



Entrepreneurship:

Economic Development Possibilities and Potential

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Job Creation

Entrepreneurship creates jobs and economic growth:

- The Global Entrepreneurship Monitor attributes 70% of economic growth to Entrepreneurship (1999)**
- 99.9% of all businesses are small; these employ half of all private sector employees (Bounds, 2004)**
- About 4 million new businesses are created each year generating 60-80% of annual net new jobs (ibid)**

High Tech Entrepreneurs (7%)* create biggest economic growth impact:

- More and higher paying jobs (Kirchhoff, US SBA, 1999)**
- Faster to market (Kirchhoff, SBA, 1999)**
- More innovation (SBA, 2003)**
 - » Small firm patents more likely than a large firm patents to be top 1% most frequently cited patents**
 - » Small firms are 1/3 of the most prolific patenting companies**
 - » Small firm innovation twice as closely linked to scientific research—more high-tech/ cutting edge**
 - » Small firms more effectively produce high-value innovations**
 - » Small firms 13 times more innovative per employee than large patenting firms**
 - » Small firm patents twice as likely to be among the top 1 percent of highest impact patents than large firm.**

***Autio, 2007**



Entrepreneurial Innovation

70% of US R&D Expenditure is Private

- **Radical**

- **Specialty of Individual Entrepreneurs**

- » **Risk Takers**
- » **Expert Scientists & Inventors**
- » **Flexible Time and Budget Constraints**
- » **No Bureaucratic Constraints**

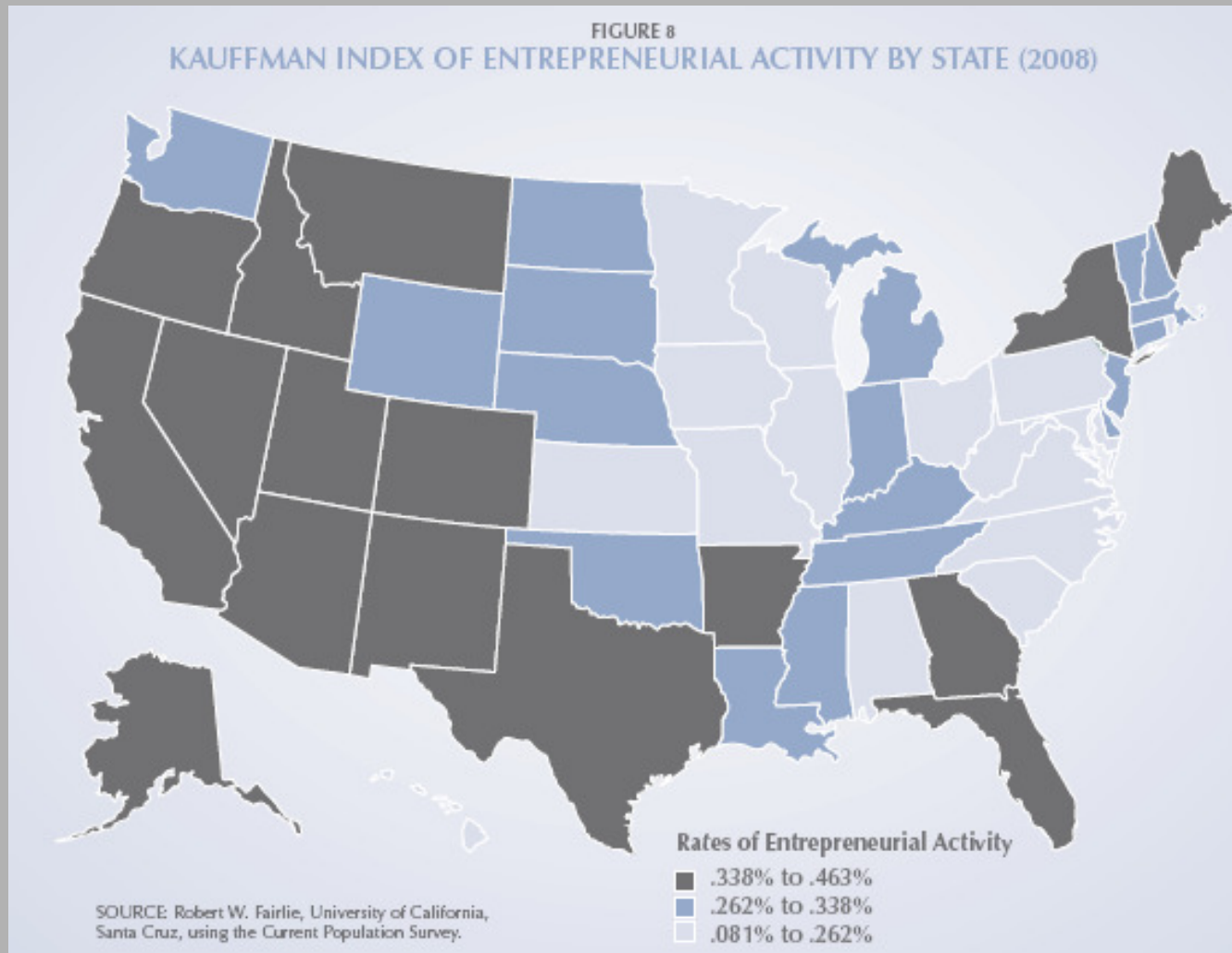
- **Incremental**

- **Specialty of Corporate R&D**

- » **Risk Averse**
- » **Managed by Planners & Marketing people**
- » **Tight Time and Budget Constraints**
- » **Bureaucratic Controls**



Rankings by State





Rankings by State, Cont.

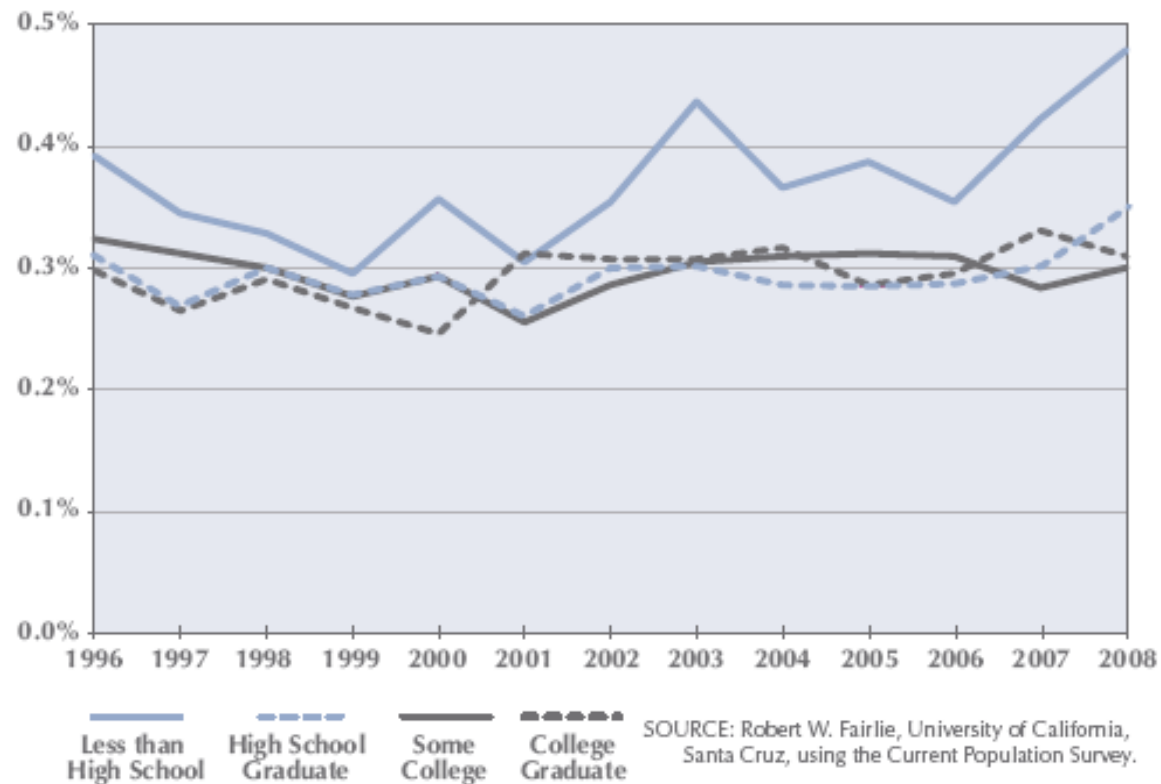
Percent of individuals age 20-64 that do NOT own a business in first survey month and start a business the following month working at least 15 hours/week:

- **NC Ranked 39th of the 50 states (and DC) in Entrepreneurial Activity**
- **NC 230 new entrepreneurs per 100,000 in 2008**
- **NC Behind US National average of 300/100,000**
- **GA, NM, MT, AZ Topped Ranked States in '08 >.49**
- **PA, MO, WI, WV Bottom Ranked States in '08 <.17**



Who are the Entrepreneurs

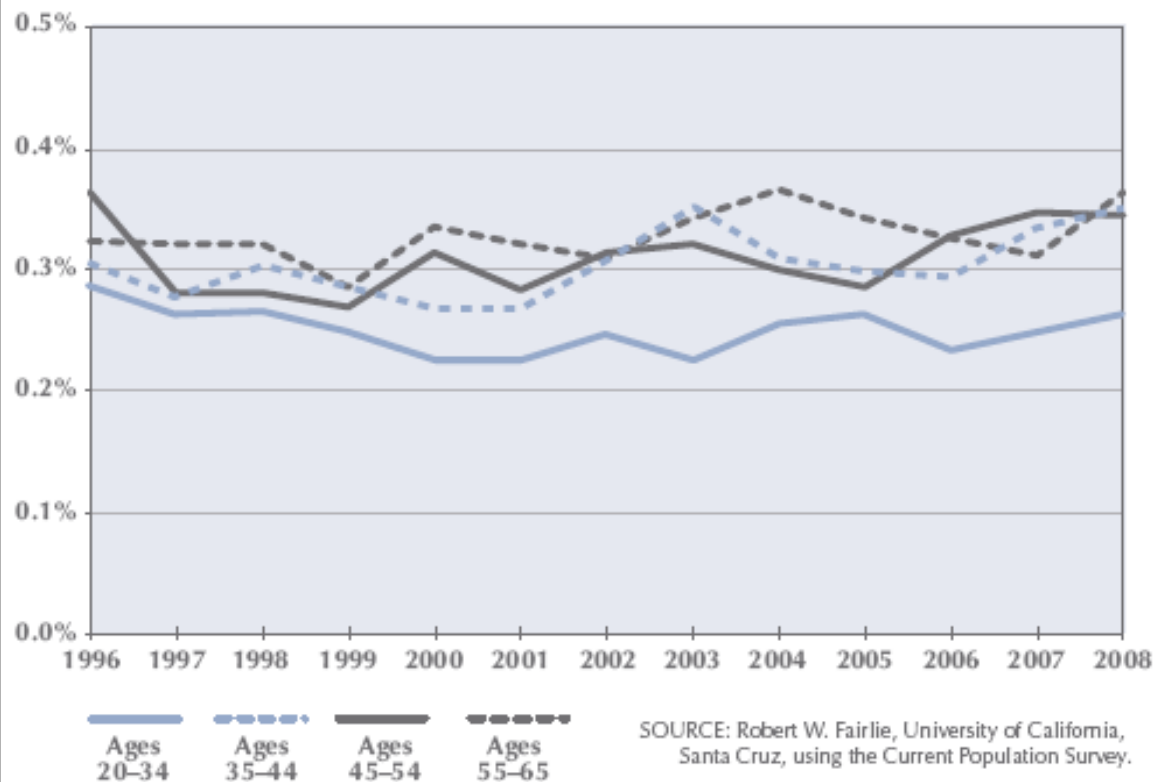
Figure 6
Kauffman Index of Entrepreneurial Activity
by Education (1996–2008)





Who are the Entrepreneurs (2)

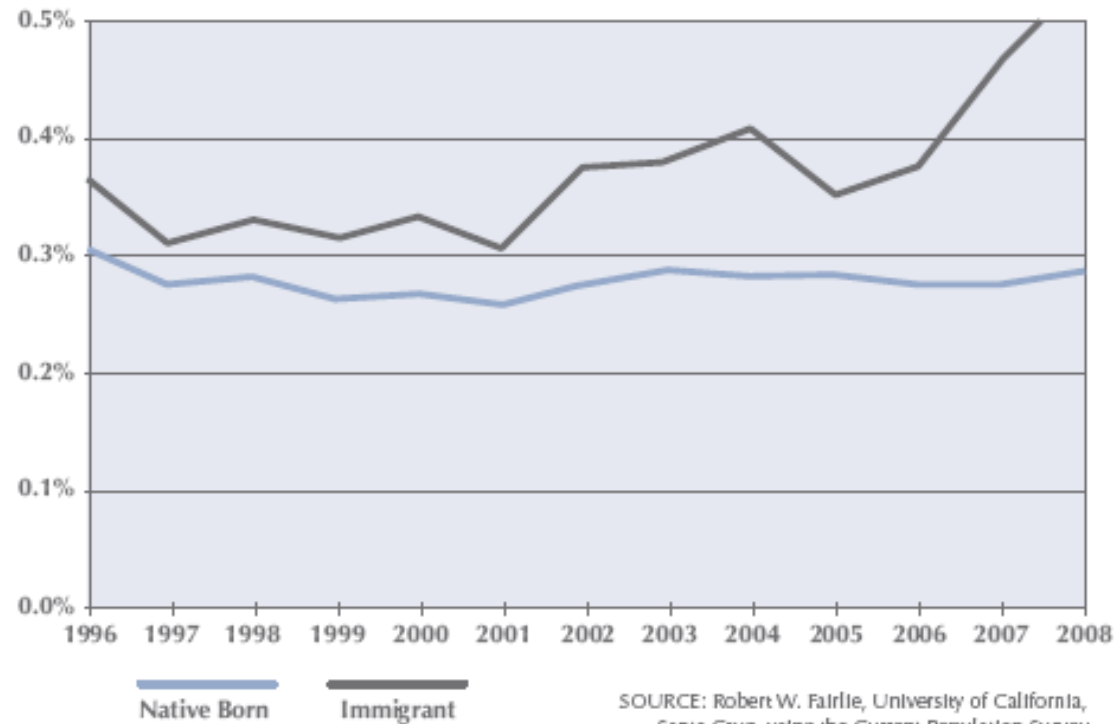
Figure 5
Kauffman Index of Entrepreneurial Activity by Age
(1996–2008)





Who are the Entrepreneurs (3)

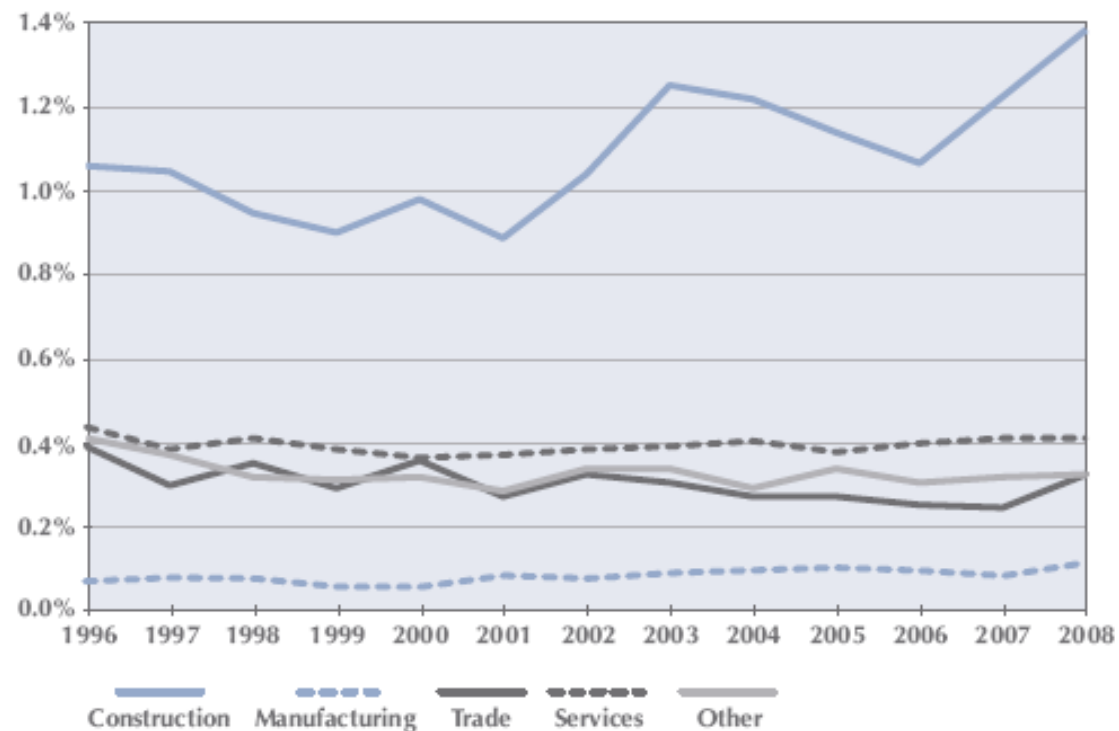
Figure 4
Kauffman Index of Entrepreneurial Activity
by Nativity (1996–2008)





Who are the Entrepreneurs (4)

Figure 7
Kauffman Index of Entrepreneurial Activity
by Industry (1996–2008)



SOURCE: Robert W. Fairlie, University of California,
Santa Cruz, using the Current Population Survey.



How can we get more Entrepreneurs?

Biggest Barriers to Entrepreneurship:*

- **Social/Cultural barriers**
 - Norms and Societal Conventions
 - Attitudes about Risk and Failure
 - Cultural Values, Religion/Ethics
- **Lack of Capital**
 - Venture and Seed
 - Government Science and Technology
 - Private R&D
- **Lack of Entrepreneurship Education, Know-how, Individual/Team Capacity**



University Engines

- **Belief/assumption that universities (where high tech is happening) can help create more and better entrepreneurs via educational interventions**
 - **2,100 Colleges and Universities offer Entrepreneurship Education (380 in 1990)**
 - **400,000 undergraduate and graduate students took at least one entrepreneurship course this past year (24,000 in 1996).**
 - **Around 300 endowed chair faculty positions**
 - **Only a fraction of the innovation that comes out of Universities is commercialized.**
 - **Can Universities commercialize more research via entrepreneurship?**



Entrepreneurship Education

Fueled by a desire to promote local and national economic development, federal agencies, foundations & universities are spending millions of dollars supporting high technology entrepreneurship education programs (majors, minors, courses, workshops, mentoring, etc.) but do these interventions really work?



The Literature

- **Multi-Disciplinary:**
 - Business Management
 - Psychology
 - » Personality
 - » Cognition
 - » Empowerment
 - Sociology
 - Education
 - Economics
- **Antecedents:**
 - Organizational (culture, roles, leadership)
 - Trait and Personality Characteristics
 - Cognition (skills, learning, opportunity recognition)
 - Contextual (culture, social networks, norms)
 - Pedagogy
 - Workforce Training, Public Policy, Capital Access



What produces entrepreneurship? Research Conception 1

- **Entrepreneurs are born**
 - » **Individual & Contextual Factors:**
 - » **Gender, Socio-Ec, Parental, Ethnic, etc.**
 - » **Personality:**
 - » **Confidence**
 - » **Autonomy**
 - » **Risk-taking**
 - » **Other predispositional characteristics**



What produces entrepreneurship? Research Conception 2

- **Entrepreneurs can be made.**
 - **Social Learning Theory**
 - » E-Self Efficacy => E-Outcomes
 - **Theory of Planned Behavior**
 - » E-Intentions => E-Outcomes
 - **Experiential Learning/Constructivist Theory**
 - » E-Skills
 - » E-Knowledge
 - » E-Experience

} => E-Outcomes



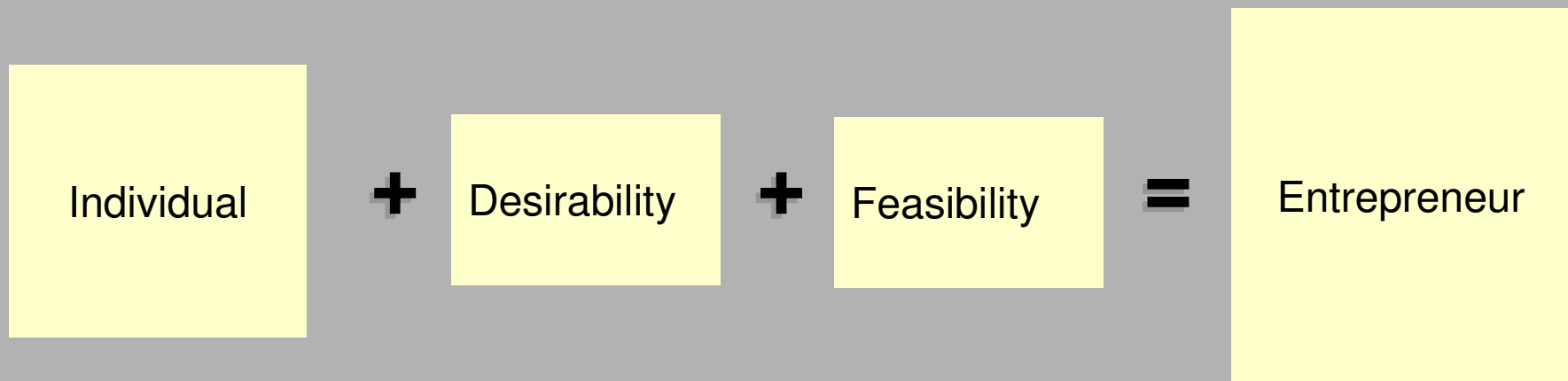
The Literature II

- **Theoretical Underpinnings of E-ed**
 - Human Capital Theory
 - Social Cognitive Career Theory
 - Agency Theory
- **Pedagogy**
 - Learner-Centric/Learning Styles
 - Content entrepreneurs need to know
 - Problem-based and experiential
 - Small Business Management vs. New Venture Creation



Entrepreneurship Curricula

Theoretically Grounded Pedagogical Model





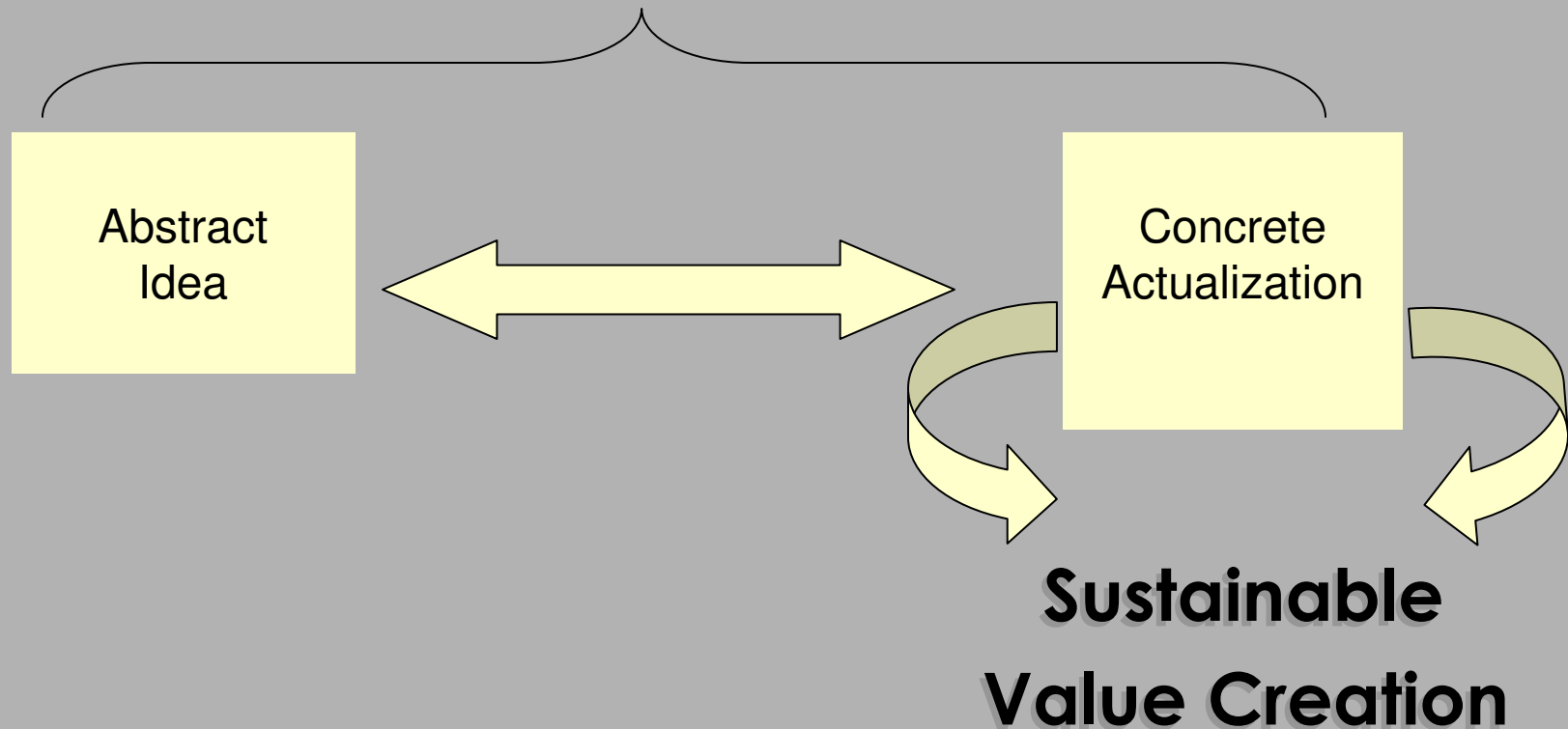
Definitions of Entrepreneurship Vary

- “Transforming an idea into an enterprise that has sustainable value.” (Green, 2007)
- “The process of identifying opportunities, gathering resources, and exploiting those opportunities through action.” (Sexton, 1991)
- “The pursuit of opportunities beyond the resources you currently control.” (Stevenson, 2006)
- “Individuals who creatively initiate, evaluate, and organize to exploit sustainable value-creating opportunities under conditions of uncertainty.” (Rideout, 2007)



The Fundamental Entrepreneurial Act

Novel, Creative, Innovative Process





**Economic
Investment
Strategies**

Entrepreneurship Education K-20

Integrated Pedagogical and Curricular Objectives by Level of Instruction Elementary and Middle School

Ed. Level	Character	Context	Invention	Action	Analytical	Organizational	Social	Knowledge & Skills
K-5 “my ideas are important”	Question Why and Why Not	Failure is usual, Try, try again JA for elementary school	Curiosity and Exploration	Learn by Doing	Find problems Use your Imagination to problem solve	Goal setting	Sharing	Causes, Effects & Consequences
6-8 “I matter and I can make a difference”	Take Initiative Question and challenge	Responsibility (personal and social) 4-H, JA etc. Perseverance	creativity brainstorming invention	Project creation and management	ID problems Solve with logic, deductive reasoning, scientific method	Time management organization planning	Work well in groups Communications Ethics	Skills competencies: Core subjects Technology



**Economic
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Strategies**

Entrepreneurship Education K-20

Integrated Pedagogical and Curricular Objectives by Level of Instruction

High School

Ed. Level	Character	Context	Invention	Action	Analytical	Organizational	Social	Knowledge & Skills
9-12 “I can be anything I want to be”	leadership Question and take initiative to find answers Self reliant, self-aware Self disciplined	Civic-minded Community service experiences FBLA, DECA, JumpStart etc. Take risks to help self and others Tenacious	Innovation Out-of-the-box thinking Resourcefulness	Real world experiential learning Job shadowing Local economy connections Senior project/portfolio	opportunity identification Analytical problem solving with factual support Information literacy and acquisition (research) competencies	Project management From abstract idea to planning, team-building, resource gathering to concrete implementation/actualization	Team-work Open minded, inclusive, appreciate diverse perspectives Ethical	Apply skills: presentation, oral, written, (articulate and literate) math, technology, financial and global economic literacy, marketing, selling an idea, small business process knowledge



**Economic
Investment
Strategies**

Entrepreneurship Education K-20

Integrated Pedagogical and Curricular Objectives by Level of Instruction Higher Education

Ed. Level	Character	Context	Invention	Action	Analytical	Organizational	Social	Knowledge & Skills
13-20 “I know how I can make a living by pursuing my passion”	Self-efficacious and confident in entrepreneurial skills and abilities	Community involvement SIFE teams, clubs, NCREAL, NCIDA, SBC, SBTDC etc.	Applied innovation Resource acquisition / Bootstrapping (human, capital, other)	technical skills and expertise Intern-ships Business plan competition s/ seed funding	Systems thinking Real Product/technology /service conceptual-ization	Product development Real Venture creation and implementation	Team-building networking Social skills	All of the above (remediation) Financial reports, accounting, business planning, marketing, management, Porters 5 forces, supply chains, HR, etc.



Assumptions about E-ed

- **Research and theory suggest...**
 - **E-ed pedagogy may make a difference**
 - **Type of student may make a difference**



Limited Empirical Education Studies

Author/Date	Design	Population	Analysis	Primary DV	Follow-Up/Length	Results
Economic Investment Strategies						
Studies with Only Psychosocial Outcome Measures						
Chen, C., Greene, P., & Crick, A. 1998	Pretest with Comparison Groups	MBA, Undergraduate Psych: 34 E-ed; 107 comparison	Regression (ANOVA and MANOVA)	Intention to start business, self efficacy	None	E-ed students higher self efficacy and higher intentions to start business at premeasure
Soutaris, V., Zerbinati, S., & Al-Laham, A. 2007	Pre and Posttest with Comparison Groups	Undergraduate science and engineering students at two Universities (France, UK): 124 E-ed; 126 comparison	Regression (ANOVA, GLM)	Intention to become self-employed	5 months	learning and resources did not impact attitudes about intention although E-ed inspiration did affect norms and intentions.
Clouse, Van G. H. 1990	One-group, Pretest-Posttest	Undergraduate business: 47 E-ed students	Multiple Regression	Simulated decision to start business	End of course (1 semester)	Venture decisions changed at post test
Cooper, S. Y. & Lucas, W. A. 2006	One-group, Pretest-Post-test, with 2nd Post-test	Students (US; UK): 218 undergraduate E-ed; 218 at Posttest1; 75 at Posttest2	T-tests; Multiple Regression (OLS)	Intention to start business; 14 start-up skills measures	End of program; 6 months	E-ed students had sustained higher self efficacy in skills but no long term E-ed effect on intentions
Zhao, Seibert & Hills, 2005	Pretest-posttest correlational path analysis	265 MBA students	Structural Equation Modeling	Entrepreneurial Intention to start business	Graduation 2 years	E-topic exposure and E-self efficacy predict E-intentions
Studies with Objective Outcome Measures						
Brown, R. 1990	Posttest with Controls and cohort pretest	Undergraduates: 214 E-ed program applicants and 75 comparison	Frequencies	Time intend to start; biz survival; jobs created; sales; profits	4 months to 3 years	E-ed accelerates business start-ups
Kolvereid, L., & Moen, O. 1997	Posttest with comparison group	Graduate business (Norway): 105 E-ed; 265 comparison	Multiple Regression (Logistic and OLS)	Business startups; entrepreneurial intentions	1 year to 8 years	E-ed majors scored higher in both business starts and E-intentions than non-majors
Charney, A. & Libecap, G. D. 2000	Posttest with matched control	College of Business and Public Admin graduate and undergraduate students: 105 E-ed; 406 Comparison	Multiple Regression (Probit, OLS)	Startup; self employed; income; job satisfaction; changes in firm performance	1 year to 13 years	Grad students more than 3X more likely to start a business
Menzies, T. V., & Paradi, J. C. 2002	Post-test with matched control	Undergraduate engineers (Canada): 287; E-ed and controls	Frequencies, Regression (OLS)	Current/ past /serial business ownership	4-11 years	E-ed grads had more businesses, more serial start-ups, sooner after graduation than controls
Ohland, M. W. et al. 2004	Post-test with matched control	Undergraduate engineers: 177 E-ed; 110 comparison	Multiple Regression (OLS) and Confidence	Retention, GPA	1 year to 6 years	E-ed students were less likely to drop out of engineering and higher



Research on E-ed Mechanisms

- **Summary of quantitative research:**

- Some support for Entrepreneurship as a planned behavior where intentions predict E-outcomes but other research says no. (Kolvereid & Moen, 1997; Krueger, Brannback & Carsrud 2007; Bay & Daniel, 2003).
- Some support that E-ed increases intentions but other research says no. (Zhao et al., 2005; Cooper & Lucas, 2006).
- Some support for E-ed as social learning enhancing self efficacy other research says no. (Markman et al., 2002; Souitaris et al. 2007).
- A few studies suggest knowledge and skills produce entrepreneurship others say no (Kourilsky & Walstad, 2002; Wallenstein, 1993; Souitaris et al., 2007)
- A few recent studies suggest intentions, self efficacy may be the result of a combination of context, experiences, and personality as well as E-ed. (Gatewood et al., 1995; Utsch & Rauch, 2000).

- **Conclusion:**

- *The evidence is modest and at times contradictory about the relationships between E-ed, self efficacy, intentions, knowledge, skills and E-outcomes*



What's Known?

Very Little! In spite of a tremendous growth in university E-ed nationally, empirical research has not kept pace ...

- **Not clear whether E-ed works or does not work**
 - **Reasons:**
 - » **Limited body of research: 11 empirical studies last 10 years**
 - » **Limited outcomes measures : >50% psychosocial outcomes**
 - » **Limited follow up period: immediate or 1-3 years post**
 - » **Weak inferential designs: pre-post test; weak post-test only comparison groups (biased comparison groups; no statistical controls)**
 - » **Little attention to pedagogy and causal mechanisms**

“The teaching productivity of an entrepreneurship program cannot be properly evaluated by the number of students graduated, as it is in other disciplines, but only by the socio-economic impact that successful programs produce.” --McMullan & Long (1987)



Research Needs

- **More and better (methodologically sound) research on the impact of E-ed:**
 - **Continue follow up research on tangible entrepreneurial outcomes**
 - **Better research designs**
 - » Use sophisticated matching procedures
 - » Statistically control for variables known to correlate with outcomes; ex: parents who are business owner
 - **Begin differentiating type of E-ed and type student**
 - **Begin to understand program mechanisms**



Goals of Research

- 1. Conduct multivariate E-ed evaluation that addresses the shortcomings of the existing literature. Specifically:**
 - Improves confidence in group equivalency;
 - Provides an opportunity to compare different programs and populations
 - Examines a diverse set of objective E-ed relevant outcome measures over a long follow-up period
- 2. Attempt to shed some light on the instrumental mechanisms that affect outcomes**
 - Examines potential E-ed mediators/moderators

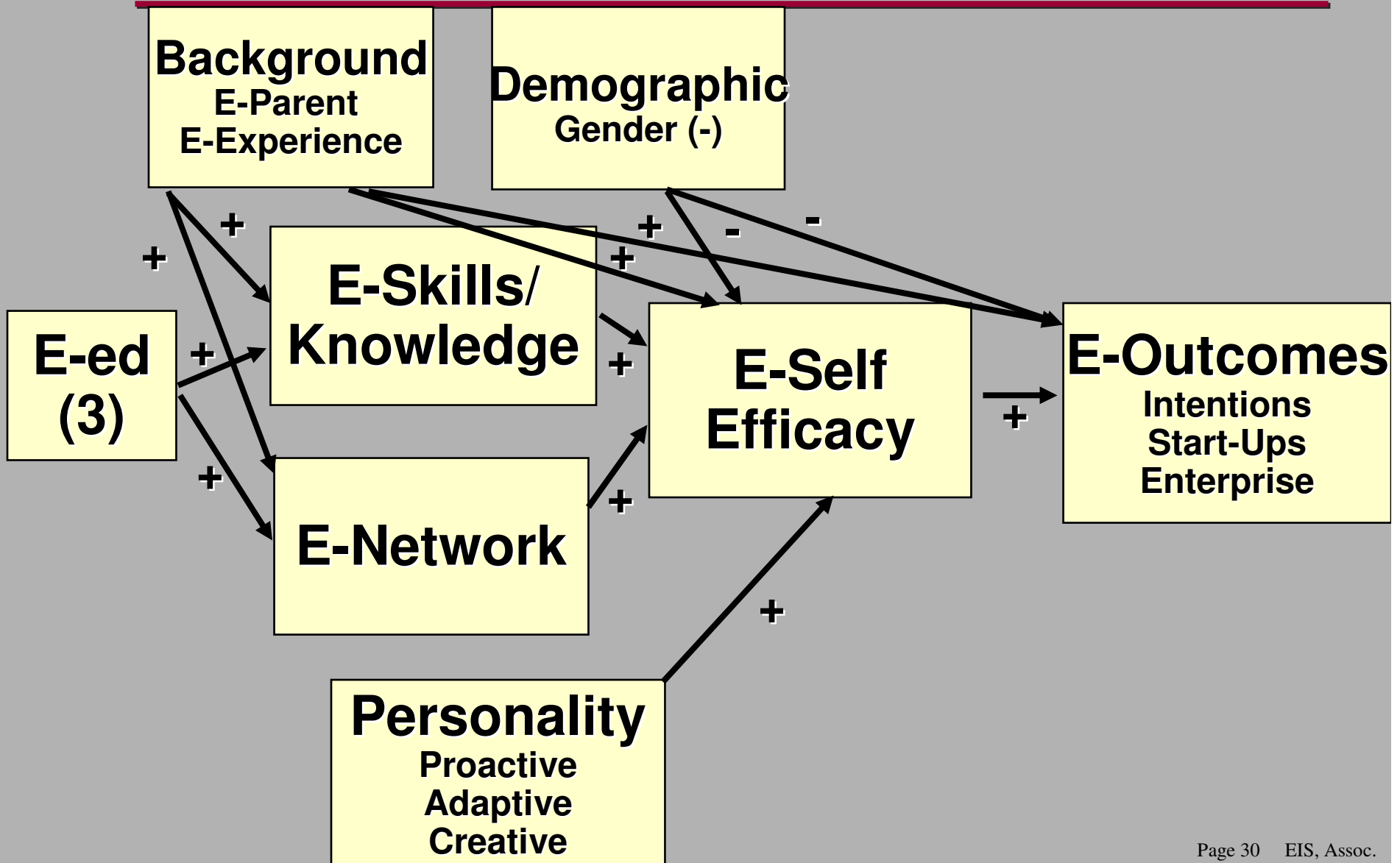


Propositions (1)

- 1. E-ed can influence skills and knowledge which in turn will influence significant E-outcomes**
 - a) E-self efficacy will have a direct and positive relationship with significant E-outcomes. (Chen et al. 1998)**
 - b) Knowledge, skills, networks will have a direct positive relationship with E-self efficacy. (Cooper and Lucas, 2006)**
 - c) U-ed & G-ed will have a direct positive effect on E-knowledge & skills. (Kourilsky & Walstad, 2002)**
 - d) U-ed & G-ed will have a direct positive effect on E-networks**



Hypothesized Model





Research Hypotheses

Hy 1. After controlling for significant covariates, E-ed students will demonstrate significantly higher entrepreneurial outcomes than a matched comparison group of students (who have not participated in E-ed)



Research Hypotheses

Hy 2. The effects of E-ed models on entrepreneurial outcomes will be mediated by entrepreneurial self-efficacy; knowledge, skills and networks.



Exploratory Questions

- 1. What factors and influences do entrepreneurs attribute their willingness to establish a new business to?**
- 2. What factors and influences do successful entrepreneurs attribute their success to?**



Key Methodological Features

- Design:

- Quasi-Experimental

- » Pre-Posttest Comparison Group (for some participants)

- » Use Freshman Survey

- » Post-test only Comparison Group (Shadish et al. 2002)

- » Matched comparison (cohort, major, age, GPA, gender)

- » Statistical control via covariance analysis (5 variables)

- Treatments

- 3 Modalities: 2 Project-Based Constructivist; 1 Traditional (lecture/case)

NR	O_{1p}	X_{1t}	O_{2p}
NR	O_{1p}		O_{2p}
NR		X_{2t}	O_{2p}
NR			O_{2p}
NR		X_{3t}	O_{2p}
NR			O_{2p}



Summary Key Methodological Features

- **Samples**
 - Undergraduate & Graduate Program Alumni and Matched Comparison, 1-15 years
- **Outcomes: intentions, “enterpriser”, start-ups, success**
- **Process Measures:**
 - Personality, Knowledge/Skills, Attitudes and Networks
- **Data Collection:**
 - Combination mail and web-based survey



Research Setting

- **Large State University**
- **Strong track record and reputation of technology-based outputs**
- **Rich and longstanding tradition of E-ed programs across degrees and majors**
 - **Undergraduate Business/ Traditional**
 - **Undergrad Engineering/ Experiential Low**
 - **Graduate Business/ Experiential High**



E-Outcomes *(Dependent Variables)*

- ***Intentions***: widely used psychosocial outcome for E-ed. Existing 4-measure scale (Cooper & Lucas).
- ***Business Startups***: yes/no; most widely used hard outcome for longitudinal E-ed (Charney & Libecap)
- ***“Enterprise”***: rationally constructed scale of “other” hard outcomes including franchises, nonprofits, intrapreneurship.



Instrumental Mechanisms (IV's and Covariates)

- 1. Entrepreneurship is influenced by individual characteristics**
 - a) Gender (f) will have a direct negative effect on self-efficacy and significant E-outcomes. (Wilson, Kickul, & Marino, 2007)**
 - b) Background (parent and individual E-experience) will have a direct positive effect on E-knowledge, skills, networking, E-self efficacy and significant E-outcomes. (Roberts, 1991; Fairlie, 1996)**
 - c) Personality (Proactive, Adaptive, Creative) will have a direct positive effect on E-self efficacy and significant E-outcomes. (Stewart, 1996)**



Scales

- **Personality Measures**
 - **Constructs:**
 - » **Autonomy**
 - » **Confidence**
 - » **Creative-proactive-adaptive-persistent personality**
 - **Number of Items (18)**
 - **Source: Goldberg, 2006; rationally constructed**
 - **Sample Item: Compared to my peers at work:**
 - » **I prefer greater independence**
 - » **I am more confident**
 - » **I more greatly dislike supervision**
 - » **I am more likely to finish things despite obstacles in my way**



Scales (2)

- **Knowledge, Skills, Networking Measures**
 - **Constructs:**
 - » E-Knowledge
 - » E-Skills
 - » E-Networking
 - **Number of Items (12)**
 - **Source: Chen, Rationally Constructed**
 - **Sample Item: Rate your current level of ability**
 - » Develop a business plan
 - » Create new products and services
 - » Conduct market analysis
 - **Confidence in identifying a person who could introduce you to a venture capitalist or angel investor.**



Scales (3)

- **E-Self Efficacy**
 - **Construct:**
 - » **E-Self Efficacy**
 - **Number of Items (4)**
 - **Source: Zhao et al., 2005 (existing scale)**
 - **Sample Item: How confident are you in successfully:**
 - » **Identifying new business opportunities**
 - » **Creating new products**
 - » **Thinking creatively**
 - » **Commercializing an idea or new development**



Summary of Measures

Variable	Variable Descriptor	Measurement Level	Other exploratory, descriptive items
Independent (IV1)	Undergraduate Eng. Treatment (UET)/ No Treatment (UET V NT)	Categorical	Self-reported E-ed Dosage
Independent (IV2)	Undergraduate Bus. Treatment (UBT)/ No Treatment (UBT V NT)	Categorical	Self-reported E-ed Dosage
Independent (IV3)	Graduate Treatment (GT) / No Treatment (GT V NGT)	Categorical	Self-reported E-ed Dosage
Dependent (DV1)	Entrepreneurial Intentions (Ei)	Continuous	
Dependent (DV2)	Entrepreneurial Startup Activities (Ev)	Categorical	Serial/multiple Startups Kinds of startups
Dependent (DV2a)	High Tech Startup (Evi)	Categorical	Objective IP, Capitalization Success
Dependent (DV3)	Enterprising Behaviors (Es)	Continuous	
Moderator (Mod)	Type of Student/Pedagogy	Categorical	
Covariate (Cov1)	Individual Characteristics: Matching (Gender/Age)	Categorical & Continuous	
Covariate (Cov2)	Individual Characteristics: Statistical [Parental, Experience, Personality (Autonomy, Confidence, Creative)]	Categorical & Continuous	Students different on premeasures
Mediator (Med1)	Knowledge/Skills	Continuous	
Mediator (Med2)	Networking	Continuous	
Mediator (Med3)	E-Self Efficacy	Continuous	



Data Collection Status

- **Sampling Frame**
 - » **U-ed, N = 900**
 - » **G-ed, N = 300**
 - » **Controls = 2,800**
 - **Mail Survey: N = 2,000**
 - **Web-survey: N = 2,000**
 - » **Response: 622**



Planned Analyses

- **Hy1**
 - **Multivariate Regression**
 - » **Sequential Logistic & MANCOVA**
 - » **Run separate models for treatments**

- **Hy2**
 - **SEM**
 - » **Run separate models for modalities**



Preliminary Findings

- **Psychometrics worked out (alpha)**
 - Entrepreneurial intentions: .84
 - Enterprising: .81
 - Personality: .76
 - E Self Efficacy: .92
 - E Skills and Knowledge: .83/.88
- **Preliminary analysis of causal model looks promising**



Preliminary Conclusion

- **Jury still out on effectiveness of E-ed**
 - Current study should allow for a greater confidence than past research
- **There are good reasons for the lack of quality E-ed research**
 - Lack of pre-measures a big challenge
 - » Freshman surveys show some promise but have limits
 - Matched comparison alumni surveys are really hard to do!
 - » Longitudinal studies expensive and difficult to achieve
 - » Self-reporting bias requires complex, sophisticated quasi-experimental designs
 - » Pre-Post test designs rare with Longitudinal studies
 - » Response rates marginal 5-15%
- ***E-ed may catalyze E-results via “Can Do” Spirit***
- ***Networking may be as important as E-content for E-ed***
- ***Pedagogy may differentially impact Self-Efficacy=> E-results***

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QUESTIONS?

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