

# Operationalizing Entrepreneurial Behavior for Effective Assessment of Engineering Entrepreneurship Programs

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## BACKGROUND

### Entrepreneurship Education Programs

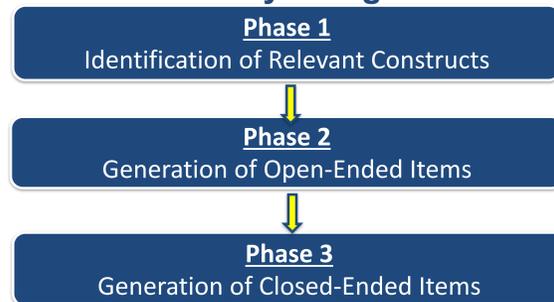


### Lack of Quality Assessment Measures

A recent review of current assessment methods in engineering entrepreneurship education identified 29 articles that utilized 52 assessment instruments (Purzer et al., 2016). Of those 52 assessment instruments, only 10 reported evidence of instrument reliability and validity

## METHODOLOGY

### Study Design



### Reliability and Validity Measures

	Description	Measures Undertaken
<b>Construct Validity</b>	Ensuring that constructs developed are consistent with domain literature	Constructs ( <b>Phase 1</b> ) and close-ended response options ( <b>Phase 3</b> ) based on entrepreneurship literature
<b>Pre-Item Content Validity</b>	Alignment of constructs with expert views before item development	Expert feedback on constructs and definitions ( <b>Phase 1</b> )
<b>Post-Item Content Validity</b>	Alignment of items with expert and student views	Expert and student response to open-ended items ( <b>Phase 2</b> )
<b>Communication Validity</b>	Ensure clarity/interpretation of items among students	Student feedback on closed-ended items with attendant revision ( <b>Phase 3</b> )
<b>Inter-rater Reliability</b>	Establishing consistency in analysis	Co-coding of open-ended responses by two researchers ( <b>Phase 2</b> )

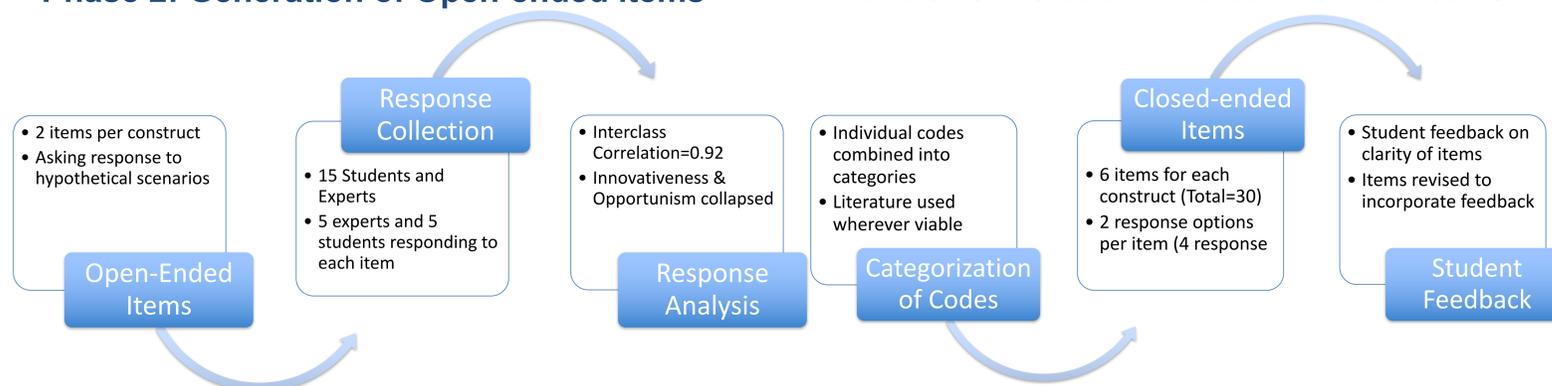
## FINDINGS

### Phase 1: Identification of Constructs (Literature Review and Expert Feedback)

	Definition
<b>Opportunism</b>	Recognizing a need to develop new products, services or processes to 1) Improve existing operations, and/or develop new marketing approaches; 2) Discover opportunities that enhance efficiency or quality; 3) Evaluate opportunities that involve balancing inadequate commitment of resources and the potential for return
<b>Innovativeness</b>	Developing new and/or new ways of improving existing 1) products, 2) services or 3) processes that meet customer/market needs
<b>Networking</b>	Purposefully establishing informal and formal relationships with other people with the intent of recruiting physical and monetary resources, and exchanging information, experiences and advice: 1) <i>Internal</i> (within an organization) and <i>External</i> (outside an organization)
<b>Risk Management</b>	Take actions that reduce the probability of risk occurring or reduce the potential impact if the risk were to occur pertaining to 1) <i>Finance</i> ; 2) <i>Resources</i> ; and 3) <i>Time</i>
<b>Adaptability</b>	Altering oneself or the environment to the changed circumstances to one's advantage: 1) <i>Proactive</i> approach - involves seeking knowledge about the environment and taking necessary actions ; and2) <i>Reactive</i> approach - involves responding to changes rather than exploiting and initiating change
<b>Perseverance</b>	Ability to sustain goal-directed action and energy when confronting difficulties and obstacles that impede goal achievement.

### Phase 2: Generation of Open-ended items

### Phase 3: Generation of Closed-ended items



	Category	Constituent Codes
<b>Opportunism</b>	No Opportunity Recognized	No Change
	Recognize an opportunity exists	Do not know the solution; Increase efficiency
	Recognizes opportunity and proposes a solution	Increase duration/recruiters; Distribution Approach; In-Person Approach
<b>Networking</b>	Looks for information without personal interactions	Use Online Sources; Use Print Media
	Seek information through intermediaries	Talk to stakeholders and/experts; Take financial classes
	Seek information directly from the source	Talk to users; Run experiments; In-person approach; Connect Virtually
<b>Risk Management</b>	Make an uninformed decision	Communicate with Stakeholders; Perform Validation
	Evaluate the situation	Depends on situation; Wait for validation results; Run more valuable event
<b>Risk Management</b>	Explore alternative solutions to mitigate risk	Merge events; Ask alternative organizations to hold event; Purchase Refundable Tickets; Seek other funding sources
	Do not adapt	Take the beneficial course; Do not take the beneficial course
<b>Adaptability</b>	Evaluate	Evaluate Priorities; Evaluate Cost
	Adapt	Find alternate venue; Find alternate time; Adapt
	No perseverance	Take course later/Take Elective
<b>Perseverance</b>	Consistency of interest	Devise a plan; Pursue as extra-curricular; Take required course in summer
	Perseverance of effort	Seek other opportunities for interaction; Pursue design

## CONCLUSION

- Our study provides an example for the engineering entrepreneurship education community on how researchers can use prior literature, expert and student feedback, and qualitative open-ended items to create measures that do not have a consistent definition/terminology in past work due to disparate efforts and real-time program evolution.
- We identify underlying constructs constituting entrepreneurial behaviour and present a 30-item survey instrument for assessing five entrepreneurial behaviour sub-constructs - opportunism, networking, risk management, adaptability and perseverance.

## FUTURE WORK

- Having performed the necessary steps to ensure high degree of validity in instrument development, our survey still needs to undergo scale analysis to ensure the generated survey items are representative of the underlying constructs.
- Pilot testing the instrument with a sample of undergraduate students and validate the survey for the sample.

## SELECT REFERENCES

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## ACKNOWLEDGMENTS

This project is funded by the U.S. National Science Foundation through grant numbers 1504257 and 1531533. The opinions are those of the authors and do not necessarily represent the National Science Foundation.