

Metacognitive Awareness and Personal Characteristics of Students: A Case of Estonia

Hannes Ling, Innar Liiv, Martin Toding, Urve Venesaar

Tallinn School of Economics and Business Administration,
Tallinn University of Technology

Corresponding author: Hannes Ling, email: hannesling@smail.ee

Abstract

Entrepreneurship education has acquired a great importance in higher education for the development of entrepreneurial thinking, acquiring knowledge and skills for the development of entrepreneurial initiative among students. However, there is a need to study more profoundly the input as well as outcome of entrepreneurship training courses, especially concerning the assessment and improvement of training courses for making them more effective. The purpose of this article is to investigate how the courses on entrepreneurship are influencing students' metacognitive awareness and whether different personal characteristics of students are connected with and influencing the development of their metacognitive abilities. The article is based on the survey carried out by using students' psychological profile questionnaire and additional metacognitive awareness questionnaire. The results of study have been analysed by the tools of linear statistical analysis and clustering methodologies.

The results indicate that entrepreneurial mindset and metacognitive awareness are most developed among students presenting higher level of self-confidence, aspiration towards independence and risk-taking propensity, i.e. enterprising students. On the basis of the results of survey it is possible to make a conclusion that in order to increase students' metacognitive awareness the content of courses and teaching methods are important aspects to consider for students with different personal characteristics.

Introduction

Entrepreneurship has been considered as a source of growth and competitiveness. Fostering entrepreneurship among students has become an important topic for universities and governments. As a research subject the entrepreneurial mindset is a complex construct which connects to a variety of different fields like education, business administration and cognitive psychology.

The field of cognitive psychology and metacognitive awareness is getting rapidly increasing attention in the scientific discussions in the context of entrepreneurship. Metacognition has been defined to be "the ability to reflect upon, understand, and control one's learning"(Schraw, 1998). In their study Mitchell et al propose that metacognitive thinking can be deliberately practiced in an entrepreneurial context. Further, they suggest such metacognitive thinking will lead to creation of entrepreneurial expertise by facilitating the self-reflection, understanding and control of one's own entrepreneurial cognitions. (Mitchell, et al. 2005). In addition it can be said that metacognition plays a role in how people adapt to their developing and changing circumstances which are present in any entrepreneurial processes (Haynie, Gregorie & Shepherd 2004, 2; Haynie & Shepherd, 2007). Moreover, findings of the studies by Haynie and Shepherd suggest that cognitive adaptability is important in an entrepreneurial context, and that metacognition does promote cognitive adaptability and thus improve performance on an entrepreneurial task. In the context of entrepreneurial training of students it would be appropriate to ask also whether the development of metacognition could be promoted by learning and acquiring of new knowledge in the settings of educational institution.

Personal traits play an important role in the frame of developing the metacognitive abilities which influence significantly the learning outcomes. Findings of Vermetten, Lodewijks & Vermunt suggest that deep (metacognitive) learning is associated with a tendency to self-

regulate (Vermetten, Lodewijks & Vermunt 2001). Metacognitive learning is considered to involve the ability to constantly ask yourself questions during the learning process about the goals and optional ways for achieving the target and the progress made. This is in correlation also with findings suggesting that personal interest is an important motivational component of self-regulated learning and metacognitive abilities (McWhaw & Abrami 2001). The lower the level of personal interest of an individual is toward the learning outcome, the more difficult it is to make a deeper impact to a persons knowledgebase. The relations between personality traits and metacognitive abilities are even further exposed by studies of Kleitman & Stankov (2007) who established the strong correlation between persons self-confidence and metacognitive abilities. However, there is a shortage of empirical evidence to justify this claim.

The purpose of this research is to explore Estonian students' metacognitive awareness in the frame of entrepreneurial profile (i.e. demographic characteristics; personal traits). The article is based on the survey carried out in the Tallinn University of Technology which included both students psychological profile questionnaire and additional metacognitive awareness questionnaire. The latter questionnaire covers 5 domains of metacognitive awareness as goal orientation, metacognitive knowledge, metacognitive experience, metacognitive choice and monitoring. This provides a rich datasets for analysis of the changes in students metacognitive awareness in the frame of their entrepreneurial profile. The current paper seeks to investigate whether self-confidence, aspiration towards independence and readiness to take risks are connected with and influencing the development of metacognitive abilities of students. As a result of the analysis it will be useful to find out about how to teach entrepreneurship with the purposes of increasing students' metacognitive awareness. The results of study have been analysed by the tools of linear statistical analysis and clustering methodologies.

The main research questions are:

- 1) What is the influence of entrepreneurship education training courses to the metacognitive awareness of students?
- 2) Whether and how the metacognitive awareness is connected with students' personality traits?

In the structure of the article next the theoretical framework is included on the issues of metacognitive awareness and self-regulation as well as on entrepreneurial personality traits and their connection with metacognition vased on previous studies in the field. After that data and methods of analysis are covered. Following this, the results of the study are presented. And finally, the article ends with short conclusion.

1. Theoretical Framework

1.1. Metacognitive awareness and self-regulation

Several studies have tried to fill in the gaps in entrepreneurship research by focusing on the role of metacognition in training, self-regulated learning and self-regulatory skills (Haynie, Gregorie & Shepherd; 2004; Haynie & Shepherd, 2007; Bryant, 2006; Ramocki 2007). It has been stated that almost anyone capable to perform a skill is also capable of metacognition, ie thinking about how they perform that skill (Schraw, 1998) or 'thinking about thinking'(Jost, Kruglanski, & Nelson, 1998). It has been also widely acknowledged that metacognition plays a significant role in success or failure and in how people adapt to their changing circumstances in an unstable entrepreneurial environment The underlying assumption of the

research related to metacognitive abilities is that some individuals are more likely to start a business, no matter what difficulties they might encounter. Success at getting into business would not take place only due to the amount of time and effort devoted to entrepreneurial activities – both successful and unsuccessful potential entrepreneurs are likely to be able to extract these resources equally. Furthermore, the findings indicate that individuals who are engaging in metacognitive activities in a larger extent than others do not necessarily work more or longer, but spend the given time more effectively (Schmidt & Ford, 2003). In parallel it has been found that metacognitive training has a positive impact on decision-making skills which on its behalf are one of the critical ones for every entrepreneur (Batha & Carroll, 2007). Moreover, findings suggest that metacognitive abilities can be improved by learning, thus enhancing the adaptability and improving the entrepreneurial performance (Haynie, Gregorie & Shepherd 2004; Haynie & Shepherd, 2007). This is supported also by the research of Mitchell et al (2005) suggesting that metacognitive thinking will lead to creation of additional entrepreneurial expertise. Nevertheless, metacognition is not a unified construct.

Previous research has shown that most theories of metacognition (Nelson & Narens, 1994; Schraw & Dennison, 1994; Schraw & Moshman, 1995) distinguish between knowledge of cognition (i.e., knowledge about one's own cognitive processes or capabilities, as well as knowledge about how, when, and why to use strategies and allocate cognitive resources), and regulation of cognition (i.e., the control aspect of learning). In this context there are three processes of metacognitive regulation typically posited (Schraw & Moshman, 1995; Schraw et al., 1995): (1) Planning, which refers to the selection of appropriate strategies and allocation of cognitive resources before the task; (2) Monitoring, which refers to the awareness of understanding and performance during the task; and (3) Evaluation, which refers to the appraisal of performance after task. This division of metacognitive processes corresponds with findings of Haynie (in Hisrich, Peters & Shepherd, 2007) who makes a distinction between five aspects as goal orientation, metacognitive knowledge, metacognitive experience, metacognitive choice and monitoring.

Schraw has argued that promoting metacognition begins with building an awareness that metacognition exists and increases the success (Schraw, 1998). Furthermore, it has been found that when both entrepreneurs and persons with high task-mastery skills present higher level of metacognitive awareness it is supporting the desired or optimal outcomes of their respective actions (Vrugt & Oort, 2008; Haynie et al., 2010). This is supported by findings of Bowman, Markham, & Roberts (2001) who indicate that metacognition refers to one's awareness of one's own cognitive processes. They argue that metacognition is an assessment of one's own ability, knowledge, and understanding of task-relevant factors and has wide implications for both educational and industrial/organizational settings. Pintrich (2002) on its behalf argues that metacognitive knowledge involves knowledge about cognition in general, as well as awareness of and knowledge about one's own cognition. This allows a person to monitor the development and to make appropriate and timely corrections in the processes in own mind. Moreover, students who are unaware that they lack certain abilities or factual or procedural knowledge are unlikely to make sufficient effort to acquire or construct new knowledge (Ibabe, 2010). This would allow to suggest that for the students who present lower metacognitive abilities (ie the ones not aware of their own reasoning patterns) than others after the training course it might be at some level related with inability of educational program to fully correspond with their needs. Although the outcomes of trainings depend also on the amount of value the participants personally put into it, there could exist a good possibility to make a lasting impact with cultivating the positive mindset towards entrepreneurship.

Will to act under the provided circumstances, to assess them, make decisions, plan the following steps and to realize them for pursuing towards the goals are all dependent on goal-setting skills. It could be even said that it is one of the core skills of an entrepreneur. Fortunato&Goldblatt (2006) argue that there exists a dimension as learning goal orientation. Based on this the individuals who are actively involved in metacognitive exercises score high on achievement orientation, generalized self-efficacy, motivation to learn, positive emotionality, and positive self-perceptions. But research indicates also the connection between goal-orientation and metacognition in the frame of mastery goals and self-reported use of metacognitive strategies over time. For example findings of Pintrich (2000) establish that higher mastery in goal orientation correlates with higher self-regulation of cognition. Furthermore, Vandewalle (2001) argues that the individuals with a strong learning goal orientation are more interested in developing their skills and abilities, believe that such development is possible, and approach situations with a sense of high self-efficacy. Based on this it could be proposed that increased levels of skills, abilities, belief into oneself and situational awareness are at some level the predictors of presence of higher levels of metacognitive awareness. By agreeing with this one could also agree that cognitive adaptability (affected by the learning process) supports the willingness to stretch oneself to meet the challenging goals and to seek opportunities that foster personal growth. Research of Godshalk&Sosik (2003) adds to this discussion by arguing that persons having high levels of learning goal orientation are associated with the highest levels of psychosocial support and report higher levels of career development, managerial aspirations and career satisfaction when compared to the ones with low levels of learning goal orientation.

1.2. Entrepreneurial personality traits and their connection with metacognitive awareness

The literature on entrepreneurial characteristics has included a number of variables that address psychological attributes, personality, attitudes, and behavior. Many authors explain the entrepreneurial profile of the person through creativity, locus of control, self-efficacy, self-confidence, self-independence and risk-taking. Hisrich and Peters (1989) focus on three personal characteristics, namely self-confidence, aspiration towards independence and readiness to take risks. This article focuses on these three personal traits and their relationship with enterprising and metacognitive awareness.

Knight and Bandura (1994) discussed the concept of self-confidence. At present, there is considerable information about the relationship between self-confidence and cognitive abilities (Stankov, 1998; 1999; Stankov & Crawford, 1996, 1997; Stanovich, 1999). Something is also known about its relationship to personality (Pallier et al., 2002). Self-confidence is sometimes treated as a personality trait, either on its own or as an underlying facet of broader traits (see Blais, Thompson, & Baranski, 2005, for a review). Moreover, Blais et al. (2005) have demonstrated that a broad range of cognitive styles, including *need for cognition* and *desire for structure*, had no effect on confidence (Kleitman, Stankov 2007). Importantly, the evidence for the meaningful relationship between self-confidence and some conceptually related constructs is scarce. In theory, confidence judgements reflect an important aspect of metacognitive processes (Stankov, 1999, cited in Kleitman, Stankov 2007).

By Kronenberg's research entrepreneur's self-independence is related with the values of entrepreneurship such as: freedom, freedom of decision, individual responsibility, responsibility and working independently. Work Independently is linked to Freedom of Decisions and describes the advantage of a self-employment in terms of not being dependent

from others. (Kronenberg 2011). However, Segal, Borgia & Schoenfeld (2005) are believing that people may be motivated to become entrepreneurs if they believe self-employment is more likely than working for others to lead to valued outcomes. People with a sense of entrepreneurial self-efficacy may be drawn to self-employment's desirable opportunities and benefits, compared to the availability of these benefits obtained through working for others (Segal, et al 2005). By option of Metaal people with a strong need for autonomy insist on not being dominated by other persons, avoid influence from others, and show impulsive, obnoxious, and irresponsible behavior (Metaal, 1992, cited in Gelderen, Jansen and Jonges 2003).

Both economic theory and every-day observation suggest that risk-taking or risk-propensity are important aspects of running a business. Mill (1848/1984) described the entrepreneur as a risktaker and captain of enterprise, and emphasized risk-taking as a feature differentiating an entrepreneur from a manager. Similarly, risk is a business factor that is widely assumed in economic theory to be a source of entrepreneurial profit (Tyszka at al 2011). Macko and Tyszka (2009), in their research on entrepreneurial risk-taking, found that in well-defined (laboratory) risky situations entrepreneurs were not more risk-prone than non-entrepreneurs. However, in naturalistic-business risky situations they found more risky choices among entrepreneurs than among non-entrepreneurs. They concluded this study with the assertion that perhaps, like most humans, entrepreneurs try to avoid risks. Furthermore, entrepreneurs have to deal with risky situations (they simply face them), so they cannot avoid undertaking risky activities in business (e.g., investing, taking out credit, etc.). In addition, according to the previous research the Estonia people are rather risk-evasive when planning the business and investment (Estonian Institute of Economic Research, 2004). The same result was found in the survey among students (Venesaar et al, 2006).

2. Data and method

The empirical study was carried out among the bachelor and master study students of technical specialities of Tallinn University of Technology, who were asked to give self-valuation to personal traits connected with entrepreneurship and to metacognitive awareness. In three academic years (2008-2010) the students who had taken the subject of entrepreneurship and business planning, were asked to evaluate their personal traits and on the first or second lecture according to the questions of the tests given, and to assess their metacognitive awareness. The purpose of the course was to introduce participants with the concept of an entrepreneurial mindset and widen the horizon of the respective knowledge among students. The content of the course in entrepreneurship and business planning included lectures and exercises, solving teaching cases and writing business plans. It lasted throughout the whole semester (i.e. total 16 weeks and 48 hours). 280 students of different specialities were participated in the study, mainly on the specialities of logistics, natural sciences and technical sciences. Assemblage of the sample of the three years allows making generalizations of the results of the analysis with a higher probability.

In order to collect the necessary data samples, participants were asked to fill out a questionnaire about cognitive adaptability. It was originally developed by Haynie (in Hisrich, Peters & Shepherd, 2007) as a "generalized measure of adaptive cognition". The questionnaire included 35 different statements and it was asked to be filled out both at the beginning and immediately at the end of the training courses. The statements covered five distinctive areas; such as goal orientation, metacognitive knowledge, metacognitive experience, metacognitive choice and monitoring. This original questionnaire was translated into Estonian in order to avoid the possibility to get false readings due to possible

misunderstanding of the text. For measuring the respective ratings a 10-step Likert Scale was introduced. Respondents were asked to answer the statements by rating each of them on the provided scale of 1 to 10, based on their own judgment where: 1 being equal to "Not very much like me" and 10 being equal to "Very much like me"

To evaluate students' personal traits, the so-called entrepreneur's psychological portrait test was used (authors Hisrich and Peters, 1993), in which the questions were directed to making certain behavioural choices and where it was possible to give „yes” and „no” answers. The results of the analysis brought out in the article are mainly based on the methodology of the test's authors. The questions have been divided into two parts – „yes”-answer to one group of the questions confirming those personal traits (self-confidence, aspiration towards independence, readiness to take risks), can give the evaluation that the person has good prerequisites of becoming an entrepreneur; a certain number of „yes”-answers to the questions of the second group characterizing the opposite personal traits (dependence on external influences, non-aspiration towards independence and risk-evasiveness) indicates the case that the respondent should very carefully observe himself and plan an action programme to develop entrepreneurial personal traits. The authors of the current article presumed that in the first case an evaluation of the person having good prerequisites of becoming an entrepreneur can be given and in the second case, they presume that the person has poor prerequisites of becoming an entrepreneur.

Then, the questions of the psychological test have been grouped to express the personal traits of an entrepreneur (self-confidence, aspiration towards independence, readiness to take risks). The authors of the article divided all the entrepreneur's psychological portrait test's questions into six groups according to vision of the authors of the test. The database earlier consisting of 22 questions (traits) became a database of 6 groups (traits) with files of the test as horizontal lines and the abovementioned 6 groups (traits) as columns. In case of each group the authors of the article counted the „yes”-answers. The questions-answers of the first group (R1) show if the respondent is dependent on external influences which can interfere with becoming an independent entrepreneur. The orientation of the questions of the second group (R2) is to determine if the respondent's inner will to achieve success and victory is more powerful than the aspiration to subordinate to a strange will. The „yes”-answers to the questions of the third group (R3) give evidence to the respondent not particularly aspiring towards independence; the „yes”-answers to the questions of fourth group (R4) give evidence to the contrary. The purpose of the questions of the fifth group (R5) is to examine the respondent's readiness to take risks, the „yes”-answers to the questions of the sixth group (R6) give evidence to the opposite.

Research design has been centered on a questionnaire developed to measure metacognitive awareness. In order to find evidence a frequency analysis has been utilized to evaluate the answers given to the respective statements. This provides the statistical properties (specifically mean and standard deviation, StDev) for each statement asked, as far as the distribution of the datapoints on the Likert scale is concerned. Additionally, analyzing these results gives an opportunity to assess whether they could be dominated by certain values or not. As a second step in the analysis of statistical properties it was designed to look at the difference of means before and after the course. This would allow extracting an indication about the impact of a training course. The basis for analysis is metacognitive awareness of students before the course. On the basis of clusters formed the changes in metacognitive awareness were assessed also after the course. And also, the profile of students were analysed according to the clusters formed.

In order to analyse the results of the questionnaire of cognitive adaptability cluster analysis has been used, the idea of which is that objects are columned into clusters (groups) in a way that one cluster consists of objects as similar as possible and they would clearly distinguish from the objects in other clusters. In order to get the first insights from the data, the agglomerative complete-linkage hierarchical clustering procedure (Hall *et al.*, 2009) was used to visualize all the respondents using a dendrogram. The cluster analysis was carried out also using *K-means* method (MacQueen, 1967), in case of which the number of clusters *k* has to be defined first – according to the information gained from the theoretical background, the results of hierarchical clustering and considering the within cluster sum of squared errors, the objects were divided into five groups. K-means is a combinatorial data analysis partitioning clustering method, where the objective function is to maximize the intra-cluster similarity and minimize the inter-cluster similarity. Similarity function for this research was chosen to be Euclidean distance, which was compatible with Likert scale. As a result of cluster analysis, each respondent was assigned to a group of similar students. The information about that cluster was added as a new attribute to every person in a database, allowing to perform a follow-up analysis of every such an object or cluster.

3. Results

3.1. Metacognitive awareness of students

In the current study the level of metacognitive awareness of students has been identified based on the Haynie's cognitive adaptability questionnaire (Annex1). In order to present the evidences the linear statistical analysis has been utilised in the frame of mean values and standard deviations of each 5 metacognitive categories (Table1). The total mean values (column2) retrieved before the training course indicates that the participants rated the level of all their metacognitive abilities quite high (more than 6 points on 10-step scale). This allows to draw an assumption that on average the students were (based on their own judgements) already before the training course significantly aware of their thinking and reasoning patterns. However, when looking at this more closely it is evident that skills related to goal orientation and metacognitive knowledge received higher ratings than others. At the same time the skills related to the abilities of choosing between multiply options (the category "metacognitive choice") received the lowest ranking on average. Furthermore, when looking at the results after the training (column2) it is evident that the ratings have increased in all metacognitive categories (ie all the ratings are above 7 points). The fact that metacognitive abilities have increased after the training, supports the findings of Haynie et al (2004; 2007) which posited that learning has significant impact to metacognitive abilities and it enhances the performance.

Table 1. Average scores of students ratings before and after the training course on entrepreneurship education

	Total		Logistics		Natural Sciences		Technical Sciences	
	Mean	StDev	Mean	StDev	Mean	StDev	Mean	StDev
1	2	3	4	5	6	7	8	9
Before the training								
Goal Orientation	7.6	1.342	7.7	1.293	7.5	1.511	7.6	1.221
Metacognitive knowledge	7.5	.960	7.6	.808	7.5	.960	7.4	1.113

Metacognitive experience	7.3	1.121	7.5	.927	7.1	1.180	7.2	1.255
Metacognitive choice	6.8	1.400	6.9	1.198	6.6	1.491	6.9	1.510
Monitoring	7.1	1.212	6.9	1.118	7.0	1.182	7.2	1.335
After the training								
Goal Orientation	7.9	1.100	8.0	1.008	7.7	1.267	8.0	1.026
Metacognitive knowledge	7.8	.907	7.9	.888	7.7	.943	7.7	.890
Metacognitive experience	7.6	1.036	7.8	.878	7.5	1.150	7.5	1.081
Metacognitive choice	7.1	1.454	7.1	1.393	7.1	1.528	7.1	1.443
Monitoring	7.5	1.219	7.6	1.127	7.3	1.191	7.4	1.340

Note: The scale of 1-10 is used, where 1 being equal to "Not very much like me" and 10 being equal to "Very much like me". Source: authors' compilation

By comparing the average ratings in the frame of the study-disciplines it can be seen that students studying logistics dominate with high scores in almost every metacognitive category both before and after the training (column4). Technical sciences students indicate the comparable scores before the training only in category "metacognitive choice" (column8, 6.9 points) and after the training in "goal orientation" (8.0 points). It is remarkable also that variance of ratings of logistics-students (column5) remain on average lower compared to students studying natural (column7) or technical sciences (column9). This indicates that logistics-students are both more aware of their reasoning patterns and they do not have on average so much different opinions than students of other disciplines.

The results of clustering using *K-means* method provided us the groups with at least 40 students in each of them (Table2). Looking at the groups closer reveals that based on the mean values calculated for each of the five metacognitive constructs both before and after the training the highest values were indicated by students belonging to cluster2 (columns 4&5). Members of this group expressed the highest scores in all the categories (ie goal orientation, metacognitive knowledge, metacognitive experience, metacognitive choice and monitoring). At the same time the lowest values before the training were given mostly by students in the cluster3 (except in the domain of metacognitive knowledge where lowest results are indicated by cluster4). However, in order to describe the metacognitive abilities and awareness of students it is necessary to take a look more at the individual statements as it allows to present several interesting aspects characterising students.

Table 2. Analysis of metacognitive awareness of students before and after the course on entrepreneurship education using *K-means* clustering method

	cluster1		cluster2		cluster3		cluster4		cluster5	
	before	after	before	after	before	after	before	after	before	after
1	2	3	4	5	6	7	8	9	10	11
Count	68		52		40		49		71	
Goal Orientation										
1	8.0	8.1	9.3	8.9	6.8	7.4	8.4	8.5	7.5	8.2
2	8.2	8.1	9.3	8.8	6.7	7.1	8.0	8.3	7.8	8.0
3	7.4	7.5	8.9	8.9	5.5	6.6	7.9	7.9	7.0	7.7
4	7.2	7.6	8.9	8.6	4.7	6.3	7.7	7.7	7.3	7.8
5	7.3	7.7	9.0	8.6	5.1	6.4	7.4	7.9	7.3	7.7
Mean	7.6	7.8	9.1	8.8	5.8	6.8	7.9	8.1	7.4	7.9
Metacognitive knowledge										
6	8.2	7.5	9.1	8.9	7.0	7.2	8.0	8.1	8.0	8.6

7	7.0	7.0	8.1	8.3	5.0	6.4	6.0	7.2	7.2	7.5
8	7.1	6.9	7.6	7.7	6.5	6.9	4.8	6.1	7.4	7.4
9	7.8	7.9	8.0	8.3	7.2	7.8	7.2	7.5	7.9	7.8
10	9.2	9.1	9.2	9.4	8.2	8.9	8.6	8.5	9.0	8.9
11	8.2	8.4	8.9	9.0	7.0	8.0	6.8	8.0	8.3	8.5
12	7.9	8.3	8.2	8.3	7.1	7.9	7.1	7.3	7.9	7.9
13	6.6	7.1	8.5	8.3	5.3	6.0	4.8	6.6	6.8	7.3
14	7.3	7.5	8.7	8.7	6.3	7.0	5.0	6.9	8.1	8.1
15	7.0	6.8	8.5	8.5	6.2	6.9	5.6	7.1	8.1	7.6
16	7.2	7.6	9.0	8.4	6.5	7.4	7.4	7.8	8.3	7.8
Mean	7.6	7.6	8.5	8.5	6.6	7.3	6.5	7.4	7.9	7.9
Metacognitive experience										
17	7.6	7.5	9.3	9.1	6.4	7.0	8.0	8.4	8.0	8.2
18	7.1	7.5	8.6	8.8	6.3	7.1	7.8	7.5	8.1	8.4
19	6.0	6.9	8.9	8.2	5.1	5.8	8.3	8.1	7.4	7.5
20	6.0	6.9	8.0	8.3	6.3	7.0	7.9	7.6	7.8	7.9
21	6.0	7.0	7.9	8.1	5.9	6.2	7.1	7.5	7.3	7.7
22	6.6	7.5	8.6	8.5	6.1	7.0	7.7	7.6	8.0	8.1
23	5.6	6.6	7.7	7.6	6.4	7.0	7.4	6.9	7.9	7.8
24	5.6	6.9	7.9	7.5	6.5	7.1	7.3	7.2	8.0	7.8
Mean	6.3	7.1	8.4	8.2	6.1	6.8	7.7	7.6	7.8	7.9
Metacognitive choice										
25	6.8	7.2	8.7	8.7	5.9	6.4	6.4	6.7	7.7	7.5
26	6.7	7.3	8.4	8.5	6.0	7.0	6.3	6.5	7.7	7.4
27	6.3	6.8	8.3	8.3	5.4	6.4	6.0	6.2	7.5	7.4
28	6.6	7.3	7.7	7.5	6.2	6.8	5.6	5.9	7.4	7.5
29	5.8	6.7	8.2	8.0	4.3	5.8	5.8	6.3	6.9	7.3
Mean	6.4	7.1	8.3	8.2	5.6	6.5	6.3	6.5	7.5	7.5
Monitoring										
30	6.9	7.0	8.8	8.7	5.9	6.7	6.7	7.4	7.6	7.8
31	7.5	7.9	9.0	8.7	6.4	7.3	7.2	7.8	7.6	7.9
32	5.8	6.7	7.9	7.8	4.8	5.7	6.3	6.8	6.8	7.4
33	6.0	6.6	7.9	8.2	4.6	5.9	5.7	6.6	7.0	7.1
34	6.8	6.8	8.4	8.2	4.9	6.3	5.9	6.6	6.9	7.2
35	8.6	8.2	9.2	9.0	7.6	7.8	7.9	8.0	8.1	8.3
Mean	6.9	7.2	8.5	8.4	5.7	6.6	6.6	7.2	7.3	7.6

Note: The scale of 1-10 is used, where 1 being equal to "Not very much like me" and 10 being equal to "Very much like me". Source: authors' compilation

When focusing on the average ratings of students in the weakest cluster before the course the lowest score in goal orientation skills is given to the statement 4 (*I ask myself how well I've accomplished my goals once I've finished*). Furthermore, the evidence shows that in this cluster also the assessment practices during performing the tasks were below average (5.1 points on statement 5). The low values indicate that although these students manage to set goals for the tasks they are not successful in assessing the progress in retrospective view allowing to increase the performance in the future. This is additionally supported by the remarkably low score of 4.9 to the statement 34 (*I find myself pausing regularly to check my comprehension of the problem or situation at hand*) which deals with self-monitoring skills. In this light also the low score provided to the statement 33 (*I find myself analyzing the usefulness of a given strategy while engaged in a given task*) addresses the lack of reflective practices. On the other hand, when looking at the scores given to the other statements describing the monitoring abilities it becomes evident that statement 31 (*I stop and go back over information that is not clear*) received highest scores in all clusters. Students seem to put high value to the practice of reviewing the information during tasks and this appears to be so regardless the cluster already before the training. It provides additional support to assumption that students possess certain metacognitive awareness prior training. At the same time, the

statement 10 (*I perform best when I already have knowledge of the task*) received similarly highest scores from all the students. This might be an indication of possible low levels of metacognitive abilities of students as knowing the task in details in advance does not involve the need to practice metacognition. Nevertheless, it is remarkable that the average score given to statement 7 (*I challenge my own assumptions about a task before I begin*) received among the students with weakest metacognitive abilities ca 38% lower score than the strongest ones. Furthermore, the trend of low self-awareness among the students in the weakest cluster is supported by looking at the score given to the statement 13 (*I ask myself questions about the task before I begin*). When looking more closely to the average scores of students in stronger cluster it is remarkable that the scores are in every aspect of metacognitive abilities on the higher end of the 10-step scale already before the course (scores ranging between 8.3 for *metacognitive choice* and 9.1 for *goal-orientation abilities*).

Nevertheless it makes it even more fascinating to compare such a values with the ones retrieved after the course. In this context it could be said that the average scores given to the five metacognitive constructs by the students in the weakest cluster have significantly increased. As the metacognitive aspects have grown higher especially among students with low initial levels of abilities, it shows the tendency that students became more interested in developing their skills and might approach similar situations in the future with higher self-efficacy. This assumption correlates with findings of Vandewalle (2001). Although the results among the cluster with highest scores indicate that the scores have decreased after the training it does not necessarily contradict with the theoretical foundations. It is likely that there exists multiply underlying factors. On one hand this could be caused by the over-optimism of high-achieving students, ie they might have been too confident in relying on their existing skills before the training. If this is the case then training actually made the students to develop the metacognitive monitoring skills which include the abilities to reviewing critically previously taken steps. This assumption is at some level supported by the ratings given to the statement 33 (*I find myself analyzing the usefulness of a given strategy while engaged in a given task*) which was the only one to increase (from 7.9 to 8.2). In parallel it could be said that the average values of scores have become somewhat more homogeneous inside metacognitive constructs (ie *goal orientation* and *monitoring*). In relation to goal-setting abilities of students it is possible to propose that training has had a positive impact in terms of reducing the over-confidence and increasing the critical goal-setting skills. Looking at the students ratings belonging to the weakest cluster the positive impact of training can be presented based on the metacognitive knowledge aspects. This means that as all the respective ratings (for statements 6...16) have significantly increased the students should have more skills in thinking about different approaches to problems, questioning the progress made and having more knowledge on how to focus on core issues with new tasks. In this light it is necessary to bring up also the significant increase in scores given among the weakest cluster for a statement 29 (*I ask myself if I have learned as much as I could have after I finish the task*). Although the absolute values leave plenty of room for further development, the magnitude of change itself is quite big (from 4.3 to 5.8).

3.2. Relations between entrepreneurial profile and metacognitive awareness

After analyzing the personal traits of the students based to the entrepreneur's psychological portrait test according to the chosen method and considering the „yes“-answers to the questions of good prerequisites necessary for an entrepreneur. it appeared that 71% of the respondents have good prerequisites of becoming an entrepreneur and only 29% do not have those prerequisites. It must me mentioned that according to this criterion many respondents were in the group of no prerequisites (the so-called poor prerequisites) whose sum of points

was very close to the margin and with only one more „yes”-answer they would have been in the group of prerequisites characteristic to an entrepreneur. Considering that, a conclusion can be made that most students questioned have entrepreneurial profile. At the same time among the entrepreneurial students 71% have expressed their aspiration for independence, 81% self-confidence and 64% readiness for taking risks. The following is an analysis of enterprising and non-enterprising students (divided by their personal characteristics into six groups) about their connection with metacognitive factors (Table 3).

Table 3. Average scores of students ratings on metacognitive awareness before and after the course on entrepreneurship education

Metacognitive awareness factors/ students' personal characteristics	Self-confidence		Aspiration towards independence		Readiness to take risks		
	yes	no	yes	no	yes	no	
	Mean	Mean	Mean	Mean	Mean	Mean	
1	2	3	4	5	6	7	
Before	Goal Orientation	7.7	7.4	7.7	7.4	7.6	7.6
	Metacognitive knowledge	7.5	7.4	7.4	7.6	7.5	7.5
	Metacognitive experience	7.4	7.0	7.4	7.1	7.3	7.2
	Metacognitive choice	6.9	6.7	6.9	6.7	6.9	6.7
	Monitoring	7.2	6.9	7.2	6.9	7.1	7.1
After	Goal Orientation	8.0	7.7	8.0	7.7	7.9	7.9
	Metacognitive knowledge	7.8	7.7	7.8	7.7	7.7	7.8
	Metacognitive experience	7.6	7.3	7.7	7.3	7.6	7.4
	Metacognitive choice	7.1	7.0	7.1	7.0	7.1	7.1
	Monitoring	7.5	7.2	7.5	7.3	7.5	7.3

Note: The scale of 1-10 is used, where 1 being equal to "Not very much like me" and 10 being equal to "Very much like me". *Source: authors' compilation*

Enterprising students have received higher ratings among the components of metacognitive awareness, especially those with higher self-confidence and aspiration towards independence. This confirms empirically the statement of Kleitman (2007) about the relationship of self-confidence with the metacognitive factor. The highest rating appeared in the orientation of students towards the objective (7.6...7.7) and the lowest score for metacognitive choice (6.9). Metacognitive choice has been rated lowest (6.7) also by non-enterprising students. This can be explained by the fact that a self-analysis of making of metacognitive choice is more difficult to carry out than, for example, an analysis of orientation towards the goal. Non-enterprising students gave a higher rating to goal orientation (7.4...7.6) and the risk tolerance factor was related to orientation towards the goal. The reason for this is that non-enterprising students may not analyse their actions very thoroughly, and in the case of the goal they simply move in that direction, in other words it is daring risk taking.

The metacognitive awareness of non-enterprising students grew more (with minor exceptions) by completing the course than that of enterprising students. It turns out here, that completing the entrepreneurial instruction had a positive effect on the metacognitive capabilities of those students. At the same time, a relatively higher growth can be found in metacognitive choice and monitoring and smaller amount of growth was seen in orientation towards the goal and metacognitive choice.

In order to develop students with smaller enterprising and metacognitive capabilities, when carrying out entrepreneurial instruction more capable and less capable students should be approached differently, since the objective of entrepreneurial instruction must be the

increasing of entrepreneurialism. When carrying out entrepreneurial instruction, the various methods of active instruction should be used more and they should be used in combination. When using active instruction methods the implementation of group work should also be applied, via which individuals with different capabilities can be developed. It is important to find the combination of such teaching methods, as a result of which it is possible to develop metacognitive capabilities the most. It became apparent from this study that increased attention must be paid during teaching to the metacognitive experience, metacognitive choice and monitoring of development. These three metacognitive factors were low in the case of enterprising as well as less enterprising students.

Continuing on the basis of cluster analysis according to the metacognitive awareness the students were divided into 5 groups of which the 2nd cluster of students expressed the highest scores in metacognitive awareness. And the lowest average values of metacognitiveness were given mostly by students in the 3rd cluster. The rest of three groups remained more at the average level of the analysed indicator with some fluctuations. However, in order to describe the metacognitive awareness of students it is necessary to take a look more at the individual statements as it allows to present several interesting aspects characterising students' personal traits and metacognitive awareness.

If one were to analyse the student group with the highest metacognitive awareness, then over represented by gender are men (63.5%), according to level of education Master's students (60%) and according to specialty technical sciences (50%) students (Table 4). The group with the lowest metacognitive awareness has nearly the same structure, but in comparison with the former group there are slightly fewer men (60%), more Master's students (65%) and also more technical sciences students (52.5%). The latter is related to the circumstance that nearly half of the sample is comprised of technical sciences students.

Table 4. Students entrepreneurial profile and metacognitive awareness in clusters (%)

Entrepreneurial profile		cluster1	cluster2	cluster3	cluster4	cluster5
	1	3	4	5	6	7
Gender	Male	60.0	63.5	60.0	61.0	63.0
	Female	40.0	36.5	40.0	39.0	37.0
Study level	Undergraduate	47.0	40.0	35.0	45.0	42.0
	Graduate	53.0	60.0	65.0	55.0	58.0
Enterprising	Yes	66.0	86.5	55.0	75.5	70.0
	No	34.0	13.5	45.0	24.5	23.0
Curricula	Logistics	22.0	19.0	17.5	18.0	25.0
	Natural Sciences	31.0	31.0	30.0	29.0	27.0
	Technical Sciences	47.0	50.0	52.5	53.0	48.0
Self-confidence	Yes	62.0	79.0	62.5	71.0	65.0
	No	38.0	21.0	37.5	29.0	35.0
Self-independence	Yes	46.0	75.0	55.0	71.0	56.0
	No	54.0	25.0	45.0	29.0	44.0
Risk-taking	Yes	50.0	44.0	52.5	55.0	58.0
	No	50.0	56.0	47.5	45.0	42.0

Source: authors' compilation

The groups with average metacognitive awareness (cluster1, cluster4 and cluster5) are similar to each other except in regards to study level, curricula, enterprising and self-independence indicators. In groups with average metacognitive awareness, the level of entrepreneurialism is average in comparison with the strongest and weakest group (including entrepreneurial personality traits: self-confidence, self-independence and aspiration for independence). Cluster4 differs from the other clusters with average metacognitive capabilities in terms of factors of entrepreneurialism (share of entrepreneurial students is 75.5%), self-confidence (71%) and aspiration for independence (75%). Cluster5 differs from the three other groups with average metacognitive capabilities in terms of aspiration for independence (58%).

Based on personal characteristics, the group with the greatest metacognitive abilities is predominantly comprised of enterprising (86.5%) students, who are characterised by self-confidence (79%) and aspiration for independence (75%), although risk takers comprise only 44%. In general, the majority of people avoid risks, and in terms of their nature do not wish to take risks. Entrepreneurs must frequently make riskier decisions, which places the individuals in a situation in which they must take the risk. In general, Estonians exhibit lower risk tolerance than the citizens of countries with a longer history of capitalism. The group with the lowest metacognitive awareness differs from this, since it has a lower number of enterprising students (55%). This is the only group out of five clusters in which the share of non-enterprising students is the highest (45%). In the lowest metacognitive awareness group there are fewer students who are confident (62.5%) and fewer who are striving for independence (55%). Therefore, this group's students exhibit greater dependence on external influences and non-aspiration towards independence. At the same time, there are more risk-takers (52.5%) in the group with the lowest metacognitive awareness.

4. Conclusions

Based on the results of cognitive adaptability questionnaire the training had a multimodal positive impact on students metacognitive skills. First and foremost, the research findings indicate that level of metacognitive awareness experienced on average significant increase over all the sample. This fact supports the findings of Haynie et al (2004; 2007) which posited that learning has significant impact to metacognitive abilities and it enhances the performance. Nevertheless, although the students studying logistics presented remarkably high levels of metacognitive awareness both before and after the training, also the ones studying technical or natural sciences showed positive changes after the training. At this point there is no single explanation to the high ratings of logistics-students. It is possible that it could be influenced by the fact that they receive business-related courses in extended format allowing to present higher initial levels of metacognition. Moreover, it might be at some level also assumed that different business-related courses provide better support to students abilities to put their skills into fast-changing real-life context than more narrow-focused technical ones.

Secondly, the results of the training had a remarkably positive effect especially to students who expressed before the training only either moderate or lower levels of metacognitive abilities. This involves for example goal setting skills in terms of progress assessment practices and task-mastery monitoring skills while engaged in entrepreneurial activities. At the same time it could be said also that the skills affecting time-management and abilities to focus on most important information when faced with a novel task have been increased. Moreover, aspects related to metacognitive knowledge have indicated rise too. This means that the students should have more skills in thinking about different approaches to problems and questioning the progress made. The fact that metacognitive abilities have grown higher after the training especially among students with lower initial levels, shows that students

became more interested in developing their skills and might approach similar tasks in the future with even higher self-efficacy. This assumption correlates with findings of Vandewalle (2001).

However, in terms of students with higher levels of metacognitive abilities prior the training it is interesting that the metacognitive awareness decreased somewhat during the process. This could be influenced by the overconfidence bias of students allowing to be too optimistic in their respective ratings before the training.

Regarding the personality traits it could be said that enterprising students have a higher metacognitive awareness than non-enterprising ones and received highest rating in goal orientation and metacognitive knowledge. This is logical result because personal characteristics of entrepreneurial formation is a prerequisite to higher metacognitive abilities. Non-enterprising students gave a higher rating to metacognitive awareness and the risk tolerance factor was strongly related to orientation towards the goal. In addition, the metacognitive awareness of non-enterprising students grew more by completing the course than that of enterprising students. It turns out here, that completing the entrepreneurial learning had a positive effect on the metacognitive capabilities of those students.

Based on personal characteristics, the group with the highest metacognitive abilities is predominantly comprised of enterprising students, who are characterised by self-confidence and aspiration for independence, although risk takers comprise only 44%. The group with the lowest metacognitive awareness differs from this, since it has a lower number of enterprising students. This is the only group out of five clusters in which the share of non-enterprising students is the highest. In the lowest metacognitive awareness group there are fewer students who are confident and fewer who are striving for independence. Therefore, this group's students exhibit greater dependence on external influences and non-aspiration towards independence. At the same time, there are more risk-takers in the group with the lowest metacognitive awareness.

In order to develop students with smaller enterprising and metacognitive capabilities, entrepreneurial lessons should include large variety of active learning methods which should be used in combination. The survey also showed excessive needs to develop non-enterprising student's metacognitive experience, metacognitive choice and monitoring capabilities as these were rated the lowest. When using active learning methods the implementation of group work should also be applied, via which individuals with different capabilities can be developed. It is important to find the combination of such teaching methods, as a result of which it is possible to develop metacognitive capabilities the most.

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Annex1 Cognitive adaptability questions

1. I often define goals for myself
2. I understand how accomplishment of a task relates to my goals
3. I set specific goals before I begin a task
4. I ask myself how well I have accomplished my goals once I have finished
5. When performing a task, I frequently assess my progress against my objectives
6. I think of several ways to solve a problem and choose the best one
7. I challenge my own assumptions about a task before I begin
8. I think about how others may react to my actions
9. I find myself automatically employing strategies that have worked in the past
10. I perform best when I already have knowledge of the task
11. I create my own examples to make information more meaningful
12. I try to use strategies that have worked in the past
13. I ask myself questions about the task before I begin
14. I try to translate new information into my own words
15. I try to break problems down into smaller components
16. I focus on the meaning and significance of new information
17. I think about what I really need to accomplish before I begin a task
18. I use different strategies depending on the situation
19. I organise my time to best accomplish my goals
20. I am good at organising information
21. I know what kind of information is most important to consider when faced with a problem
22. I consciously focus my attention on important information
23. My "gut" tells me when a given strategy I use will be most effective
24. I depend on my intuition to help me formulate strategies
25. I ask myself if I have considered all the options when solving a problem
26. I ask myself if there was an easier way to do things after I finish a task
27. I ask myself if I have considered all the options after I solve a problem
28. I re-evaluate my assumptions when I get confused
29. I ask myself if I have learned as much as I could have after I finish the task
30. I periodically review to help me understand important relationships
31. I stop and go back over information that is not clear
32. I am aware of what strategies I use when engaged in a given task
33. I find myself analysing the usefulness of a given strategy while engaged in a given task
34. I find myself pausing regularly to check my comprehension of the problem I am situated at
35. I ask myself questions about how well I am doing while I am performing a novel task. I stop and re-read when I get confused

Source: adopted from Hisrich, R.D., Peters, M.P., & Shepherd, D.A. (2007)