Opening up the black box of entrepreneurial education
- Outline of an app-based action research project

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## Agenda

### Problem
- Some challenges in entrepreneurial education
- Focus on methodological challenges – how to open the black box?
- Three different research strategies – thoughts, actions, emotions

### Opportunity
- Using experience sampling (ESM) to research emotional entrepreneurial experience
- The proxy theory of assessing entrepreneurial education
- Roots and results so far of proxy based ESM research on entrepreneurial education

### Proposition
- An app-based multi-site international action research project

### Expectations
- Some results to be expected
Problems in entrepreneurial education

Entrepreneurial education researchers
- Methods
  - "How can we study it?"
    - What methods can develop our understanding of entrepreneurial education?
- Research
  - "What have we learned?"
    - What research has been done that can describe and explain entrepreneurial education?

Today’s entrepreneurial educators
- Understanding
  - "What are we doing?"
    - Do our students develop entrepreneurial competencies?
- Development
  - "What should we be doing?"
    - When, how and why do students develop entrepreneurial competencies?

Wider community
- Legitimacy
  - "What are they doing?"
    - What is the purpose? What is the difference & impact? Is it effective & efficient?
- Diffusion
  - "Should I be doing it too?"
    - Can it help me reach my goals? Will it work on my students? Will I be able to manage it?
Some methodological challenges

**Macro level studies (Rigor)**
- Look at regularities in cause–effect by studying large populations (large N), but correlation does not give causation
- Do not open the black box – only tell us IF entrepreneurial competencies are developed, not HOW, WHEN or WHY
- Lack methodological rigor by default, a generic problem with RCTs in education
- Severe self-selection bias in ent.ed
- Results seldom relevant to practitioners, but easy to get published

**Micro level studies (Relevance)**
- Often single case studies or very small N, aiming to explain HOW, WHEN or WHY entrepreneurial competencies are developed
- Anecdotal and descriptive, frequent lack of decontextualization / categorization / contrasting
- Statistical methods often not applicable, therefore trustworthiness is questioned
- Methodological sloppiness often substantial
- Results seldom publishable, but more often relevant to practitioners

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The researcher’s dilemma:
“Shall [s]he remain on the high ground where he can solve relatively unimportant problems according to his standards of rigor, or shall he descend to the swamp of important problems where he cannot be rigorous in any way he knows how to describe?”. (Schön, 1995, p.28)
# Three research strategies

<table>
<thead>
<tr>
<th>Research strategy</th>
<th>Before education</th>
<th>During education</th>
<th>Directly after education</th>
<th>Long time after education</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thoughts</td>
<td>Entrepreneurial knowledge, skills and attitudes (TPB)</td>
<td><strong>What do they think?</strong></td>
<td>Entrepreneurial knowledge, skills and attitudes (TPB)</td>
<td>-</td>
</tr>
<tr>
<td>Actions</td>
<td>-</td>
<td><strong>What do they do?</strong></td>
<td>-</td>
<td>Actual entrepreneurial behavior</td>
</tr>
<tr>
<td>Emotions</td>
<td>-</td>
<td><strong>What do they feel?</strong></td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

- Based on tracking critical and emotional events triggering learning (i.e. links)
- Captures the learners’ experiences, i.e. formative assessment, leans on experience sampling
- Focus is on what happens during the educational intervention, not before / after / long after
Experience Sampling Method (ESM)

- Very short surveys answered in the actual situation / environment
  - Captures the subjective experience with high validity and reliability
  - A mix between diary and survey
  - Can be done through mobile smartphones that most people have today

- Has been adjusted to the purpose of capturing learning
  - The learner decides when to report something significant
  - Leans on people’s inclination to share strong emotions socially
  - Anchored in Vygotsky’s view of learning that human activity spurs learning
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What teenagers do in class:
Experience Sampling Method (ESM)

The week of a teenager:

Mood (Raw Score)

Monday
12:44 PM
Talking with friends at lunch about “the jerks who try out for Miss America”
6:45
Talking with sister in TV room, thinking “what a liar my sister’s friend is”
8:40
Watching Miss America alone, thinking “what it would be like to be a model in Paris”
10:25
Watching the news alone, thinking about “Trans Arms”

Tuesday
8:45 AM
Talking with friend in gym, thinking “how smart by brother is”
10:58
In English Lit, thinking “Rime and rhyme are the same”
12:36 PM
Talking to friends at lunch about computer programming
2:00
In Sociology class, discussing “how the number of marriages has grown”
5:15
Talking to aunt on phone; “My aunt talks too much”
7:07
Taking a shower, thinking, “What to do about my situation”

Wednesday 10:30 AM
Talking with friends about “whether you have to stop on the highway if a bus stops”
12:15 PM
In Psych class, thinking “how rotten a day this has been”
1:30
Alone, buying a birthday present for sister; “When is the sales lady ever going to get done”
2:55
With friend buying Coke; “I’m so mad right now, I’m going to get fat”
A mobile app captures learners’ emotional experiences / events

Interviews follow up these events, connects them to learning outcomes

Interviews transcribed, coded in NVIVO, link frequency counted

Analysis of when / why / how competencies are developed

"Experience sampling"

Month 1 Month 2 Month 3 Month 4 Month 5

- What happened?
- Why?
- What did you learn?
- What insights do you take with you?
The proxy theory of assessing entrepreneurial education

Educational interventions...
- Creation
- Value creation
- Venture creation
- Sustainable venture creation

...trigger emotional events...
- Interaction with outside world
- Uncertainty and ambiguity in learning environment
- Teamwork environment
- Overcoming competency gaps
- Presenting in front of others
- And others...

...which in turn develop entrepreneurial competencies
- Increased self-efficacy
- Increased uncertainty and ambiguity tolerance
- Increased self-insight
- Formation of entrepreneurial identity
- Increased marketing skills
- And others...

Empirically established strong links between emotional activity and developed entrepreneurial competencies

Novel assessment strategy – focus on emotional activities
Origin of the proxy theory

Entrepreneurial education

Educating about entrepreneurship
Educating for/in entrepreneurship
Educating through entrepreneurship

Entrepreneurship as practice

Becoming an entrepreneur by founding a real-life venture

Venture creation programs
Some characteristics of Venture Creation Programs

Emotional roller-coaster

Building air castles

Strong positive emotions

Strong negative emotions

"Crisis in my head and crisis in my stomach"

"Everyone else needs to see a flower while I see a seed"

"We can take over the world if we want to"

"Free falling from an airplane without a parachute"

Some characteristics of Venture Creation Programs

A methodological dream
- The data is screaming to us!

What can’t be observed here, probably can’t be observed, or isn’t happening at all

The challenge comes later when using the developed methods in environments with lower signal-to-noise ratio
An example of an opened black box

Educational design
- Requirement to create a venture
- Requirement to create value for other actors
- Requirement to create something

Emotional events
- Frequent interaction with outside world
- Happiness, motivation, sense of relevancy and meaning
- Frustration, anger, despair etc.

Entrepreneurial competencies developed
- Increased perseverence
- Increased feedback from externals
- Increased energy input
- Happiness, motivation, sense of relevancy and meaning
- Frustration, anger, despair etc.
- Increased uncertainty / ambiguity tolerance
- Increased self-efficacy
- Increased entrepreneurial passion
- Developed entrepreneurial identity

"I can do this!"
"I dare!"
"I overcome!"
"This is who I am!"

A new educational philosophy – surprisingly novel! It is now being tested widely in Sweden and abroad.

Value creation pedagogy profiler

- Student owns process
- Encourage failures
- Interaction with world outside class / school
- Subject matter connections
- Team work over time
- Value created outside team / teacher
- Activity based feedback / assessment
- Iterative process

Videos, slides and more info at the blog: vcplist.com
Three other studies applying the proxy theory

• Assessment of Chalmers’ own Venture Creation Program
  - Confirmed previous research on what emotional events generate the most important learning

• Assessment of an action-oriented enterprise education concept on secondary education
  - Outlined how, when and why 13-year old students developed their entrepreneurial competencies

• Assessment of the three “best” entrepreneurial secondary schools in Sweden
  - Showed that what often is pictured as very entrepreneurial environments were actually not at all that entrepreneurial
  - Confirmed that what was still rather entrepreneurial led to strong increase in student motivation and engagement
Proposed pan-european study
Analysis and synthesis

Year 1
- Start up meeting
  - 4 x 10 teachers learn to use & manage app
  - Preparations for autumn term start
  - 4 x 50-100 students start using app
  - Students and teachers use app for 1 year
- App-inspired focus group meetings for teachers
- Transcription and analysis of teacher meetings
- App based selection of students to interview
- App-based interviews with students
- Transcription and analysis of student interviews
- Compilation of all data into common database
- Years of research based on collected data

Year 2
- Autumn term
- Spring term

Videos, slides and more info at the blog: vcplist.com
The app instrument – LoopMe 2.0
(www.loopme.se – in Swedish only so far)
# The interview template

<table>
<thead>
<tr>
<th>Step</th>
<th>Theme</th>
<th>Time share</th>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduce the study</td>
<td>5% / 2-3 mins</td>
<td>Purpose, confidentiality, questions.</td>
</tr>
<tr>
<td>2</td>
<td>Capture general insights</td>
<td>10% / 5-6 mins</td>
<td>Define learning for the interviewee in terms of knowledge, skills and attitudes. Based on this, capture the interviewee’s view of key learnings.</td>
</tr>
<tr>
<td>3</td>
<td>App-based questions</td>
<td>50% / 25-30 mins</td>
<td>4-8 of the most interesting app reports are selected. Each app report is read out. The student is asked to tell more about what happened, induced emotions, resulting learning and why so. An iterative ‘five whys’ question-asking technique is applied in order to drill down to the core of issues.</td>
</tr>
<tr>
<td>4</td>
<td>Critical events</td>
<td>20% / 8-10 mins</td>
<td>Interviewee is asked to try remembering any other critical events and/or creative moments not covered by these app reports. Associated learning is explored in the same way as in step 3 above.</td>
</tr>
<tr>
<td>5</td>
<td>Motivation</td>
<td>5% / 2-3 mins</td>
<td>A short question asking for key factors increasing or decreasing student motivation during the education. Purpose is to surface more critical events.</td>
</tr>
<tr>
<td>6</td>
<td>Similarities and differences</td>
<td>5% / 2-3 mins</td>
<td>A short question asking for similarities and differences between this learning environment and other learning environments. Purpose is to surface more critical events.</td>
</tr>
<tr>
<td>7</td>
<td>Decisions</td>
<td>5% / 2-3 mins</td>
<td>A short question asking the interviewee if he/she has taken any main decisions lately as a consequence of the education. Purpose is to surface more critical events.</td>
</tr>
<tr>
<td>8</td>
<td>Final reflections</td>
<td>5% / 2-3 mins</td>
<td>Can be used depending on previous topics.</td>
</tr>
</tbody>
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## Coding frameworks

### Entrepreneurial competencies

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<th>What is it?</th>
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<tbody>
<tr>
<td>...knowledge</td>
<td>Declarative entrepreneurship knowledge, procedural entrepreneurship knowledge, knowledge about oneself as entrepreneurial</td>
</tr>
<tr>
<td>...skills</td>
<td>Marketing, strategy, resource acquisition, opportunity identification/creation, learning skills, interpersonal skills, leadership skills, collaborative skills, creativity</td>
</tr>
<tr>
<td>...attitudes</td>
<td>Entrepreneurial passion, entrepreneurial self-efficacy, entrepreneurial identity, proactiveness, perseverance, uncertainty and ambiguity tolerance</td>
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### Emotional events / sources

1. new kind of learning environment
   1a) uncertainty and confusion
   1b) theory versus practice
   1c) support from outside
2. collaborative learning
   2a) team work
   2b) time pressure
   2c) individual differences between the learners
3. challenging tasks
   3a) overcoming knowledge and skills gaps
   3b) interacting with the real world
   3c) leadership and managing people
Links between emotional events & learning outcomes

- Chalmers master students
Links between emotional events & learning outcomes

- Chalmers master students

Sources of emotion

- Individual differences
- Overcoming competency gaps
- Interaction with outside world
- Uncertainty and ambiguity in learning environment
- Team-work experience
- Theory versus practice
- Leadership and managing people

Entrepreneurial learning outcomes

- Increased perseverance ("I overcome")
- Increased entrepreneurial passion ("I want")
- Formation of entrepreneurial identity ("I am / I value")
- Increased self-efficacy ("I can")
- Increased uncertainty and ambiguity tolerance ("I dare")
- Increased self-insight
- Increased marketing skills
- Increased interpersonal skills

Core finding of study

Attitudes

Knowledge

Skills
Task: Talk-English

Student owns process

Encourage failures

Interaction with world outside class / school

Subject matter connections

Team work over time

Value created outside team / teacher

Activity based feedback / assessment
Example: Value creation as pedagogy

Entrepreneurial education researchers

Methods
- How can we study it?
  - App based study of VCP emotionality

Research
- What have we learned?
  - A novel educational philosophy

Today’s entrepreneurial educators

Understanding
- What are we doing?
  - Value creation motivates students a lot

Development
- What should we be doing?
  - Make more students get to create value

Wider community

Legitimacy
- What are they doing?
  - Those students seem damn motivated!

Diffusion
- Should I be doing it too?
  - I want to try it in my classroom too!

What are we doing? Value creation motivates students a lot.
What should we be doing? Make more students get to create value.
What are they doing? Those students seem damn motivated!
Should I be doing it too? I want to try it in my classroom too!
Generalized expectations

“...these methods allow researchers to develop understandings not easily obtained with other paradigms. For example, everyday experience studies may help establish the real-world prevalence and impact of particular processes and phenomena; may identify situational contexts in which effects are more or less likely to occur; may determine boundary conditions necessary or sufficient for the operation of basic processes; may help distinguish between-person and within-person processes; may identify patterns of cyclicity and covariation among social, cognitive, emotional and psychophysiological variables; and may clarify their interactions with other, naturally occurring processes.”

Possible uses beyond research

• **Teaching.** An app can improve the day-to-day communication between students and teachers in many many ways.

• **Management & Development.** An app can help many of the more peripheral actors in education, such as school developers, principals, administrators, politicians, evaluators etc etc.

• **Financing.** An app can make explicit what works really well in an intervention, generating crucial evidence that can motivate investments – for both the financier and for the receiver of funds.
Thank you for listening!

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