

- Content Validity – mapping the CDIO syllabus to questionnaire items
 - The role of specificity: Difficulty, context, ou
- Predictive Validity – testing measures against factors known to be predicted by Self-Efficacy
- Response structures and variation
- Status:
 - Designs and measurement testing, 2009-2010
 - Plan for 2010-1011 multi-national study of early use of Project-Based Learning

Content and Predictive Validity of Scales to Measure Self-Efficacy

- A self-efficacy scale is created by summing the self-rated confidence an individual has that they can perform a set of tasks that together represent a core content.
- Content Validity is whether the items used to create a scale that are representative the desired content.
 - Much less of a challenge when one has a formal syllabus to guide item selection
- A scale can be tested statistically to determine whether the items represent a common core concept.
- Predictive Validity is the acid test: Does the self-efficacy scale that is created predict (statistically correlate) intention, behavior or other variables know to be influenced by self-efficacy.

TEAMWORK(3.3)

3.3.1 *Forming Effective Teams*

3.3.2 *Team Operation*

3.3.3 *Team Growth and Evolution*

If question is asked if the student is confident they are that they can “form effective teams”, the answer is based heavily on what type of team they envision, which is unknown to the researcher.

Those with more experience may have experienced more difficult teams, and that would make the experienced student judge their skills by a higher standard.

Tasks used for creating self-efficacy scales need to be specific

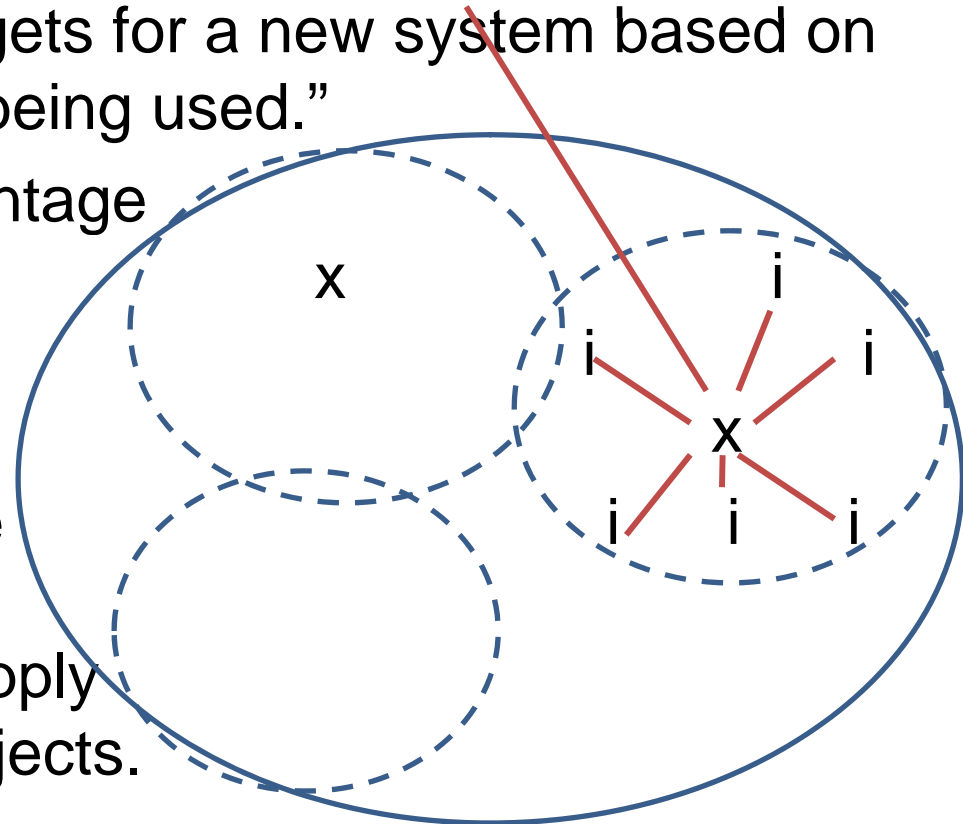
Item Specificity and the Assumption of Generality

- *One does not need to have a very large number of specific items because of high domain inter-correlations*

4.3.1.2.2 Locate and classify competitors, benchmarks

"Establish performance targets for a new system based on similar systems already being used."

- Scale design takes advantage of this quality and uses items to represent the identified sub-domains.
- The sub-domains are the 4th level of the CDIO syllabus, but probably apply to most engineering subjects.



3.1.1 Forming Effective Teams

Interpret task and team processes

Help **ensure** that your team understands the goals, scope deadlines at a **project start**. (Social, Moderate)

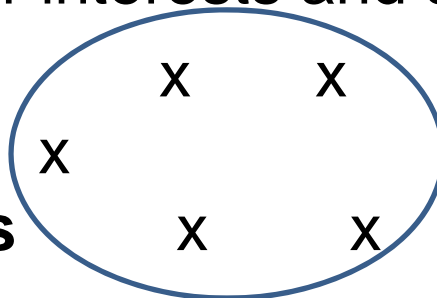
Identify team roles and responsibilities

Identify the roles and **special skills that are needed** for your project. (Cognitive, Easy)

Analyze the strengths and weakness of the team

Talk with the members of your new team and become familiar with their interests and skills. (Social, Easy but rare)

Forming teams



Seeking tasks that are a representative balance of a domain

Specifying and Balancing Difficulty and Nature of Tasks: Team Operation

Choose goals and agenda

Work with others to establish a schedule of when different tasks have to be completed. **Easier, Cognitive w/social**

Demonstrate positive and effective feedback

Give constructive criticism to a poorly performing team member that that improves their performance. **Harder/Social**

Practice the planning, scheduling and execution of a project

Help make sure your teammates deliver on the schedule that they agreed to. **Social, Enforcing and more difficult**

Practice conflict negotiation and resolution **(Has two aspects)**

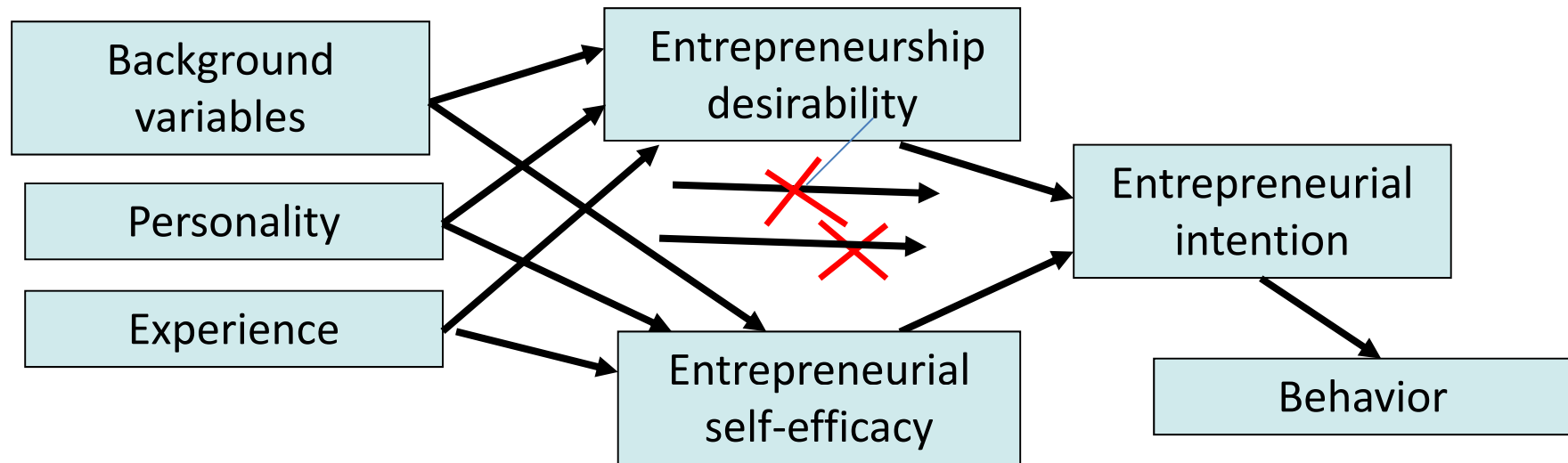
Facilitate a team reaching an agreement when there had been conflicting views over steps to be taken.

Bring two team members together who have serious personal differences so they can talk it through.

Persuade investors to put a substantial sum into a new company.	.789
Recognise an idea that will support a major new venture or project.	.787
Inspire confidence in a radically new business concept.	.786
Take a proposal through the company planning/budgeting process.	.785
Estimate accurately the costs of running a new project or venture.	.778
Get suppliers to support a business with favourable terms.	.776
Write a clear and complete business plan.	.772
Pick the right marketing approach for introducing a product.	.766
Arrange for a retailer to sell your new product.	.765
Analyse the strengths and weaknesses of a business plan.	.748
Sell a brand new product or service to a first time customer.	.742
Know how to place financial value on a start-up company.	.717
Design a product or service to meet a new market opportunity.	.682
Recognise and hire good employees for a new project or venture.	.677

Cronbach's alpha = .941

Criterion Variables for Predictive Validity: The Case of Entrepreneurship



- There are well established models of the formation of intention and behavior that suggest men have higher self-efficacy, that self-efficacy relate to desirability, the formation of intention, and subsequent behavior
- The next step in our assessment work is to collect data on our scale and these concepts.

- Creation of “Desirability of Engineering” scales
 - Desirability of purely engineering
 - Desirability of broader use of technology
 - Desirability of technology based entrepreneurship

Tested on small sample at the University of Calgary
- Local option to attach behavior data
 - Electing to enter engineering major
 - Continuing in engineering studies
 - Engineering marks
 - Participating in engineering activities

Current Status and Plans

- CDIO members are welcome to use the survey this year.
 - Seen as a pilot, and focus is more on establishing the validity of the measures than assessment.
 - Three universities currently committed.
 - Survey may be late pretest with Spring post-test, post-test only, or single administration at any time.
 - Data entry is local responsibility.
 - MIT will provide analysis of all data we receive, with report on measurement performance at CDIO meetings.
- Major comparative effort planned for 2010-2011
 - Participants urged to use pre-/post-programme research design and collect comparable behavior data