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# CHARACTERISTICS THAT TYPIFY SUCCESSFUL FINNISH WORLD SKILLS COMPETITION PARTICIPANTS

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## Outline

- "Modeling of Vocational Excellence" (MoVE, 2007 – 2009)
  - Background
  - Results (interview and survey)
- "Actualizing Vocational Excellence" (AVE, 2009 – 2011)
  - Background
  - Initial results (survey)



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## Introduction

- A two-year (2007-2008) “Modeling of Vocational Excellence” (MoVE) project was funded by the Finnish Ministry of Education.
- During the study, a sample of Finnish World Skills Competition (WSC) participants (2005 Helsinki, Finland and 2007 Shitsuka, Japan), their personal trainers, working life representatives and parents (total  $n = 67$ ) was collected.



## Introduction

- **Semi-structured interview** was carried out to answer the following research questions:
  1. What characteristics typify a successful WSC participant?
  2. How the importance of WSC participants' characteristics differ during training period, competitions and working life?
  3. What characteristics specify WSC participants' initial interest towards the work field, perseverance in acquiring a vocational skill and mastery of the skill?
  4. What characteristics specify WSC participants' employer?



## Introduction

- **Survey** was carried out to answer the following research questions:
  5. Which intelligence areas, according to the MI theory, are the most essential to WSC participants? (MIPQ)
  6. What are the WSC participants' most essential motivational factors? (APLQ, SaaS)
  7. What is the influence of home and school atmosphere to the development of vocational expertise? (FA, SA)



## Theoretical framework

- **Bloom:** Talent development taxonomy (1985).
- **Ericsson:** Development of expertise (1993, 2006).
- **Gagné:** Differentiated Model of Giftedness and Talent (2004).
- **Gardner:** Multiple Intelligences Theory (1983, 1993, 1999).
- **Greenspan, Solomon & Gardner:** Cognitive and social skills on talent development (2004).
- **Zimmerman:** Sociocognitive approach to self-regulation (1998, 2000).



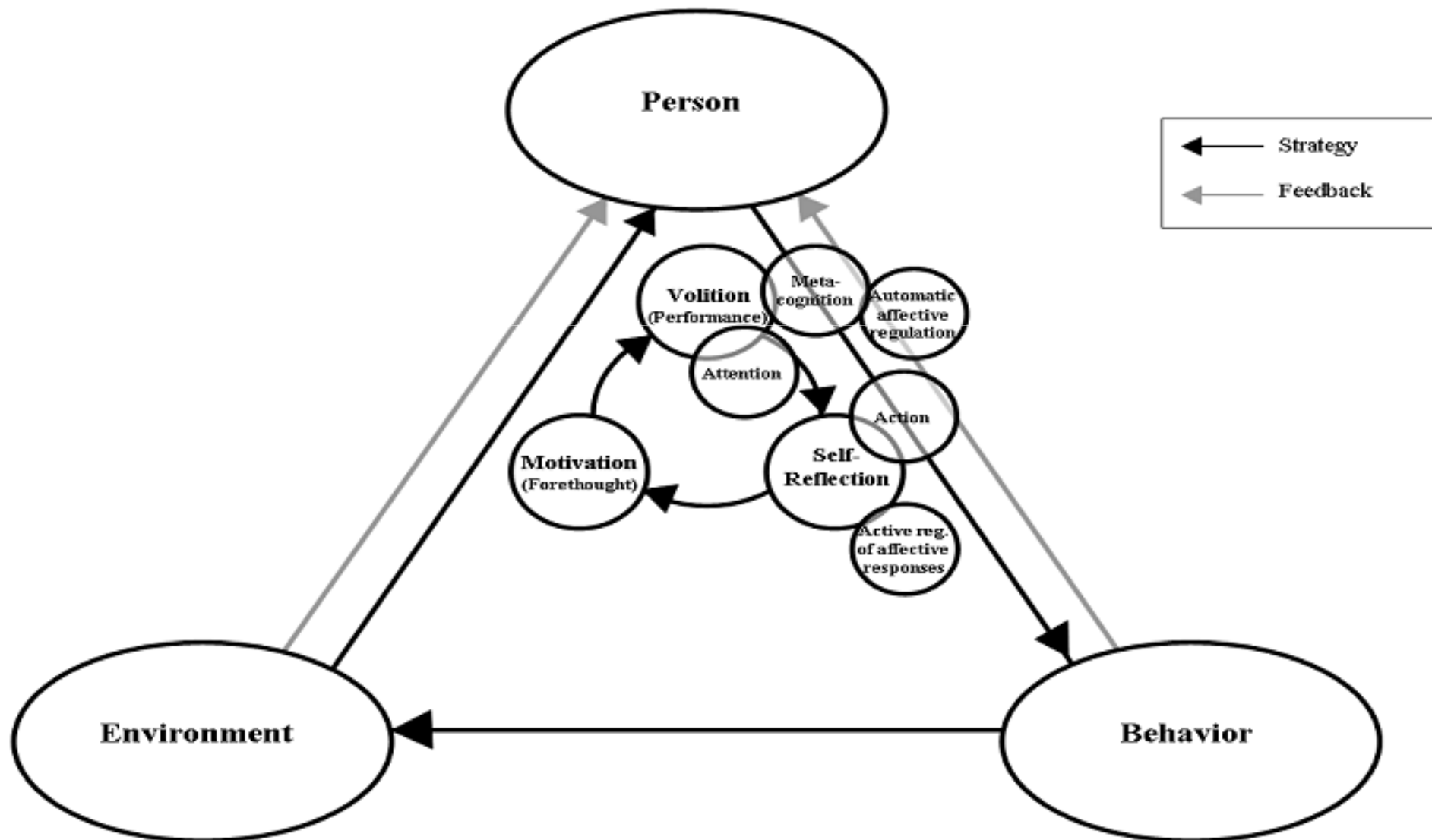
# Theoretical framework: Gardner's Multiple Intelligences Theory (1983)

- (1) Linguistic intelligence
- (2) Logical-mathematical intelligence
- (3) Musical intelligence
- (4) Spatial intelligence
- (5) Bodily-kinesthetic intelligence
- (6) Interpersonal intelligence
- (7) Intrapersonal intelligence
- 
- (8) Spiritual intelligence
- (9) Environmental intelligence

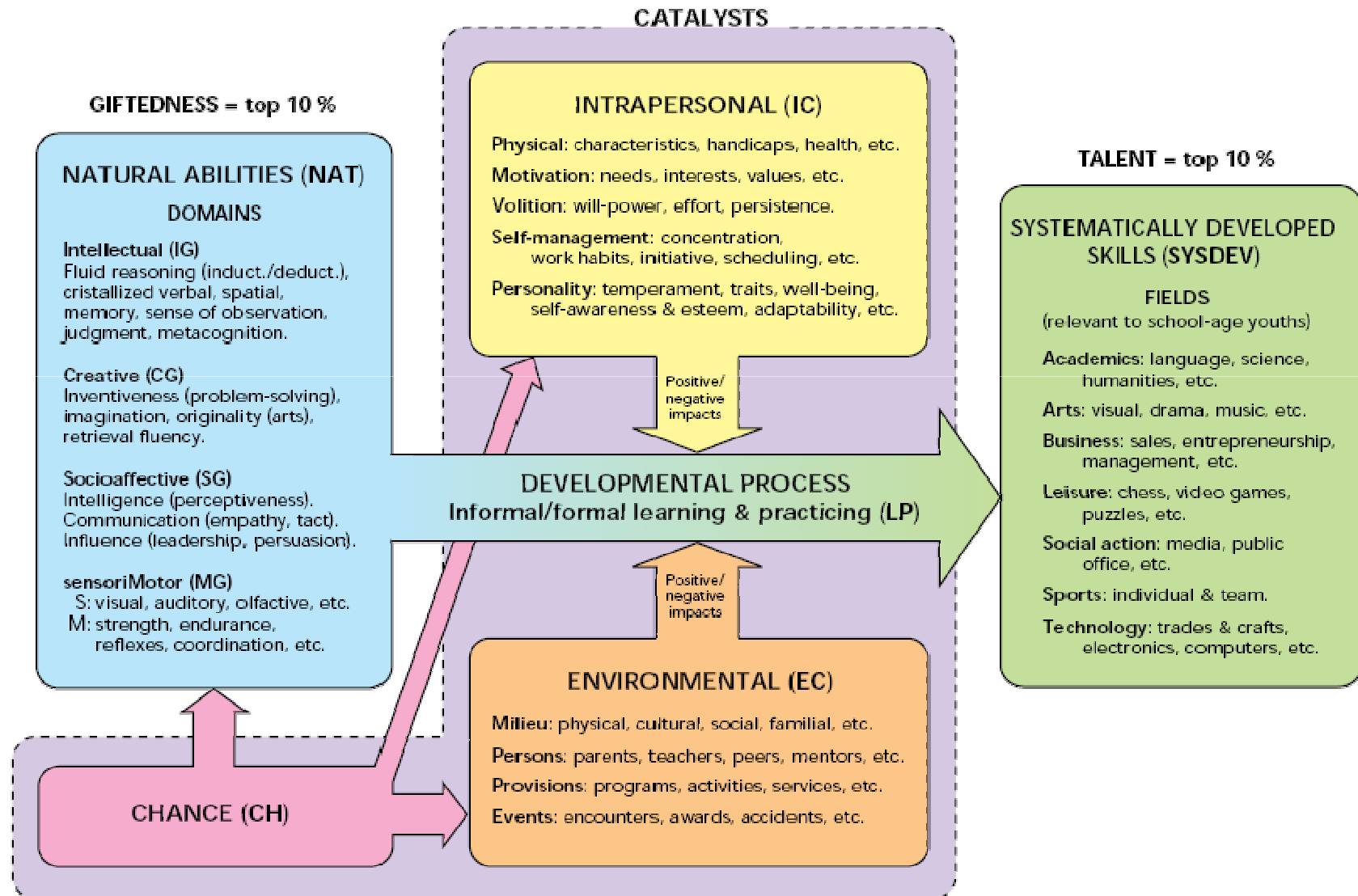


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# Theoretical framework: Adaptation of Zimmerman's Self-regulation Model (Zimmerman, 1998; Nokelainen, 2008)



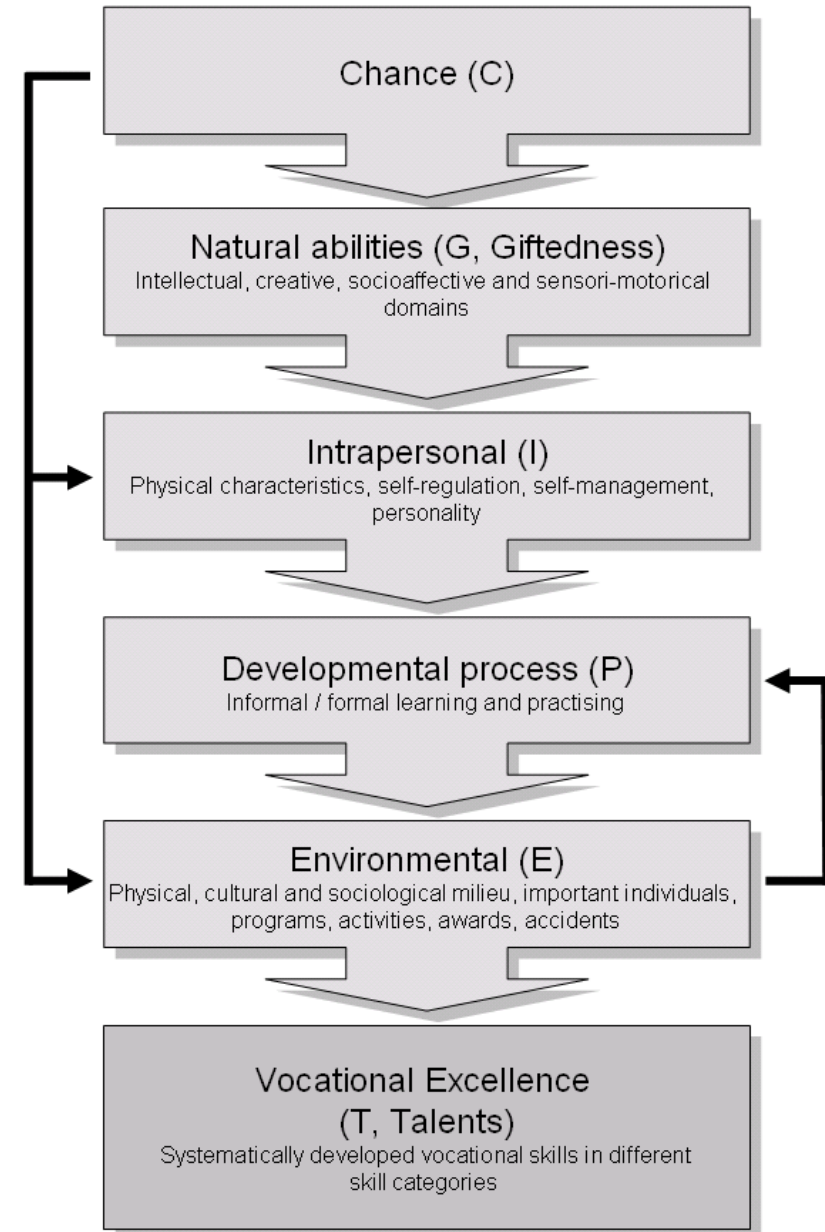
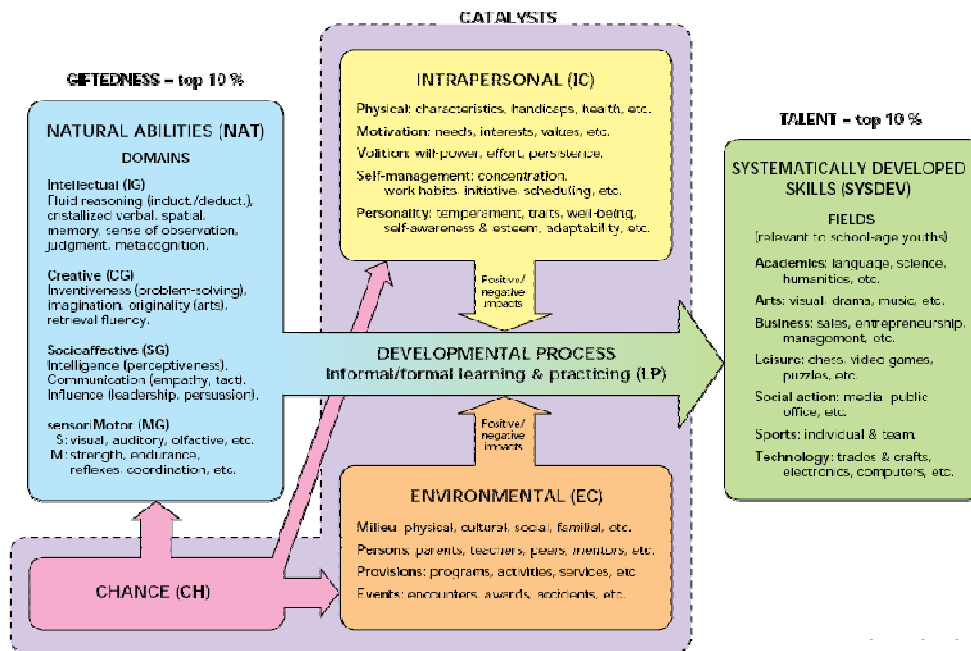
# Theoretical framework: Differentiated Model for Giftedness and Talent (DMGT) (Gagné, 2004)





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# Theoretical framework: Causal order of components in DMGT (Nokelainen & Ruohotie, 2009; Tirri & Nokelainen, in press)





## Method: Participants

### INTERVIEW

- Four Finnish WSC 2005 medalists and four WSC 2007 participants ( $n = 8$ ) were interviewed
  - Six males ( $M_{\text{age}} = 21$  years) and two females ( $M_{\text{age}} = 20$  years)

in addition to their trainers, working life representatives and parents ( $n = 22$ ).

- WSC participants in this study represent four skill categories, which are linked to the Multiple Intelligence theory (Gardner, 1983):
  - **IT/Software Applications** (logical-mathematical).
  - **Web Design** (spatial, logical-mathematical).
  - **Plumbing** (bodily-kinesthetic, spatial).
  - **Beauty Therapy** (interpersonal, bodily-kinesthetic, spatial).



## Method: Participants

### SURVEY

- Finnish Shitsuoka team ( $n = 25$ )
  - 16 males and nine females ( $M_{age} = 22$  years)and their parents ( $n = 12$ ) responded to surveys.
- WSC participants represent 20 skill categories, which are linked to the MI theory, for example:
  - **Landscaping** (environmental, bodily-kinesthetic, spatial).
  - **Floristry** (environmental, spatial).
  - **Polymechanics, IT/Software Applications** (logical-mathematical, spatial).
  - **Nursing, Beauty Therapy** (interpersonal, bodily-kinesthetic).



## Method: Instrument

### INTERVIEW

- Textual empirical data was collected in 2007 with a semi-structured interview.
- The interview concentrated on two major aspects:
  1. Influence of self-regulation and cognitive and social skills on talent development (Greenspan, Solomon & Gardner, 2004; Zimmerman, 1998).
  2. Importance of intrinsic and extrinsic motivation in initial participation to the training, perseverance and mastery of the skill (Bloom, 1985).



## Method: Instrument

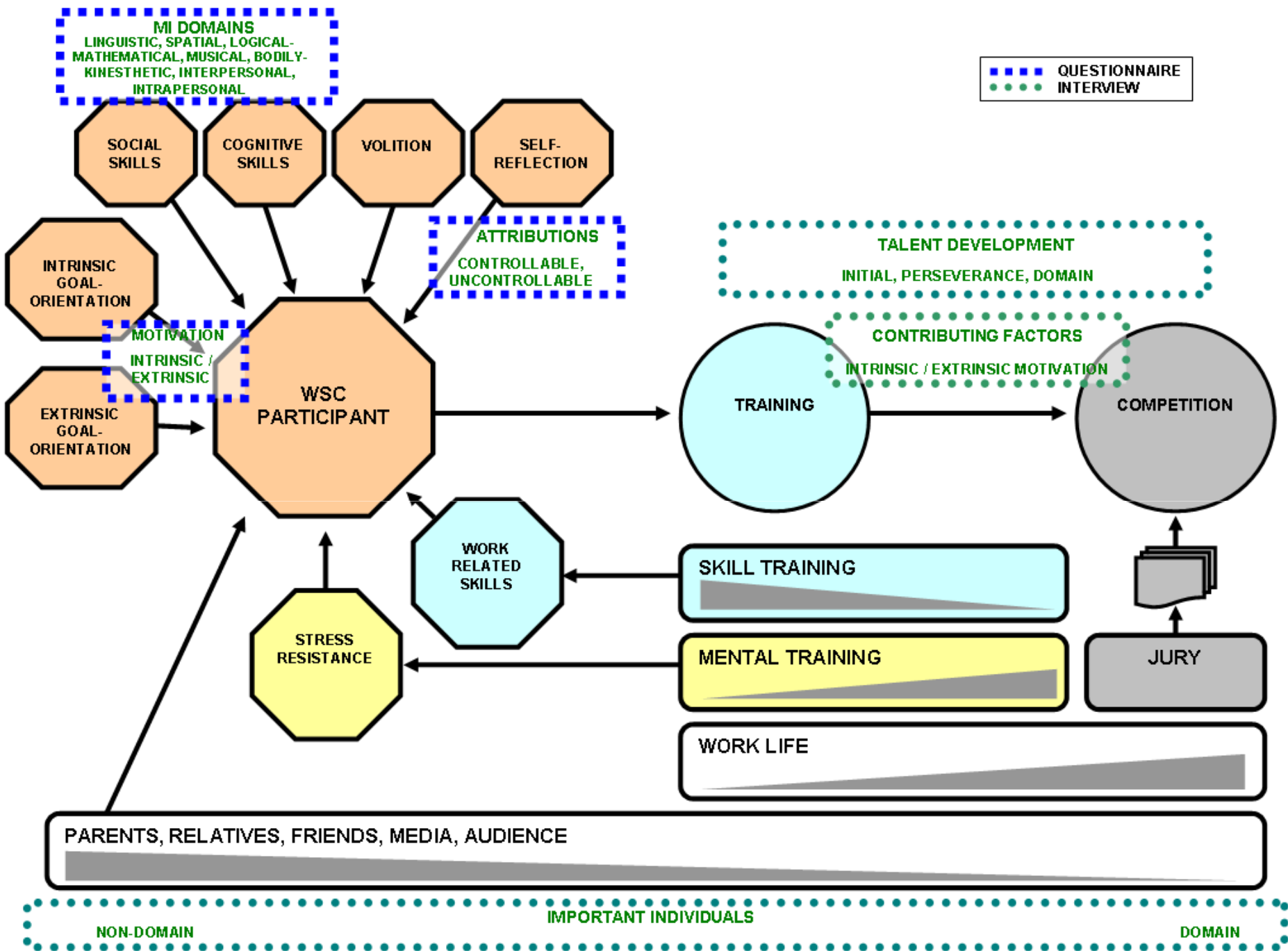
### SURVEY

- Numerical empirical data was collected in 2007 with the following self-rating instruments:
  - ***Multiple Intelligences Profiling Questionnaire*** (MIPQ III, Tirri, K., Komulainen, Nokelainen & Tirri, H., 2003; Tirri & Nokelainen, 2008).
  - ***Abilities for Professional Learning Questionnaire*** (APLQ, Nokelainen & Ruohotie, 2002).
  - ***Self-attitudes and Attributes Scales*** (SaaS, Campbell, 1996; Campbell, Tirri, Ruohotie & Walberg, 2004).
  - ***Family and School Influences Questionnaire*** (FA, SA, Campbell, 1996).



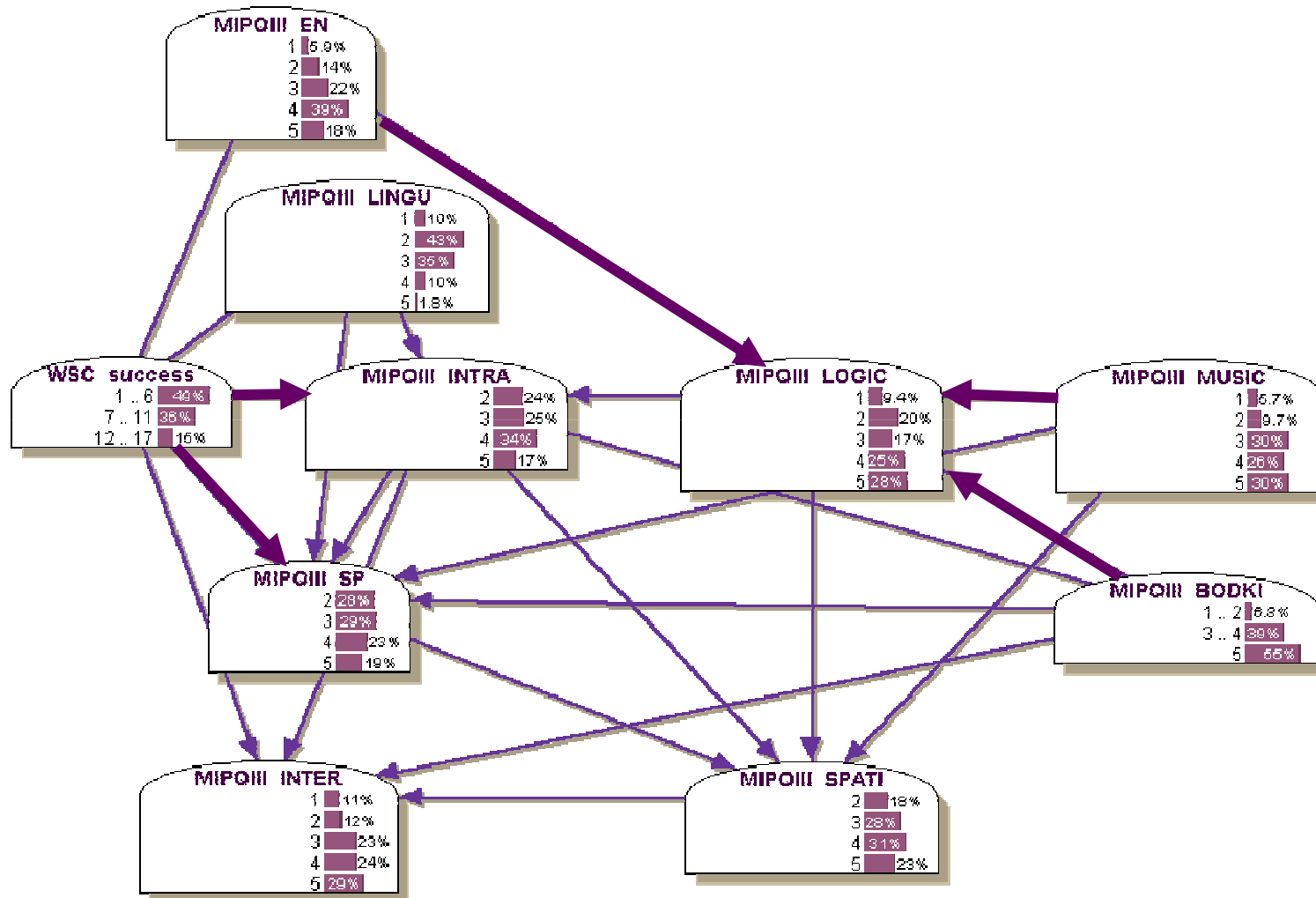
## Method: Design

- The measurement model is described in Figure 1.
  - The boxes that have a **green dotted borderline**, represent qualitative methods (semi-structured interview) that operationalize both the influence of non-domain and domain specific individuals and trainee's affective, conative, social and cognitive constructs in the model.
  - The boxes that have a **blue squared borderline**, represent quantitative methods (APLQ, SaaS and MIPQ surveys) that operationalize affective, conative, social and cognitive constructs in the model.





# Method: Statistical analyses





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## Results: Interview

**1. What characteristics typify a successful WSC participant?**

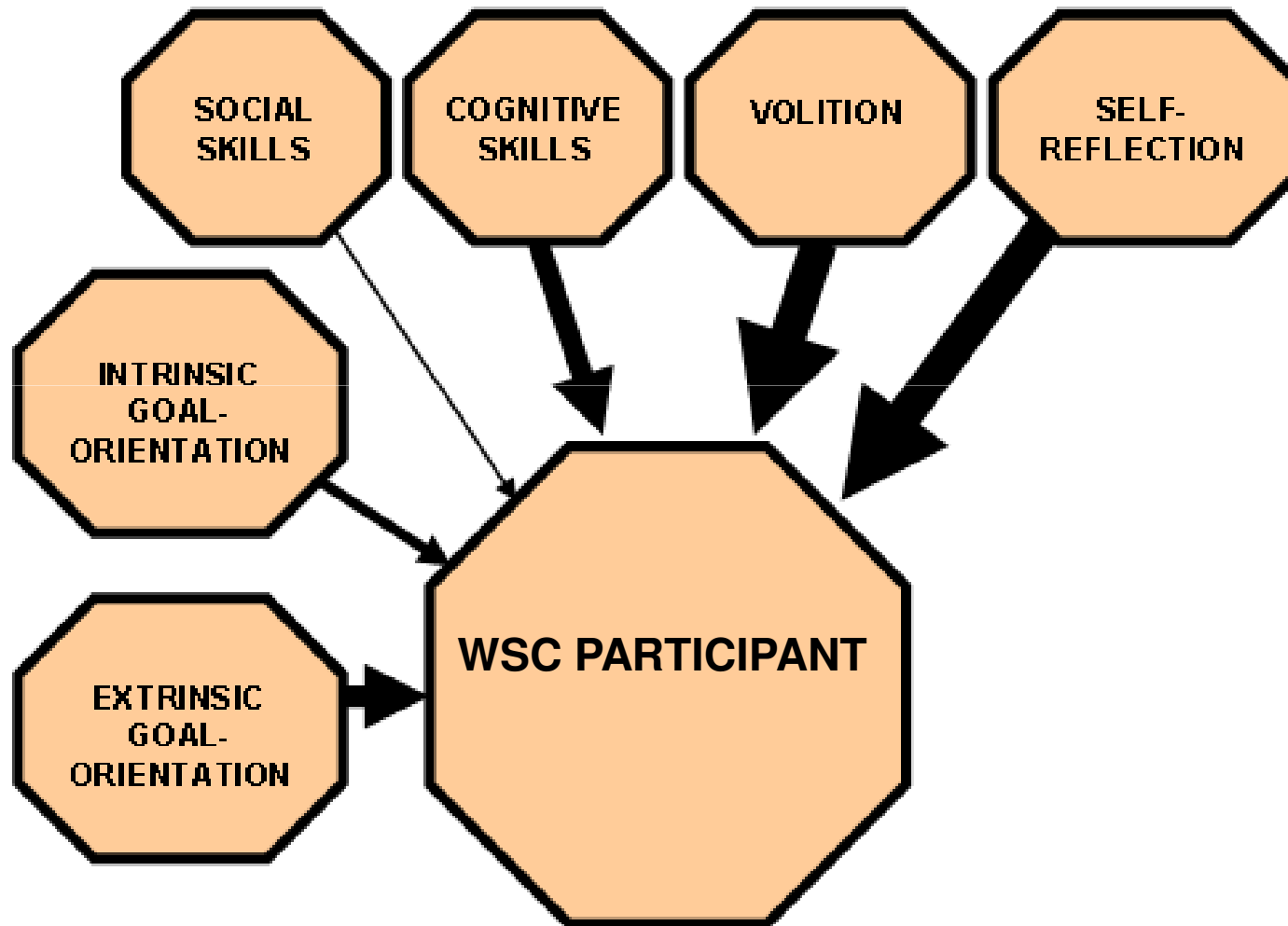


## Results: Interview

- 1. Self-reflection** (stress tolerance)
  - Mental training
- 2. Volition** (perseverance, time management skills)
  - Total mastery of work skills
- 3. Cognitive skills** (development potential)
  - Shift from uncontrollable to controllable attributions
- 4. Extrinsic goal-orientation** (competitiveness, ambition)
  - Promotion of advances of competitions for future career
- 5. Intrinsic goal-orientation** (interest towards work)
  - Meaningful training tasks, interesting artifacts, home/teacher support
- 6. Social skills**
  - Collaborative tasks during training



## Results: Interview





## Results: Interview

- Important role of self-regulation was theoretically expected, as it separates experts from workers (Day, Arthur & Gettman, 2001; Pillay, 1998; Ruohotie, 2004).
- Results are parallel to findings from US Olympic Champions research (Gould, Dieffenbach & Moffett, 2001) and international study of Academic Olympians in Mathematics, Physics and Chemistry (Campbell, Tirri, Ruohotie & Walberg, 2004; Heller & Lengfelder, 2000; Wu & Chen, 2001).
- Small role of social skills was an expected finding as the four skill categories (IT/Software Applications, Web Design, Plumbing, Beauty Therapy) involved individual competition tasks.



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## Results: Interview

**2. How the importance of WSC participants' characteristics differ during training period, competitions and working life?**



## Results: Interview

1. **Volitional characteristics** were found to be the most important in all three career stages.
2. **Cognitive skills** and **self-regulation** were equally important in all three career stages.
3. As expected, the role of **social skills** increased during the three stages.
  - As the role of social skills is important for career development, this is one possible development target for vocational schools/institutions.
4. Results showed **no difference between internal and external goal-orientations**.
  - It should be remembered that motivation is a prerequisite for volition.



## Results: Interview

### **3. What characteristics specify WSC participants'**

**a) initial interest towards the work field,**

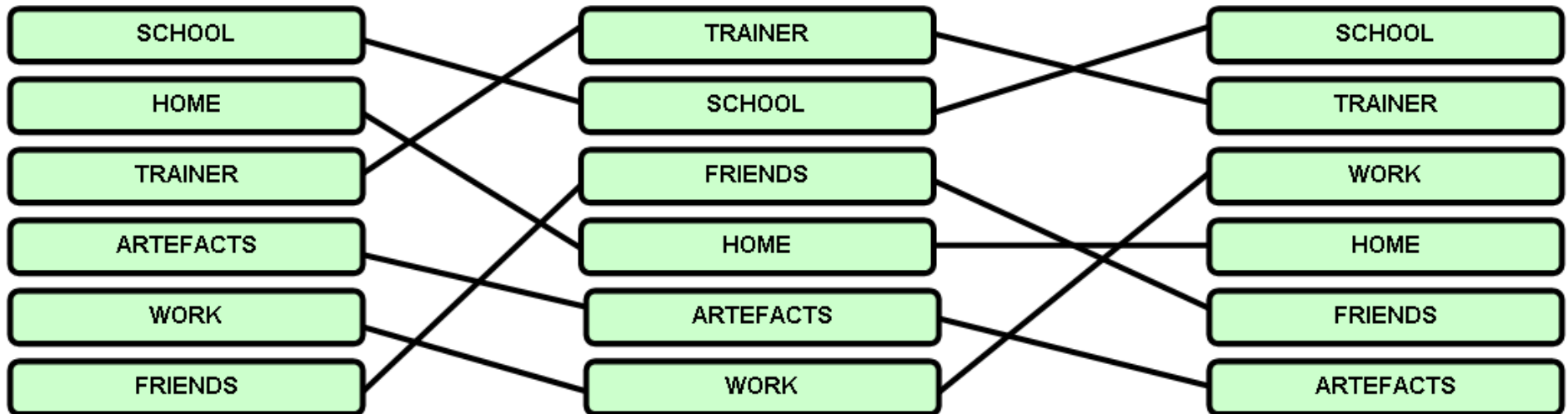
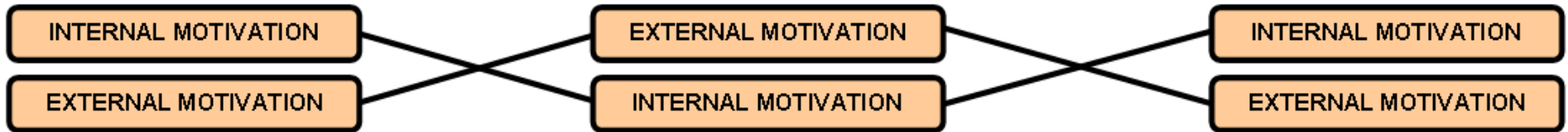
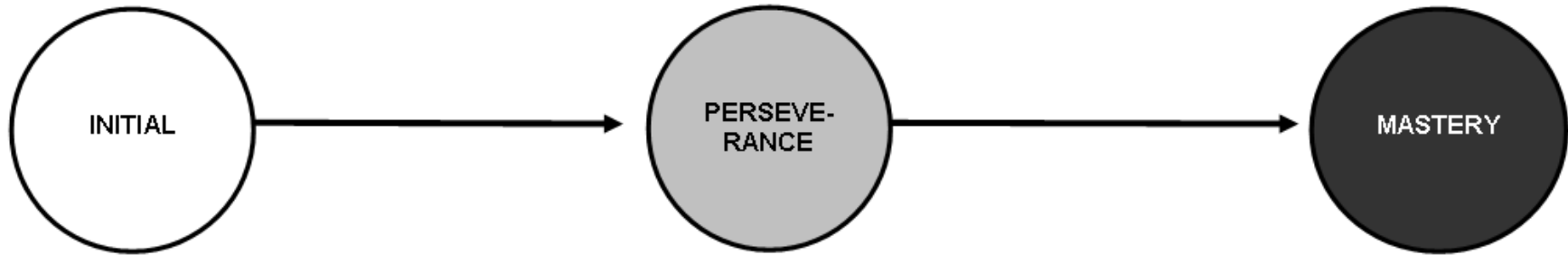
**b) perseverance in acquiring a vocational skill and**

**c) mastery of the skill?**



## Results: Interview

1. **Institutional and trainers' support** are important throughout the three skill acquisition stages.
2. **Intrinsic goal-orientation** is more important at the initial stage than **extrinsic goal-orientation**, but the roles change during training process (perseverance).
  - Theoretically plausible result.
3. **Importance of motivational aspects decrease towards the mastery level.**
  - International research has not been successful showing causal relationship between motivational aspects and learning outcomes.
4. **Future work security and possibilities** play an important role at the mastery level.
5. **Role of social skills** stay quite small and stable throughout the process.





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## Results: Interview

### 4. What characteristics specify WSC participants' employer?



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## Results: Interview

- 1. Challenging work tasks**
- 2. Freedom and responsibility**
- 3. Logical and fair leadership**
- 4. Acknowledgement of life long learning**
- 5. Competitive salary**



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## Results: Survey

### 5. Which intelligence areas, according to the MI theory, are the most essential to WSC participants? (MIPQ)

#### **Intelligences in MI theory:**

- (1) Linguistic,
- (2) Logical-mathematical,
- (3) Musical,
- (4) Spatial,
- (5) Bodily-kinesthetic,
- (6) Interpersonal,
- (7) Intrapersonal,
- (8) Spiritual,
- (9) Environmental.



## Results: Survey

- 1. Bodily-kinesthetic intelligence**
- 2. Interpersonal intelligence**
- 3. Mathematical-logical intelligence**
- 4. Environmental intelligence**
- 5. Spatial intelligence**
- 6. Intrapersonal intelligence**

**Where the 'A' group differs from the 'C' group:**

- 1. Intrapersonal intelligence ('A' higher)**
- 2. Spiritual intelligence ('A' higher)**
- 3. Environmental intelligence ('A' higher)**
- 4. Interpersonal intelligence ('A' higher)**



## Results: Survey

### 6. What are the WSC participants' most essential motivational factors? (APLQ, SaaS)

#### **Motivational factors:**

- (1) Intrinsic goal orientation,
- (2) Extrinsic goal orientation,
- (3) Meaningfulness of studies,
- (4) Control beliefs,
- (5) Self-efficacy,
- (6) Test anxiety.

#### **Attributional factors:**

- (1) Success due effort,
- (2) Success due ability,
- (3) Failure due effort,
- (4) Failure due ability.



## Results: Survey

1. **Intrinsic goal orientation** (deep level learning)

2. **Control beliefs** (success due effort)

- Inquiry –based learning, authentic learning tasks

- In addition, '**A**' group of Finnish WSC participants differed from '**C**' group as they possessed higher internal goal orientation and they believed more in hard trying (effort) than ability.



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## Results: Survey

**7. What is the influence of home and school atmosphere to the development of vocational expertise?  
(FA, SA)**



## Results: Survey

1. **Home and school atmospheres are equally important** for the development of vocational talent.
  2. **Very few negative experiences** were reported.
- Teacher/trainer/mentor has an important role in supporting WSC participants talent development process:
    - **Predictive modeling showed a positive relationship between supportive home/school atmosphere and success in World Skills competition.**



## Outline

- "Modeling of Vocational Excellence" (MoVE, 2007 – 2009)
  - Background
  - Results (interview and survey)
- "Actualizing Vocational Excellence" (AVE, 2009 – 2011)
  - Background
  - Initial results (survey)



## Current research

- **”Actualizing Vocational Excellence”** (AVE, 2009 – 2011) project is funded by the Finnish Ministry of Education.
- Major goals are
  - to extend the MoVE study to cover **10-12 WSC competition areas** (both analyzed with qualitative and quantitative methods)
  - to study **life management** and **work ethics** together with participant’s level of **innovativeness** and **entrepreneurship**
  - to investigate **WSC competitors success in working life**
    - **control group** is included for all abovementioned areas



## Research questions

- Interview
  1. What **characteristics** typify WSC participants?
  2. What **life management skills** typify WSC participants?
  3. What is the level of **moral thinking (work ethics)** of WSC participants?
  4. What is the level of **innovativeness** and **entrepreneurship** of WSC participants?



## Research questions

- Interview
  5. How the importance of WSC participants' **characteristics differ during training period, competitions and working life?**
  6. What characteristics specify WSC participants' **initial interest towards the work field, perseverance in acquiring a vocational skill and mastery of the skill?**
  7. What characteristics specify WSC participants' **employer?**
  8. How WSC participants' know-how meets the **expectations of working life** and how their **potential is actualized?**



## Research questions

- Survey

9. What are the WSC participants' most essential **intelligence areas**? (MIPQ III)

10. What are the WSC participants' most essential **motivational factors**? (APLQ, PALS)

11. What are the WSC participants' most essential **life management skills**? (CMSRVE)

12. What are the WSC participants' most essential **ethical sensitivity skills**? (MOJVE)

13. What is the **influence of home and school atmosphere** to the development of vocational expertise?



# Design

	Interview	Survey	
<b>RQ 1</b>	x	x (Survey 6)	Characteristics
<b>RQ 2 (RQ 11)</b>	x	x (Survey 10*)	Life management
<b>RQ 3 (RQ 12)</b>	x	x (Survey 3)	Work ethics
<b>RQ 4</b>	x	x (Survey 5)	Innovativeness and Entrepreneurship
<b>RQ 5</b>	x		Training, Competition and Working life
<b>RQ 6 (RQ 13)</b>	x	x (Survey 4)	Background factors
<b>RQ 7</b>	x		Employer characteristics
<b>RQ 8</b>	x		Working life competencies
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<b>RQ 9</b>		x (Survey 2)	Multiple intelligences
<b>RQ 10</b>		x (Surveys 7 & 8)	Motivation
<b>RQ 11</b>	x	- (Survey 10*)	<i>Life management</i>
<b>RQ 12</b>	x	x (Survey 3)	<i>Work ethics</i>
<b>RQ 13</b>	x	x (Survey 4)	<i>Background factors</i>

\* To be completed in 2010



## Current phase of the AVE project

### Interview

- 14 interviews conducted, analysis in progress.
  - 2009 Calgary participants ( $n=6$ ), trainers ( $n=4$ ) and experts ( $n=4$ ).
- 15 interviews in progress.
  - Finnish WSC medalists who have more than two year work experience after the competition.
    - Six gold, one silver and nine bronze medals from Helsinki 2005 and Shizuoka 2007 competitions.
  - Control group (similar age and work experience, no WSC training).
  - WSC medalist's employers.



## Current phase of the AVE project

### Survey

- 41 Calgary team members responded to a survey in 2009.
  - Age mean 20.2 years and standard deviation 1.47 years.
  - 29 (70.7%) males and 12 (29.3%) females.
  - Some parts of the survey are comparable to earlier presented Shizuoka 2007 team survey ( $N=23$ ).
- Control group survey is in progress.



## Initial survey results

- **Success in middle school does not predict vocational skill competition success.**
  - Negative correlation was found between middle school math, native language, first foreign language, religion, music and handicraft marks and skill competition success.
  - Only exception was a zero correlation with middle school sports mark.
  - The finding is plausible as those subject domains are general, not specific to vocational skills.



## Initial survey results

- **Success in vocational studies predict vocational skill competition success.**
  - Positive correlation ( $r = .41$ ) was found between vocational school average mark and skill competition success.
  - Controlling for age or gender did not change the result.
  - If skills needed in competitions represent real working life skills, one may further (prudently) conclude that success in vocational studies is a good measure of initial working life skills.
    - Limitations: Small and highly selective sample (only top grades from vocational studies), difference between competition and working life skills.



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## Initial survey results

### 9. What are the WSC participants' most essential intelligence areas?

#### **Multiple Intelligences theory:**

- (1) Linguistic,
- (2) Logical-mathematical,
- (3) Musical,
- (4) Spatial,
- (5) Bodily-kinesthetic,
- (6) Interpersonal,
- (7) Intrapersonal,
- (8) Spiritual,
- (9) Environmental.



## Initial survey results

### 1. Bodily-kinesthetic intelligence

- Dominant in most skill areas, important in all skill areas.

### 2. Mathematical-logical intelligence

### 3. Spatial intelligence

### 4. Intrapersonal intelligence

**Where the 'A' group differs from the 'C' group:**

#### 1. Linguistic intelligence ('A' higher)

Strong positive correlation with competition success ( $r = .42$ ).

#### 2. Interpersonal intelligence ('A' higher)

Weak positive correlation with competition success ( $r = .17$ ).



## Initial survey results

### 6. What are the WSC participants' most essential motivational factors? (APLQ, PALS)

#### **Motivational factors:**

- (1) Internal goal orientation,
- (2) External goal orientation,
- (3) Meaningfulness of studies,
- (4) Control beliefs,
- (5) Self-efficacy,
- (6) Test anxiety.

#### **Patterns of Adaptive Learning Scales:**

- (1) Mastery Goal Orientation,
- (2) Performance-Approach Goal Orientation,
- (3) Performance-Avoidance Goal Orientation.



## Initial survey results

1. **Meaningfulness of studies** (studies will benefit future work career)
2. **Extrinsic goal orientation** (need for positive feedback from others, ambition)
3. **Intrinsic goal orientation** (mastery of the skill is a satisfying experience)
4. **Efficacy beliefs** (success due ability)
5. **Control beliefs** (success due effort)



## Initial survey results

**Where the 'A' group differs from the 'C' group\*:**

**1. All motivational factors, except test anxiety, were higher in the 'A' group.**

Small positive correlations (from .11 to .26) with competition success, except with intrinsic motivation ( $r = -.08$ ) and test anxiety ( $r = .24$ ).

**2. Test anxiety was higher in the 'C' group.**

\* Combined sample of Shizuoka and Calgary,  $N = 64$



## Initial survey results

- 1. Mastery Goal Orientation** (development of competence is important, learning is interesting, focus is on the task)
- 2. Performance-Approach Goal Orientation** (show others, focus is on the self)
- 3. Performance-Avoidance Goal Orientation** (avoidance of embarrassment, focus is on the self)

**Where the 'A' group differs from the 'C' group:**

- 1. The 'A' group was more mastery and performance-approach oriented than the 'C' group.**
- 2. The 'C' group was clearly more performance-avoidance oriented than the 'A' group.**



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# Thank you!

For more information, please contact:

- [petri.nokelainen@uta.fi](mailto:petri.nokelainen@uta.fi)
  - **MoVE –project** (2007 – 2008)  
<http://www.uta.fi/aktkk/projects/move>
  - **AVE –project** (2009 – 2011)  
<http://www.uta.fi/aktkk/projects/ave>



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