may be at a critical evolutionary inflection point. Economists, political bodies, and others have lauded the triumph of high consumption- and self-interest-based capitalism over alternative economic models. However, other voices have called attention to capitalism's endogenous deficiencies and seek a normative transformation from a basis of consumption to prosocial contribution which would engender greater skilled capacity, equitable social participation, and general economic vitality (Stiegler, 2014).

In developed nations such as the United States, classical capitalism with arguably weak government policy and intervention has yielded wide swaths of de-industrializing society, often referred to as *rust belt* regions (Brady, Beckfield, & Zhao, 2007). Features include diminishing economic vitality (Koistinen, 2013), shrinking populations, urban decay, and growing political “hostility and even anger” (Stiegler, 2014, p. 42). Although economists and political actors have prescribed entrepreneurial activity and reduced governmental involvement as simple remedies for rust belt and rural challenges, a diverse body of literature confirms the need to better understand the antecedents of entrepreneurial capacity. Many scholars posit that there is no adequate or robust explanation of entrepreneurial capacity (Chaminade, Lundvall, Vang-Lauridsen, & Joseph, 2009; Diaz-Casero, Hernandez-Mogollon, & Roldan, 2012).

While many institutional scholars of varying views argue for policies that stimulate the development of entrepreneurial capacity as a safeguard to progress, they often disagree about the optimal institutional path to achieving more robust economic activity. Further complicating this challenge, is the related phenomenon of outmigration (Petrin, Schafft, & Meece, 2014) or *brain drain*—the loss of educated, achievement-oriented young adults who may have the general cognitive and physical capabilities and long-term interests to change local institutions. For many rust belt and rural regions, brain drain has become a predictor of further de-industrialization. Rational choice and economic institutional theories may not fully consider the antecedent behavioral processes and technological systems effects that enable actors (Chaminade et al., 2009; Green, Li, & Nohria, 2009; Maguire & Hardy, 2009; Mahoney & Thelen, 2010). As such, the purpose of this interdisciplinary study is to test the impact of design culture treatments on efficacies, attitudes, and behavioral intentions of *young adults* during the *transition to work* stage as necessary *human* conditions for entrepreneurial capacity (Geldhof et al., 2014; Lloyd, Behrman, Stromquist, & Cohen, 2006). Accordingly, university students are ideal subjects since they directly represent the target population of potential young adult entrepreneurs. Our research is guided by these questions: *How might entrepreneurship be reimagined?; Which institutional strategies might governments, educators, and others use to encourage creative and entrepreneurial behavior in young adults?; and How might deindustrialized communities engage their “best and brightest” and experience “brain gain”?*

Entrepreneurship and Design Culture

Entrepreneurs are actors who through the actions of entrepreneurship, a combination of creativity and business expertise, are able to lead the sustainable introduction of technological innovations that represent novel market value (Reynolds, 2010). Entrepreneurs are often driven by their intuitive sense that the current and accepted equilibrium in a given stable system is unsatisfactory, a view that the system could be more beneficial to multiple

stakeholders if certain novel or creative changes were introduced. Although entrepreneurs have traditionally been conceived as transformative economic agents in marketplaces, current scholarship extends the scope to include those who through social skill (Albert & Couture, 2013; Bozic Yams, 2017) introduce novel change within social and political arrangements. Furthermore there are emergent conceptions of “social entrepreneurship” that feature entrepreneurs who, working through hybrid “social venture” organizational forms, transcend boundaries to achieve social change and purposeful impact through sustainable economic means (Martin & Osberg, 2007; Perrini, Vurro, & Costanzo, 2010). Entrepreneurial capacity is defined as the ability of a given geopolitical entity to produce entrepreneurial activities that introduce and diffuse novel innovations (Diaz-Casero et al., 2012; Hindle, 2012; Yencken & Gillin, 2004). As discussed above, many scholars agree that the literature lacks a complete or robust explanation of entrepreneurial capacity.

One broad stream of research focuses on technoscientific aspects such as infrastructure and various arrangements of institutional bodies (Leydesdorff & Etzkowitz, 1998; Rypestøl & Aarstad, 2018). Others have begun to investigate aspects of human behavior, agency, and self-efficacy that are relevant for would be entrepreneurs (Lindh & Thorgren, 2016; McGee, Peterson, Mueller, & Sequeira, 2009; Souitaris, Zerbini, & Al-Laham, 2007). However, methods and processes for building or increasing individual self-efficacy are still not clear. Lastly, a few scholars from disciplines outside of economics have begun to broaden entrepreneurship discourse by setting normative sustainability expectations. For instance, some have called for the social worth of current capitalists and entrepreneurs to be correlated with their capacities to collaboratively expand the possibilities for future entrepreneurial activity and humanity (Edgell & Vogl, 2013; Steyaert & Katz, 2006; Stiegler, 2014; Toutain, Fayolle, Pittaway, & Politis, 2017). Stiegler (2014, p. 19) defines a normative re-enchantment of capitalism as “this new industrial model *the economy of contribution*.” that creates positive externalities in the form of individual capabilities and “care for self and for other, taken individually and collectively.” We posit that reimagining entrepreneurship to provide positive prosocial externalities might be achieved through emphasis on aspects of design culture, specifically immersion and network engagement.

Design Immersion. This refers to culturalizing others into designers’ values, beliefs, and practice techniques. The views and practices of designers provide a robust “framework for evolving purpose, identity, self-efficacy, creative action, and sensitivity to the needs of others” (Edgell & Moustafellos, 2017, p. 10). Designers search, through deep phenomenon immersion, for meanings and assumptions as important precursors to solving and ideation (Kolko, 2010). They deploy visuo-spatial intelligence (e.g., mental rotations)—the visualization of three dimensional space and objects (Prokýsek, Rambousek, & Wildová, 2013;

Uttal, Miller, & Newcombe, 2013). For visualization, they use techniques such as building physical scale models (e.g., prototyping), drawing conceptual maps, and sketching diagrams with the aim of iterative and abductive modeling of various novel systemic arrangements. To gain insight into the varied needs of others and to develop shared meanings, designers may embrace discursive practices with diverse constituents (Edgell & Kimmich, 2015; Wilkinson & De Angeli, 2014). During and after phenomenon investigation, designers may use participatory design to generate novel concepts by engaging in collaborative ideation sessions, often called charrettes or hackathons (Cardona & Tomancak, 2012; Østergaard, Simonsen, & Karasti, 2018). However, despite the literature about designers and their methods, there is little scientific empirical data to support the benefits of design culture situated in the wider context of entrepreneurship.

Network Engagement. Networks refer to the sociotechnological arrangements of humans and technology with discernible ties, structures, and densities (Willson, 2010). It follows that diverse human actors who are engaged with technologically saturated networks have a higher probability of opportunities to iteratively tinker, experiment, and learn (Carvalho & Goodyear, 2017). This repeated exposure to perplexing phenomena and struggle-inducing challenges increases the probability of greater future resilience, resourcefulness, ingenuity, and self-efficacy as predicted by expectancy and self-efficacy theories (Erozkan & Deniz, 2012), all of which result in comfort with and command of technological resources (Lamers, Verbeek, & Putten, 2013; Ritz & Moye, 2011). Other research provides evidence that creative development is linked to engagement, the degree to which actors connect their inner selves with outer contexts, thus leading to powerful and concentrated participation in creative activities (Olson, 2005, p. 1692).

We argue that design culture with its participatory practices, deep phenomena exploration, use of visuo-spatial and traditional coded language information, and concern for others might be a partial remedy to a host of individual and group challenges including cognitive biases (e.g., narrative fallacy), unethical decisions, and harmful innovation behaviors (Boland & Collopy, 2004; Edgell & Vogl, 2013). Deliberate immersion into design culture could provide youth with the consciousness of designers and with the capabilities for ethical venturing.

Theoretical Framework

Few scholars have empirically studied the effects of design culture and collaborative design processes as mediators for institutional entrepreneurial capacity development. Our dominant thesis is that exposing young adults to design culture treatments will induce heightened levels of individual attributes associated with entrepreneurial capabilities and civic engagement. Both are necessary conditions that when coupled with appropriate national and local institutional support infrastructure result in entrepreneurial capacity. Given that

other research focuses on the value of technoscientific support infrastructure often in the form of connective triple helix configurations (Leydesdorff & Etzkowitz, 1998), we investigate the human aspects of entrepreneurial capacity.

Mediating Design Culture Treatment (DCT) Variables: Design Immersion (DI) and Network Engagement (NE). We theorize that an effective DCT would embed collaborative design process variables DI and NE to provide participants with the capabilities to investigate and collaboratively act upon unstructured and complex social phenomena. Furthermore, we theorize that exposure to DCTs could help participants view entrepreneurial venturing in a different or *reimagined* way. The DCT process deliberately shifts participants' foci away from the self or personal perspectives and individual monetary needs of the would-be entrepreneurs to the perspectives and needs of other individuals (e.g., stakeholders) who are deeply affected by the social phenomena under consideration. Boland and Collopy (2004) have characterized this as moving from a *decision attitude* which dominates business education and practice to a *design attitude* which focuses on investigating underlying assumptions in an effort to collaboratively and creatively enhance life for others. We are guided by our Architectural Theory of Innovation (Edgell & Moustafellos, 2017) as a means for adapting, arranging, and integrating the DCT's DI and NE techniques developed and used by Architects, designers, and urban planners. These embedded techniques include collaborative designing, charretting, visualizing, and prototyping.

Dependent Entrepreneurial Capability Variables: Collaboration Self-Efficacy (CSE) and Entrepreneurial Self-Efficacy (ESE). While many national and local institutional conditions contribute to the development of entrepreneurial capacity, arguably having individual actors capable of enacting entrepreneurship is essential. Research reveals that various forms of individual-level efficacy are necessary for successful entrepreneurship, in particular the twin abilities to collaborate and to take entrepreneurial action. Scholars have found that collaborative self-efficacy, the confidence in one's ability to collaborate with both acquaintances and strangers, is a necessary capability for successful entrepreneurship (Moolenaar, Slegers, & Daly, 2012). McGee et al. (2009, p. 965) have empirically demonstrated that entrepreneurial self-efficacy, "a person's belief in their ability to successfully launch an entrepreneurial venture", is a predictor of success. In particular, they found that entrepreneurial self-efficacy to be a combination of *search*, the efficacy to identify market opportunities, and *marshaling*, the efficacy to arrange resources for venture realization.

We theorize that exposure to design culture will help develop individuals develop both their collaboration and mental rotations abilities (e.g., visuo-spatial intelligence) which will help them with entrepreneurial undertaking. As

discussed above, previous research has linked mental rotations abilities to successful entrepreneurship (Prokýsek et al., 2013). Given the aforementioned, we theorize the following two hypothesis:

Hypothesis 1: *Exposure to design culture treatment (DCT) variables (DI & NE) will significantly increase levels of collaboration self-efficacy (CSE).*

Hypothesis 2: *Exposure to design culture treatment (DCT) variables (DI & NE) will significantly increase levels of entrepreneurial self-efficacy (ESE) including the sub-variables searching (SC) and marshaling (MC).*

Dependent Civic Engagement Variables: Affect Geopolitical (AG), Perceptions of Opportunity (PO), and Propensity to Remain (PR). During the past few decades, rust belt communities have been challenged by the phenomenon of outmigration or the loss of highly educated young adults. Scholars had traditionally theorized that outmigration was a result of education level (e.g., the higher, the more prone one is to outmigrate) and in particular the advice of educators. However, research by Petrin et al. (2014, p. 294) reveal: "... our data suggest that the highest-achieving rural students are among those with the greatest community attachment, and that student perceptions of local economic conditions are far more influential in shaping postsecondary residential aspirations ..." These findings suggest three relevant geopolitical factors: General affect or feelings towards the local community; perceptions of opportunity in the local area; and residential aspirations in terms of propensity to remain (e.g., continuing to reside) in the local community. We theorize that giving young adults the concrete means and processes for collaborating, investigating, and re- envision their surroundings (e.g., network engagement and design immersion) will reinforce favorable affect towards their local communities. Accordingly, we propose the following:

Hypothesis 3: *Exposure to design culture treatment (DCT) variables (DI & NE) will significantly increase levels of affect geopolitical (AG) including the sub-variables affect host community (AH) and affect local residential area (A).*

Furthermore, by exposing young adults to various assets of their host and local communities through the immersive aspects of design culture treatments, we hypothesize that they will perceive more opportunities for employment, personal fulfillment, and overall happiness as follows:

Hypothesis 4: *Exposure to design culture treatment (DCT) variables (DI & NE) will significantly increase levels of perceptions of opportunity (PO).*

Lastly, we hypothesize that young adults, by participating in the design culture treatment, will experience high levels of community engagement and

empowerment and, as such, will therefore express an increased propensity to remain resident in their local communities as follows:

Hypothesis 5: *Exposure to design culture treatment (DCT) variables (DI & NE) will significantly increase levels of propensity to remain (PR).*

The conceptual framework in Figure 1 below graphically delineates our theorized relationships.

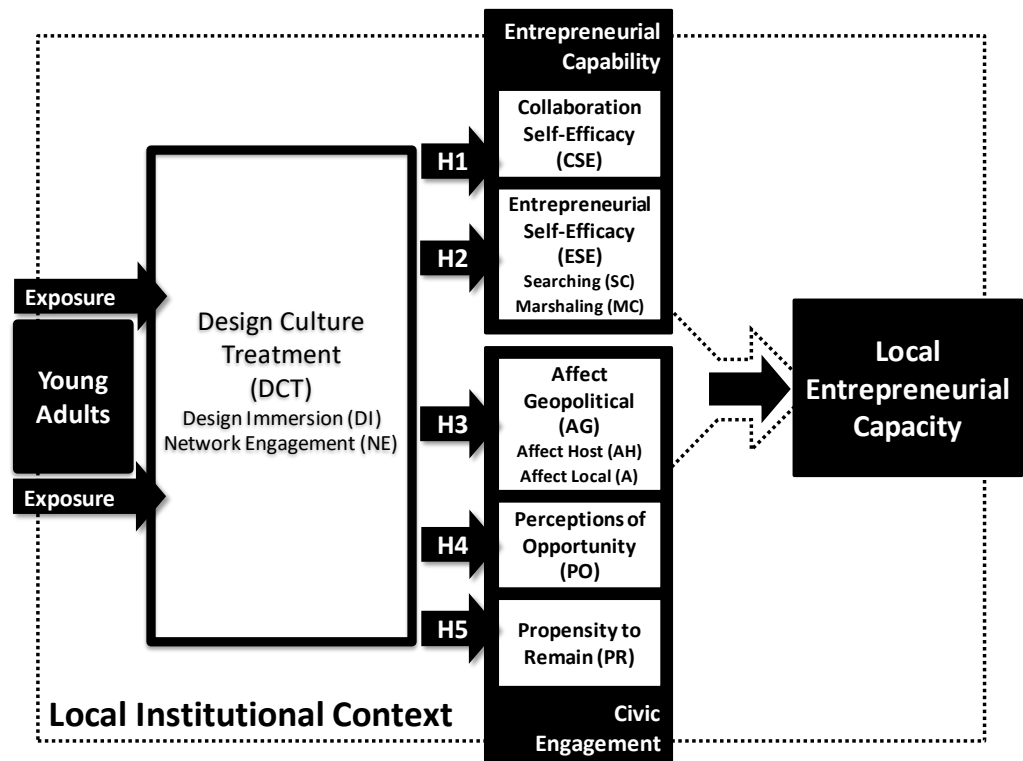


Figure 1. Conceptual Framework.

Method

Participants and Site. We collected and analyzed pre and post treatment exposure empirical data from 143¹ student participants across 33 teams in four (4) interdisciplinary design culture treatment initiatives which were conducted over three years. All surveys had 100% response rates since survey completion was required for full DCT participation. In addition, we collected and analyzed pre and post control group (non-exposure) data from another 34 comparable students to verify exogenous influences that might account for variances

¹ This number is after we eliminated subsequent responses from participants who had participated in more than one DCT treatment iteration. Fewer than 10 respondents had participated in more than one iteration.

between pre and post data. The participating treatment students were both undergraduates and graduates students who studied diverse disciplines ranging from business administration to engineering. While a majority of students were enrolled in a host university, students from other universities participated. The universities were located in the upstate New York region known as the greater Mohawk Valley area with the principle city of Utica, New York. This particular region was highly salient for the study site since it exhibits many of the attributes associated with de-industrializing societies. For the study, university instructors either required or incentivized students in existing courses to participate in the co-curricular DCTs referred to as **Innovation Challenge New York (ICNY)**. While the challenge topic or phenomenon studied varied for each treatment iteration, the treatment procedure remained constant and is explained below.

Instruments and Measures. For this IRB-approved study, the pre- and post-exposure instruments for both exposure and control groups were deployed using web-based hosted survey systems. Each had nine (9) varying items for collecting useful descriptive, demographic, and qualitative data. In addition, each contained 22 same items constituting five (5) repeated variables or measures for testing entrepreneurial capability and civic engagement hypotheses. We adopted one measure from other validated work while we created and validated four measures. For face validation, three (3) subject matter experts and three (3) students not familiar with the subject matter reviewed and gave input for the proposed items for each new measure. We used the first iteration exposure responses to perform principal components analysis and used the pooled responses (all responses from participants in the four iterations) to calculate Cronbach's alpha for each to verify internal consistency.

For measuring entrepreneurial self-efficacy (ESE), we adopted McGee et al's (2009) validated 5-item questionnaire ($\alpha = .82$). This scale measures two subscales, searching (SC) (3 items; $\alpha = .83$) and marshaling (MC) (2 items; $\alpha = .81$) using 5-point Likert scales ranging from 1 (*very little*) to 5 (*very much*) or 1 (*very dissatisfied*) to 5 (*very satisfied*). Select items include: *How much confidence do you have in your ability to collaboratively brainstorm (come up with) a new idea for a product or service?* (searching) and *How much confidence do you have in your ability to network—i.e., make contact with and exchange information with others?* (marshaling).

For our second measure of entrepreneurial capability, collaboration self-efficacy (CSE), we created and validated a 5-item scale ($\alpha = .75$) to capture the nuanced differences associated with collaborations that involve strangers versus those that involve acquaintances as well as collaborating for generally creative and civic purposes. For developing our items, we followed the ESE language patterns

established by McGee et al. (2009) and used 5-point Likert scales ranging from 1 (*very little*) to 5 (*very much*) or 1 (*very dissatisfied*) to 5 (*very satisfied*). Sample items include: *How much confidence do you have in your ability to collaborate with strangers (unfamiliar individuals)?* and *How much confidence do you have in your ability to collaboratively improve the quality of life in your community?*

For civic engagement, we devised and validated three (3) new measures. Affect geopolitical (AG) (6 items; $\alpha = .81$) is intended to quantify individuals' feelings towards aspects of the region. To capture differences between the treatment host communities and participants' own local communities, we crafted two subscales affect host (AH) (1 item) and affect local (A) (5 items; $\alpha = .80$) using 5-point Likert scales ranging from 1 to 5 anchored by the terms: *very unappealing, very appealing; very dissatisfied, very satisfied; very little, very much; or very difficult, very easy*. Sample items include: *How satisfied are you with life in your local community?* and *How appealing is life in your local community?*

Perceptions of opportunity (PO) (3 items; $\alpha = .77$) uses 5-point Likert scales ranging from 1 to 5 anchored by the terms *very little* and *very much*. The purpose is to gauge individuals' attitudes towards regional economic opportunity, self-fulfillment potential, and overall happiness potential. A sample item includes: *How much opportunity for employment does your local community offer?* Propensity to remain (PR) (3 items; $\alpha = .89$) uses 5-point Likert scales ranging from 1 to 5 anchored by the terms: *very unlikely, very likely; very uncommitted, very committed; or never, always*. This measure captures individuals' residency intents and commitments. A sample item includes: *How likely are you to remain in your current local community?*

Procedure. For each of the four (4) iterations, we consistently administered the DCT which typically had a duration of approximately three to four weeks and encompassed three phases. We collected pre-exposure data during the *Phenomenon Comprehension Phase* then after the *Core Ideation Process Phase* we collected post-exposure data during the *Integrative Reflection Phase*. Individual respondents individually and privately completed pre and post surveys on their own devices in self-selected locations. Although embedded throughout the DCT, participants were most robustly exposed to the dominant and transformative DI and NE aspects during the *Core Ideation Process* phase. Also during the first iteration, we collected survey data from a control group of comparable students who were not involved in the DCT.

The **Phenomenon Comprehension Phase** provided participants with structured opportunities to deeply research and individually gather field information about the local social phenomenon or topic of the particular DCT. This prepared participants with sufficient levels of phenomenon familiarity so they were productively able to contribute in team-based exercises during the next phase.

During this phase of up to three weeks, participants gained a more physical and direct experience of the phenomenon domain including human and technological actors. Field work consisted of site tours, “windshield” and “walking” (Whitehead, 2006, p. 2) style casual ethnographic studies (using a topic-customized research notebook tool), firsthand observations, interaction with technologies, and discussions with diverse constituents. Participating students investigated constituents’ needs and interests with the intent to become more aware and concerned about the wellbeing of others. Students collected data in the form of notes, photos, videos, and artifacts. During concluding sessions, students gathered additional information through interaction with relevant subject matter experts.

The **Core Ideation Process Phase** had a typical duration of one day and was led by one or more facilitators with design culture expertise. Students experienced intense exposure to DI and NE by working in assigned teams to optimize diversity. They participated in structured and time bound activities arranged into five modules: (1) Teaming and Discovery; (2) People, Needs, and Paradox; (3) Ideation & Prototyping; (4) Value & Sustainability; and (5) Communication & Evaluation. Each module progressed the overall group from individual research to collaborative team working methods and ultimately group sharing among teams. Within modules, the techniques deployed required a mixture of both individual and collective contributions to reduce adverse team effects such as free rider problems. Members shared and synthesized multiple individual ideas into team concepts they further refined through visualization and prototyping techniques. Activities guided teams to collectively frame the phenomenon, understand and empathize with affected constituents, explore problem or opportunity aspects, and propose new visions or concepts that were evaluated by judges. At the end of this phase, students, judges, and others engaged in discussions about proposed concepts and DCT procedures.

The final **Integrative Reflection Phase** occurred during the week immediately following the previous phase and provided opportunities for participants to individually and collectively reflect upon their overall experiences. During this phase, students individually and privately completed the post-exposure surveys which included additional qualitative reflection questions. Also, they collaboratively crafted written descriptions of their team concepts.²

Data Analysis. We used a mixed design analysis of variance (ANOVA, type III ss) of the pooled exposure responses and first iteration control group to determine the general treatment effects on all dependent variables summed. For the pooled responses, we conducted paired sample dependent *t*-tests (two tailed,

² Additional detailed explicative information and diagrams about various aspects of the DCT are available from the authors.

95% CI) to verify all hypotheses. We used Cohen's *d* as a measure of effect size for the increases from the pre to post exposure.

Results

Table 1 below contains all means and standard deviations for pre- and post-treatment data by pooled exposure group (*n* = 143) and control group (*n* = 34).

TABLE 1 Means and standard deviations for the exposure (pooled) and control groups³

Scales	Exposure (<i>n</i> = 143)				Control (<i>n</i> = 34)			
	Pre		Post		Pre		Post	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Collaboration Self-Efficacy (CSE)**	19.5	3.2	20.9	3.1	18.9	3.3	18.4	3.4
Entrepreneurial Self-Efficacy (ESE)**	18.8	3.3	20.4	3.2	17.6	3.7	17.9	3.5
Searching (SC)**	11.4	2.0	12.3	2.0	10.5	2.3	10.4	2.2
Marshaling (MC)**	7.3	1.9	8.1	1.7	7.1	2.1	7.5	1.9
Affect Geopolitical (AG)	18.9	4.0	19.6	4.4	19.6	4.1	19.7	4.4
Affect Host (AH)*	2.8	0.9	3.0	0.9	2.8	0.8	2.7	1.0
Affect Local (A)	16.1	3.6	16.5	3.9	16.9	3.6	17.0	3.7
Perceptions of Opportunity (PO)*	8.7	2.3	9.3	2.5	8.4	2.7	8.7	2.8
Propensity to Remain (PR)	8.2	3.1	8.6	3.0	8.4	3.3	8.9	3.4

* *p* < .05, ** *p* < .00

For the ANOVA, we used time (pre-exposure, post-exposure) as the within-subjects factor and treatment group (exposure, control) as the between-subjects factor. The analysis revealed no significant effect arising from group (membership in either the exposure or control groups), $F(1, 175) = 2.39, p = .124, \eta_p^2 = .013$. This indicated, as predicted, that the control group was characteristically comparable to the exposure group. However, there was a main effect of time, $F(1, 175) = 10.84, p < .01, \eta_p^2 = .058$ and interaction between time and group, $F(1, 175) = 6.05, p < .05, \eta_p^2 = .033$. This suggested that the DCT did have a significant and medium size effect on exposed subjects as further tested below.

Hypothesis 1. For the collaboration self-efficacy (CSE) scale, a paired-samples t-test indicated that scores were significantly higher for the post-exposure sample ($M = 20.9, SD = 3.06$) than for the pre-exposure sample ($M = 19.5, SD = 3.19$), $t(142) = -4.0, p < .001, d = 0.45$. Accordingly, hypothesis 1 was accepted.

Hypothesis 2. For the entrepreneurial self-efficacy (ESE) scale, a paired-samples t-test indicated that scores were significantly higher for the post-exposure sample ($M = 20.4, SD = 3.25$) than for the pre-exposure sample ($M = 18.8, SD = 3.33$), $t(142) = -4.3, p < .001, d = 0.50$. For the searching (SC) subscale, a paired-

³ Source: own calculations.

samples t-test indicated that scores were significantly higher for the post-exposure sample ($M = 12.3$, $SD = 2.04$) than for the pre-exposure sample ($M = 11.4$, $SD = 2.02$), $t(142) = -3.4$, $p < .001$, $d = 0.41$. For the marshaling (MC) subscale, a paired-samples t-test indicated that scores were significantly higher for the post-exposure sample ($M = 8.1$, $SD = 1.67$) than for the pre-exposure sample ($M = 7.3$, $SD = 1.92$), $t(142) = -4.0$, $p < .001$, $d = 0.44$. Based on the scale and subscales results, hypothesis 2 was fully accepted.

Hypothesis 3. For the affect geopolitical (AG) scale, a paired-samples t-test indicated that scores were not significantly higher for the post-exposure sample ($M = 19.6$, $SD = 4.38$) than for the pre-exposure sample ($M = 18.9$, $SD = 4.05$), $t(142) = -1.4$, $p = .151$, $d = 0.16$. For the affect host (AH) subscale, a paired-samples t-test indicated that scores were significantly higher for the post-exposure sample ($M = 3.0$, $SD = 0.92$) than for the pre-exposure sample ($M = 2.8$, $SD = 0.93$), $t(142) = -2.1$, $p < .05$, $d = 0.27$. For the affect local (A) subscale, a paired-samples t-test indicated that scores were not significantly higher for the post-exposure sample ($M = 16.5$, $SD = 3.89$) than for the pre-exposure sample ($M = 16.1$, $SD = 3.57$), $t(142) = -1.1$, $p = .287$, $d = 0.12$. Based on the mixed results, hypothesis 3 was only partially accepted (for affect host).

Hypothesis 4. For the perceptions of opportunity (PO) scale, a paired-samples t-test indicated that scores were significantly higher for the post-exposure sample ($M = 9.3$, $SD = 2.49$) than for the pre-exposure sample ($M = 8.7$, $SD = 2.26$), $t(142) = -2.2$, $p < .05$, $d = 0.25$. Accordingly, hypothesis 4 was accepted.

Hypothesis 5. For the propensity to remain (PR) scale, a paired-samples t-test indicated that scores were not significantly higher for the post-exposure sample ($M = 8.6$, $SD = 3.05$) than for the pre-exposure sample ($M = 8.2$, $SD = 3.14$), $t(142) = -1.0$, $p = .308$, $d = 0.12$. Accordingly, hypothesis 5 was rejected.

Discussion and Conclusion

The results of this study suggest that exposure to design culture may be an efficacious treatment for helping young adults become more entrepreneurial, collaborative, and somewhat more engaged with their communities. As predicted by various human agency views, the observed increases in both collaboration and entrepreneurial self-efficacies, with medium effect sizes, may be due to the DCT providing participants with a combination of design culture mastery experiences, social modeling, and social persuasion (Bandura, 2008). Giving students the means to create positive civic options in situations where no existing or obvious options seem adequate might induce more confidence when compared to traditional management *decision attitude* approaches. Also, improved agency as a function of exposure to and embeddedness with technologies in the form of design processes and techniques is consistent with actor network theory (Latour, 2005).

DCT facilitators led participants through a structured, intensive, collaborative, and experiential process, rich with embedded DI and NE aspects. This enabled students to gain first-hand comprehension about and proactively take collective creative action on complex, mysterious, and weakly defined social phenomena. As a result, they not only may have experienced increased awareness and sensitivity to social phenomena, but also may have shifted attitudinal perceptions of phenomena from mysterious and unclear to demystified, intelligible, interesting, and actionable. This may have served the dual purposes of increasing internalized locus of control while reducing cognitive dissonance associated with social phenomena or more specifically with entrepreneurship. This is consistent with Cash and Kreye (2018, p. 51) who proposed that “uncertainty is gradually resolved” through persistent and focused engagement in design activities. The DCT may have provided participants with various means to reduce uncertainty by helping them comprehend objective constraints and affordances then progress from discrete individual subjective perceptions to collective intersubjective understandings (Davidson, 2001). Majorities of participants qualitatively reported being transformed by the treatment. As a student anonymously reflected in a post-exposure survey, “I have learned a new way of looking at problems. I have also learned that many minds can have so many different ideas yet still come together to find one collaborative solution”. The student declares, “... now I look at my surroundings and think 'how could this change for the better?’”

The DCT may have induced new attitudinal perceptions towards outcomes or reward valences. Participants may have perceived exposure to creative ideational processes, divergent thinking, and novelty generation through the use of visualization and prototyping techniques as highly enjoyable and intrinsically rewarding. Furthermore, visualization may induce participant ease since it may have enabled the capture and communication of nuanced and complex information that is not comfortably or readily articulable through traditional coded language (Oakley & Halligan, 2017). Research suggests that techniques such as visualizing and prototyping confer cognitive benefits in the form of greatly reduced inference sorting and determination associated with written or spoken language (Thagard & Shelley, 1997). Changing perspective from preoccupation with self to collaborative sharing and heightened awareness of others’ needs might also be intrinsically rewarding (Oakley & Halligan, 2017; Webb & Graziano, 2015). Also, this shift may create favorable conditions for more ethical decision-making (Kelly & Dorian, 2017). This prosocial perspective shift may be particularly refreshing to young adults given their growing frustrations over perceptions of social inequalities, consumption-based capitalism, and excessive emphasis on individualism (Harvard IOP, 2016; Rosemont, 2016). Exposure to the DCT may have transformed students’ preferences towards these intrinsically rewarding outcomes and, in doing so,

may have fostered a more favorable view of entrepreneurial activity as reimagined through the lens of design culture. On a cognitive basis, we speculate that the DCT's structured integration of both intuitive and reflective processes and high cognitive loading may contribute to enhanced prosociality (Rand et al., 2014); participants may become more generous and open to adopting cooperative game behaviors. However, more research is needed to better understand this dimension. Also, any such transformations in preferences may be perceived by participants as compensation for failure risks commonly associated with entrepreneurial activity.

In the area of civic engagement and opportunity, the positive results for PO were due to the single dimension of *personal fulfillment* which might explain the small effect size. The PO dimensions of *happiness* and *employment opportunities* were not significantly changed. The possibility of greater personal fulfillment post-DCT exposure may be explained by the participants' improved self-efficacies. Accordingly, they may have perceived themselves as more capable of re-envisioning their environments and see the potential for fulfillment, if not the difficulty and personal challenge involved, in so doing. Overall there was no increase in AG and the subscale *affect local*. However, *affect host*, with a small effect size, did significantly improve after exposure to the DCT. Feelings toward the DCT host region may have shifted due to direct examination of host assets (e.g., field tours of relevant sites) during the Phenomenon Comprehension Phase. Yet affect or feelings towards students' local communities were not significantly changed. DCT exposure did not significantly increase PR. We theorize that this may be an interaction result of insignificant improvement to the *perceptions of opportunity* subscale, *employment opportunities*.

The study contributes to an emerging theory of entrepreneurship by linking design culture to human efficacy and institutional-level entrepreneurial capacity development. Also, the study contributes more insight into the micro-processes that underpin institutional transformation. Moreover, we have demonstrated that young adults can be entrepreneurially motivated by the spirit of compassionately contributing to the wellbeing of others, without a dominant focus on personal monetary gain. This may be a useful contribution for reimagining entrepreneurship and re-enchanting capitalism. Also, the study contributes to the nascent literature on outmigration by linking design culture treatments to civic engagement primarily in the form perceptions of opportunity. Nonetheless, the study contributes new scales for understanding and measuring relevant collaboration and civic engagement outcomes. Elected officials, policy makers, educators, and practitioners aiming to taking positive action on civic challenges such as deindustrialization and outmigration, might want to engage in discourse about these findings, reflect on current policies, and experiment with exposing both students and others to similar design culture treatments.

In terms of limitations, the study does not measure actual long-term entrepreneurial behavior, the duration of treatment effects, or verify if repeated treatments are needed. The allocation of students to control and exposure groups was not truly random due to well-known subject selection challenges associated with educational settings. Our approach was quasi-experimental which suggests caution when generalizing the results and findings. Also, while human attitudinal and behavioral transformation is necessary, it is not alone sufficient for robust entrepreneurial capacity. Communities also need technological and knowledge infrastructure and other resources for actualizing entrepreneurship. For future research, a longitudinal study that measures duration of the treatment effects or the effects of repeated exposure and likely conversion to entrepreneurial behavior would be beneficial. More research is needed to determine efficacious treatments or approaches for improving propensity to remain and local affect. Our research widens the entrepreneurship discourse by including design culture as an important antecedent. It is our hope that this scholarship contributes to a new reimagined entrepreneurship and re-enriched capitalism.

References:

- Albert, M.-N., & Couture, M. M. (2013). The support to an entrepreneur: From autonomy to dependence. *SAGE Open*, 3(2), 1-9.
- Bandura, A. (2008). An Agentic Perspective on Positive Psychology. In S. J. Lopez (Ed.), *Positive Psychology: Exploring the Best in People, Discovering Human Strengths* (Vol. 1, pp. 167-196). Westport, US: Praeger Publishers, Greenwood Publishing Group.
- Boland, R., & Collopy, F. (Eds.). (2004). *Managing as Designing*. Stanford, US: Stanford Business Books.
- Bozic Yams, N. (2017). Integrated model of innovative competence. *Journal of Creativity and Business Innovation*, 3(1), 140-169.
- Brady, D., Beckfield, J., & Zhao, W. (2007). The consequences of economic globalization for affluent democracies. *Annual Review of Sociology*, 33, 313-334.
- Cardona, A., & Tomancak, P. (2012). Current challenges in open-source bioimage informatics. *Nature Methods*, 9(7), 661-665.
- Carvalho, L., & Goodyear, P. (2017). Design, learning networks and service innovation. *Design Studies*, 55, 27-53.
- Cash, P., & Kreye, M. (2018). Exploring uncertainty perception as a driver of design activity. *Design Studies*, 54, 50-79.
- Chaminade, C., Lundvall, B.-A., Vang-Lauridsen, J., & Joseph, K. J. (2009). *Innovation policies for development: Towards a systemic experimentation based approach*. Paper presented at the GLOBELICS 2009, 7th International Conference, Dakar, SN.
- Davidson, D. (2001). *Subjective, Intersubjective, Objective*. Oxford, UK: Clarendon Press.
- Diaz-Casero, J. C., Hernandez-Mogollon, R., & Roldan, J. L. (2012). A structural model of the antecedents to entrepreneurial capacity. *International Small Business Journal*, 30(8), 850-872.
- Edgell, R. A., & Kimmich, P. (2015). A new view on innovation and language: Design culture, discursive practices, and metaphors. *Journal of Creativity and Business Innovation*, 1(1), 107-128.
- Edgell, R. A., & Moustafellos, J. K. (2017). Toward an architectural theory of innovation: Explicating design, networks, and microprocesses. *Journal of Creativity and Business Innovation*, 3(1), 5-34.

- Edgell, R. A., & Vogl, R. (2013). A theory of innovation: Benefit, harm, and legal regimes. *Law, Innovation and Technology*, 5(1), 21-53.
- Erozkan, A., & Deniz, S. (2012). The influence of social self-efficacy and learned resourcefulness on loneliness. *The Online Journal of Counselling and Education*, 1(2), 57-74.
- Geldhof, G. J., Malin, H., Johnson, S. K., Porter, T., Bronk, K. C., Weiner, M. B., . . . Damon, W. (2014). Entrepreneurship in young adults: Initial findings from the young entrepreneurs study. *Journal of Applied Developmental Psychology*, 35(5), 410-421.
- Green, S. E., Li, Y., & Nohria, N. (2009). Suspended in self-sun webs of significance: A rhetorical model of institutionalization and institutionally embedded agency. *Academy of Management Journal*, 52(1), 11-36.
- Harvard IOP. (2016). *Harvard Institute of Politics spring 2016 poll*. Retrieved from <http://iop.harvard.edu/youth-poll/past/harvard-iop-spring-2016-poll>:
- Hindle, K. (2012). Small-i or BIG-I? How entrepreneurial capacity transforms 'small-i' into 'Big-I' innovation: Some implications for national policy. *Telecommunications journal of Australia*, 52(3), 51-63.
- Kelly, L., & Dorian, M. (2017). Doing well and good: An exploration of the role of mindfulness in the entrepreneurial opportunity recognition and evaluation process. *New England Journal of Entrepreneurship*, 20(2), 26-36.
- Koistinen, D. (2013). *Confronting Decline: The Political Economy of Deindustrialization in Twentieth-Century New England*. Gainesville, US: University Press of Florida.
- Kolko, J. (2010). Abductive thinking and sensemaking: The drivers of design synthesis. *Design Issues*, 26(1), 15-28.
- Lamers, M., Verbeek, F., & Putten, P. H. (2013). Tinkering in Scientific Education. In D. Reidsma, H. Katayose, & A. Nijholt (Eds.), *Advances in Computer Entertainment* (Vol. 8253, pp. 568-571). Chams, CH: Springer International Publishing.
- Latour, B. (2005). *Reassembling the Social: An Introduction to Actor-Network-Theory*. Oxford, UK: Oxford University Press.
- Leydesdorff, L., & Etzkowitz, H. (1998). Triple Helix of innovation. *Science and Public Policy*, 25(6), 358-364.
- Lindh, I., & Thorgren, S. (2016). Entrepreneurship education: The role of local business. *Entrepreneurship & Regional Development*, 28(5-6), 313-336.
- Lloyd, C. B., Behrman, J. R., Stromquist, N. P., & Cohen, B. (Eds.). (2006). *The Changing Transitions to Adulthood in Developing Countries: Selected Studies*. Washington, US: The National Academies Press.
- Maguire, S., & Hardy, C. (2009). Discourse and deinstitutionalization: The decline of DDT. *Academy of Management Journal*, 52(1), 148-178.
- Mahoney, J., & Thelen, K. A. (2010). *Explaining Institutional Change: Ambiguity, Agency, and Power*. Cambridge, UK: Cambridge University Press.
- Martin, R., & Osberg, S. (2007). Social entrepreneurship: The case for definition. *Stanford Social Innovation Review*, Spring, 28-39.
- McGee, J. E., Peterson, M., Mueller, S. L., & Sequeira, J. M. (2009). Entrepreneurial self-efficacy: Refining the measure. *Entrepreneurship Theory and Practice*, 33(4), 965-988.
- Moolenaar, N. M., Slegers, P. J. C., & Daly, A. J. (2012). Teaming up: Linking collaboration networks, collective efficacy, and student achievement. *Teaching and Teacher Education*, 28(2), 251-262.
- Oakley, D. A., & Halligan, P. W. (2017). Chasing the rainbow: The non-conscious nature of being. *Frontiers in Psychology*, 8(1924). doi:10.3389/fpsyg.2017.01924
- Olson, K. R. (2005). Engagement and self-control: Superordinate dimensions of Big Five traits. *Personality and Individual Differences*, 38(7), 1689-1700.
- Østergaard, K. L., Simonsen, J., & Karasti, H. (2018). Examining situated design practices: Nurses' transformations towards genuine participation. *Design Studies*, In Press. doi:10.1016/j.destud.2017.12.002
- Perrini, F., Vurro, C., & Costanzo, L. A. (2010). A process-based view of social entrepreneurship:

- From opportunity identification to scaling-up social change in the case of San Patrignano. *Entrepreneurship & Regional Development*, 22(6), 515-534.
- Petrin, R. A., Schafft, K. A., & Meece, J. L. (2014). Educational sorting and residential aspirations among rural high school students: What are the contributions of schools and educators to rural brain drain? *American Educational Research Journal*, 51(2), 294-326.
- Prokýsek, M., Rambousek, V., & Wildová, R. (2013). Research into spatial intelligence and the efficiency of the application of spatial visualization in instruction. *Procedia - Social and Behavioral Sciences*, 84(2), 855-859.
- Rand, D. G., Peysakhovich, A., Kraft-Todd, G. T., Newman, G. E., Wurzbacher, O., Nowak, M. A., & Greene, J. D. (2014). Social heuristics shape intuitive cooperation. *Nature Communications*, 5(3677). doi:10.1038/ncomms4677
- Reynolds, P. D. (2010). *Entrepreneurship in the United States: The Future is Now*. New York, US: Springer.
- Ritz, J. M., & Moye, J. J. (2011). Using Contextualized Engineering and Technology Education to Increase Student Motivation in the Core Academics. In M. Barak & M. Hacker (Eds.), *Fostering Human Development Through Engineering and Technology Education* (pp. 131-151). Dordrecht, DE: Springer.
- Rosemont, H. (2016). *Against Individualism: A Confucian Rethinking of the Foundations of Morality, Politics, Family, and Religion*. Lanham, US: Lexington Books.
- Rypestøl, J. O., & Aarstad, J. (2018). Entrepreneurial innovativeness and growth ambitions in thick vs. thin regional innovation systems. *Entrepreneurship & Regional Development*, 30(5-6), 639-661.
- Souitaris, V., Zerbini, S., & Al-Laham, A. (2007). Do entrepreneurship programmes raise entrepreneurial intention of science and engineering students? The effect of learning, inspiration and resources. *Journal of Business Venturing*, 22(4), 566-591.
- Steyaert, C., & Katz, J. (2006). Reclaiming the space of entrepreneurship in society: geographical, discursive and social dimensions. *Entrepreneurship & Regional Development*, 16(3), 179-196.
- Stiegler, B. (2014). *The Re-enchantment of the World: The Value of Spirit Against Industrial Populism*. New York, US: Bloomsbury Academic.
- Thagard, P., & Shelley, C. P. (1997). Abductive Reasoning: Logic, Visual Thinking, and Coherence. In M. L. Dalla Chiara, K. Doets, D. Mundici, & J. van Benthem (Eds.), *Logic and scientific methods* (pp. 413-427). Dordrecht, DE: Kluwer.
- Toutain, O., Fayolle, A., Pittaway, L., & Politis, D. (2017). Role and impact of the environment on entrepreneurial learning. *Entrepreneurship & Regional Development*, 29(9-10), 869-888.
- Uttal, D. H., Miller, D. I., & Newcombe, N. S. (2013). Exploring and enhancing spatial thinking: Links to achievement in science, technology, engineering, and mathematics? *Current Directions in Psychological Science*, 22(5), 367-373.
- Webb, T. W., & Graziano, M. S. (2015). The attention schema theory: A mechanistic account of subjective awareness. *Frontiers in Psychology*, 6(500). doi:10.3389/fpsyg.2015.00500
- Whitehead, T. L. (2006). *Workbook for Descriptive Observations of Social Settings, Acts, Activities and Events*. College Park, US: University of Maryland CuSAG: EICCARS Workbooks.
- Wilkinson, C. R., & De Angeli, A. (2014). Applying user centred and participatory design approaches to commercial product development. *Design Studies*, 35(6), 614-631.
- Willson, M. (2010). Technology, networks, and communities: An exploration of network and community theory and technosocial forms. *Information, Communication & Society*, 13(5), 747-764.
- Yencken, J., & Gillin, M. (2004). Entrepreneurial capacity and the new technology-based small firm. *Small Enterprise Research*, 12(1), 30-44.

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