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A NEW APPROACH TO TESTING THE EFFECTS OF ENTREPRENEURSHIP

EDUCATION AMONG SECONDARY SCHOOL PUPILS

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ABSTRACT

This paper aims to contribute to a better understanding of the effects of entrepreneurship education among secondary school pupils. Using a combination of retrospective pretest-posttest and self-perceived change measures, we assessed changes in entrepreneurial intent, creativity and attitudes towards entrepreneurs as a result of a variation of 21 entrepreneurship education programs among 3130 pupils in Flanders, Belgium. Furthermore, we grounded entrepreneurial intent in Shapero's Entrepreneurial Event model and tested the impacts of the entrepreneurship perceived feasibility, perceived desirability and propensity to act. We find that the higher the intensity and experientiality of the entrepreneurship programs, the stronger their impact on some of the variables investigated. Furthermore, we found that the subjective evaluation of the program by the pupils had an even stronger effect on all investigated changes. As such, our findings highlight the importance of both objectively measurable program characteristics, as well as their subjective evaluation by the pupils in order to increase their effectiveness.

A NEW APPROACH TO TESTING THE EFFECTS OF ENTREPRENEURSHIP EDUCATION

Since entrepreneurship may serve as an important vehicle for economic and social prosperity, a plethora of actors in society have taken initiative to stimulate entrepreneurship through education at various stages of human development. In particular, it is argued that entrepreneurship education programs should start at an as early age as possible (Wilson, Marlino, & Kickul, 2004; World Economic Forum, 2009), because:

“to a greater or lesser degree in just about every culture there are sceptical or even hostile attitudinal barriers to entrepreneurship. (...) And hence the need for entrepreneurship education aimed specifically at young people, who are typically more open to self-exploration and usually more willing to challenge received wisdom and societal prejudice than are most adults. (World Economic Forum, 2009: 30).

Entrepreneurship education programs for teenage pupils, however, may also be confronted with many specific challenges. For example, teenage pupils are often not allowed to start up their own companies or may not have full control over their financial situation. Furthermore, career choices may be part of some distant future for teenagers. As a result, educational initiatives aimed at stimulating entrepreneurship may be perceived by teenagers as irrelevant, or may be long forgotten by the time actual career choices have to be made (Peterman & Kennedy, 2003). The question is then what entrepreneurial outcomes can be realized with entrepreneurship programs among teenage pupils, and how. In line with previous work that has argued in favour of entrepreneurship education programs that match the specific characteristics of a target population (Wilson, Kickul, & Marlino, 2007; Athayde, 2009), our interest in this paper is therefore to know what characteristics of entrepreneurship education programs are most “effective” for teenage pupils. More specifically, our aim is to address two research questions: first, do entrepreneurship education initiatives have an impact on secondary school pupils, and how will we assess this “impact”? And second, what types of personal and initiative characteristics influence these effects?

With our paper, we thus hope to contribute to the broader entrepreneurship education literature, by exploring the specific effects of a variety of entrepreneurship education initiative characteristics, but also to shed more specific light on these effects among secondary school pupils. Furthermore, we propose a new approach of measuring the impact of entrepreneurship education initiatives, by using not only several types of outcomes, but also by using different ways of measuring the outcomes.

ENTREPRENEURSHIP EDUCATION

In recent years, we have seen a slow but increasingly growing body of scholarship dedicating research on entrepreneurship education. A first stream in this literature has been mainly focussed on the establishment of entrepreneurship education as a legitimately distinct profession, and takes a historical perspective on the development of the field to identify the needs and challenges that entrepreneurship education should address (Kuratko, 2005; Gibb, 2002; Solomon, Duffy, & Tarabishy, 2002; Katz, 2003; Aronsson, 2004a). A second stream of literature has been dedicated to assessing the effectiveness of entrepreneurship education, and identifying some of the factors that may play a role in determining this effectiveness (Peterman & Kennedy, 2003; Souitaris, Zerbinati, & Al-Laham, 2007; Wilson et al., 2007; Athayde, 2009; Charney & Libecap, 2000). This paper aims to contribute in particular to the second body of conversation.

A number of studies have shown that entrepreneurship education programs have a significant positive impact on various proxies for entrepreneurship, including entrepreneurial intentions, the desirability and feasibility of entrepreneurial ventures, and various competencies that are associated with entrepreneurship (Peterman & Kennedy, 2003; Souitaris et al., 2007; Wilson et al., 2007; Charney & Libecap, 2000; Athayde, 2009). In these impact studies, researchers most often draw on the psychology literature to argue that the “intention” to start up a business is the proxy that best reflects the odds a person will start a business or not (Krueger, Reilly, & Carsrud, 2000; Souitaris et al., 2007). As a result, the success of entrepreneurship education is mostly measured as a positive change in entrepreneurship as a career choice, and the majority of these studies do in fact show that entrepreneurship education has a positive impact on such entrepreneurial intentions.

Drawing on the same psychology literature, changes in entrepreneurial intentions are subsequently further explored by using different theoretical intention models, such as the Shapero Entrepreneurial Event (SEE) model (Shapero & Sokol, 1982) or Ajzen's Theory of Planned Behaviour (TPB) (Ajzen, 1991). Whereas the SEE model predicts entrepreneurial intentions based on the perceived feasibility and the perceived desirability of entrepreneurship as a career choice, along with the propensity to act, the Theory of Planned Behavior models entrepreneurial intentions as a result of the attitudes toward entrepreneurship, the subjective norms held about entrepreneurship by one's important relationships, and the perceived behavioural control one has to actually follow through one's ambitions. Although a comparative study showed that the SEE model had better predictive power over the TPB model (Krueger et al., 2000), both models are successfully used in entrepreneurship education impact studies. The results of these studies, however, are somewhat inconclusive. Whereas some studies have shown that entrepreneurship education increases the desirability of entrepreneurship (Peterman & Kennedy, 2003; Athayde, 2009), others show that such initiatives have no impact on the desirability or the attitudes towards entrepreneurship (Souitaris et al., 2007). Entrepreneurship education also seems to have a positive effect on the perceived feasibility of entrepreneurship, or on entrepreneurial self-efficacy (Wilson et al., 2007), which is a similar measure, but not on the perceived behavioural control (Souitaris et al., 2007). Finally, Souitaris and his colleagues found the interesting observation that entrepreneurship education initiatives had a significant impact on the "expectations of significant others", which they explained as the as the result of a small network of fellow program participants they shared a positive disposition towards entrepreneurship with as a result of the program. Overall, however, we can conclude that results about entrepreneurship education initiatives remain inconclusive, and that more detailed research is needed to get a full understanding of the contingent effects of entrepreneurship education.

Furthermore, given the high importance expressed about student population specific entrepreneurship education, we also lack knowledge on the impact of personal and initiative characteristics on entrepreneurial intentions and other outcomes. Whereas we know that positive entrepreneurship education impacts are stronger among pupils with a positive prior exposure to entrepreneurs (Peterman & Kennedy, 2003), among female students (Wilson et al., 2007), and when triggering inspirational event are part of the entrepreneurship education initiative (Souitaris et al., 2007), we lack a more comprehensive perspective on how these factors influence entrepreneurship education impacts at the same time.

THE RESEARCH QUESTIONS

Given the inconclusive results of entrepreneurship education impact studies, we are interested in assessing their effect on a variety of entrepreneurship outcomes. To this purpose, we are interested not only in the effect of entrepreneurship education programs on entrepreneurial intentions, but also on their theoretical antecedents. In line with earlier research among high-school pupils, we follow the SEE model and investigate the impact of entrepreneurship education on the perceived desirability, perceived feasibility and propensity to act. Furthermore, we assess the impact of entrepreneurship education programs on the level of creativity and a general attitude towards entrepreneurs, both identified as critical aspects of entrepreneurship (Timmons & Spinelli, 2004). We therefore tested the following hypotheses:

Hypothesis 1a: High-school pupils that have followed an entrepreneurship education program will have higher levels of entrepreneurial intentions after than before the program.

Hypothesis 1b: High-school pupils that have followed an entrepreneurship education program will have higher levels of creativity after the program than before the program.

Hypothesis 1c: High-school pupils that have followed an entrepreneurship education program will have a more positive attitude towards entrepreneurs after the program than before the program.

Hypothesis 1d: High-school pupils that have followed an entrepreneurship education program will have higher levels of perceived desirability, perceived feasibility and propensity to act after the program than before the program.

Hypothesis 1e: High-school pupils that have increased their perceived feasibility, their perceived desirability and their propensity to act, will also have increased their intention to start their own business.

The next hypotheses were concerned with the impact of pedagogical methods on the entrepreneurship education program effects. Entrepreneurship programs may cover a wide array of initiatives and pedagogical methods, all aimed to foster entrepreneurial competencies among pupils. Such initiatives may include more passive approaches such as lectures, guest speakers or site visits to entrepreneurial companies, or more active “experiential” programs that include simulations, writing business plans up to the actual setting up of a company (Hills, 1988; Gartner & Vesper, 1994; Solomon et al., 2002; Kuratko, 2005). It is often argued that for entrepreneurship education to be successful, more experiential and active hands-on approaches are necessary (Solomon et al., 2002; Aronsson, 2004b; Gendron, 2004). Such approaches confront pupils with the actual practice of starting and running a business or being passionately engaged in an activity of uncertain success and thus expose the pupil to a learning experience that would be more easily internalized. We therefore test the following hypotheses:

Hypothesis 2a: The greater the intensity of an entrepreneurship education program, the higher the increase in pupils’ entrepreneurial intentions, perceived desirability, perceived feasibility, propensity to act, creativity and attitudes towards entrepreneurs.

Hypothesis 2b: The greater the experiential nature of an entrepreneurship education, the higher the increase in pupils’ entrepreneurial intentions, perceived desirability, perceived feasibility, propensity to act, creativity and attitudes towards entrepreneurs.

Regardless the pedagogical approach taken, the study of Souitaris and colleagues (2007) also showed how individual benefits derived from the entrepreneurship education program have an influence. We therefore hypothesize:

Hypothesis 3: The better the pupils evaluated the program in terms of fun and importance, the higher the increase in pupils’ entrepreneurial intentions, perceived desirability, perceived feasibility, propensity to act, creativity and attitudes towards entrepreneurs.

METHODS

Procedures

In order to test for the effects of the entrepreneurship education programs, we adopted an unusual approach. Instead of using a traditional pretest-posttest control group design, we combined two different methods at the same time, to independently assess the evolution of the pupils. More specifically, we used a retrospective pretest-posttest design on the one hand, in which we used the different program participant groups as control groups for each other, and a perceived change measure on the other. In contrast to pretest-posttest designs, retrospective pretest-posttest designs assess the “before”(pre-) and “after”(post-) situation at the same time, namely at the end of the program. We argue that such an approach may be more appropriate than pretest-posttest assessments, as these may suffer from response shift biases (Howard & Dailey, 1979; Sprangers & Hoogstraten, 1989; Lam & Bengo, 2003; Pratt, McGuigan, & Katzev, 2000; Hill & Betz, 2005), and as such under- or overrated the impacts of entrepreneurship education programs.

Response shift biases occur when a person’s subjective (internal) *measurement scale* for assessing a particular phenomenon at one point in time (e.g., feasibility to start a firm) may be different before and after a particular intervention. For example, the insights of an entrepreneurship program may (and preferably do) produce a direct impact on how “entrepreneurship” is assessed, and how one self-perceives one’s ability and desirability regarding entrepreneurship. Respondents asked to self-assess their ability and desirability towards entrepreneurship may thus use different subjective measurement scales before and after the program. As a result, concluding that a respondent may have felt no impact of a program because of a self-assessed “very high” feasibility for entrepreneurship both before and after the program may in fact be a wrong representation of what actually happened. Looking back, this same respondent could maybe assess his ability in the past as “low”, despite the fact that he or she answered “very high” at that time. In order to avoid this bias, impact study methodology suggests to use a combination of posttest – retrospective pretests on the one hand, in which one’s status at the beginning (retrospectively) and the end of the program is measured at the same time, and self-perceived change on the other hand. This methodology is an often used method in impact studies, especially in the context of impact evaluation of educational interventions, recreation or medical treatments (Sibthorp, Paisley, Gookin, & Ward, 2007; Schwartz & Rapkin, 2004; Lam & Bengo, 2003).

In our survey, we asked all respondents to reflect back to the same “pre-test” moment, since we asked them about a particular status “at the beginning of the schoolyear”. The “post-test” moment differed among respondents, as respondents were only asked to complete a survey once they had finished participating in the entrepreneurship education program.

Programs

We conducted the study among pupils that participated in 21 entrepreneurship education programs that are implemented in Flemish part of Belgium. The 21 programs, which cover almost all of the 23 identified initiatives identified in Flanders, were collected through a thorough field analysis (Van den Berghe, 2007) and invited to participate in the research. Together, the 21 initiatives are present in 78% of the schools, which indicates that entrepreneurship education is gaining a significant penetration among secondary schools (650 in total). This, however, does not necessarily mean that 78% of all pupils get in contact with such a program. Table 1 shows the 21 programs, their penetration in Flemish schools, and their pedagogical characteristics in terms of intensity and experiential focus.

Insert Table 1 about here

Participants

In order to garner survey participants, we asked the coordinators of each of these entrepreneurship programs to contact all the teachers they worked with in their programs and ask the teachers to distribute a survey among their pupils. We asked the program coordinators to only submit the survey request when the program was finished, so that the post-test measurement was indeed taken after the program was finished. As a result of this approach, a total of 3130 pupils answered the questionnaire. From these 3130 responses, we selected only the last four years of high-school. After data-cleaning, this left us with 2160 responses. From these 2160 responses, 46% were from boys, and 54% from girls.

Intention and SEE

We adopted an adapted version of the intention and SEE questionnaire as proposed by Krueger (1993) and Krueger and colleagues (2000). The adaptations consisted of rephrasing the questions such that they could all fit the same five point Likert scale that ranged from “totally disagree” to “totally agree”. As a result, the intention question, for example, changed from “estimate the probability you’ll start your own business in the next 5 years” to “the likelihood that I will ever run my own business is very high”. We adapted each of the five “perceived feasibility” questions and each of the three “perceived desirability” questions in a similar way. For the “propensity to act” measure, we adopted 9 questions from the 20 “desirability of control” (Burger, 1985) measure. Table 2 summarizes the questions as they were asked in the survey.

Insert Table 2 about here

Other dependent variables: creativity and attitude towards entrepreneurs

In order to measure creativity, we adopted a shortened version of the “Problem Solving” part of the Self-Description Questionnaire (Marsh & O’Neill, 1984). This questionnaire has been used in earlier research on creativity, and in particular related to motivation profiles of pupils (Sheldon, 1995). The attitude towards entrepreneurs was measured using two measures from the Gallup Eurobarometer survey, that investigated the image of entrepreneurs across various countries in Europe and around the world.

Evaluation of the activity

In order to capture the evaluation of the activity, we designed four questions aimed at capturing both whether the pupils found the activity and whether they found it important. As such, we deviate from the “trigger-event” approach as used by Souitaris and colleagues (2007), but our aim was more on getting a broader evaluation of the program to the pupil than merely the inspiration received from the program.

Control variables

In order to control for other potential factors that interfere with the effects of the program initiatives, we controlled for gender, age, breadth and positiveness of exposure, motivational profile and the initial values of the pupils at t1.

RESULTS

Hypotheses 1a-1e

In order to test our first hypotheses whether the programs had an effect on entrepreneurial intentions and its related predictor variables, and on creativity and attitudes towards entrepreneurs, we conducted a series of paired t-tests with the retrospective pretest (t1) and posttest (t2) values of each of these variables. TABLE 3 summarizes the results of these t-tests. Results revealed significant difference between t1 and t2 for each of these variables, confirming hypotheses 1a, 1b, 1c and 1d. Furthermore, table 3 also reports the direct measurements of perceived change, and their difference and correlation with the calculated retrospective pretest-posttest differences. In line with the predictions of Lam and Bengo (Lam & Bengo, 2003), we see that the perceived change measures are consistently and significantly higher than the actual calculated t2-t1 differences. The perceived changes are nevertheless also all significantly correlated with the actual calculated differences, indicating that both measurements are related to each other despite their substantial differences. Given that Lam and Bengo (Lam & Bengo, 2003) argue that these results are due to a smaller bias in retrospective pretest-posttest designs, we only used the data collected with these measures in the rest of our analysis.

Insert Table 3 about here

In order to test hypothesis 1e, we employed a correlation analysis, as summarized in TABLE 4. As expected, a change in perceived feasibility, perceived desirability and propensity to act was significantly related to an increased intention to start one's own business. Therefore, hypothesis 1e was accepted.

Insert Table 4 about here

Hypotheses 2a-b and 3

In order to test for the differences in effects between the programs, we employed three analyses. First, we used the correlation analysis in table 4 to test whether an increase in intensity, experientiality or a positive personal evaluation of the program was significantly associated with an increase in entrepreneurial intentions and its predictive variables, and creativity and the attitudes towards entrepreneurs. Second, we used a stepwise hierarchical regression (TABLE 5) to test whether these correlations held while controlling for additional predictive variables. Finally, given that both intensity and experientiality were ordinal variables, we also used a one-way ANOVA to test for differences between the means of each of the categories (TABLE 6).

Insert Table 5 and 6 about here

The correlation table in table 4 indicates a significant and positive association between both the intensity and the experientiality of the programs, and the change in entrepreneurial intention, creativity, perceived feasibility, perceived desirability and propensity to act. From our data, however, we were not able to prove that more intensive and more experiential programs had stronger effects on changes in attitudes towards entrepreneurs. As such, these results would invite to accept hypothesis 2a and 2b for all variables except the attitude towards entrepreneurs. Using the hierarchical regression analysis, these correlations lost their significance for all variables but the impact of experientiality on changes in creativity, when we control for gender, age and grade, major and type of motivation profile (intrinsic vs. extrinsic). In other words, these findings would indicate that we should reject hypothesis 2a, and only partly accept hypothesis 2b for creativity. However, the regression analyses with intensity and experientiality as independent variables are based on the assumption that they are continuous variables. Since this assumption may be violated, we do an additional test using a one-way ANOVA to assess the significance of the differences between the three levels of intensity and experientiality. As table 6 indicates, the three intensity and experientiality levels differ significantly ($p \leq .05$) from one another for differences in creativity, perceived feasibility and perceived desirability, and marginally

significantly ($p \leq 0,1$) for differences in entrepreneurial intention and propensity to act. The intensity and experientiality does not seem to have an effect on the differences in attitude towards entrepreneurs.

As a result, we reject hypotheses 2a and 2b for attitude towards entrepreneurs at the .1-level, and for attitude towards entrepreneurs, entrepreneurial intention and propensity to act at the .05-level.

Finally, we used the correlation and the hierarchical regression analysis to test the influence of the program evaluation on the change in entrepreneurial intention, creativity, perceived feasibility, perceived desirability and propensity to act. From both these analyses, we found a significant impact of the evaluation of the program on all these variables. As a result, we do not reject hypothesis 3.

DISCUSSION

The main focus of this article is to assess whether entrepreneurship education programs have an effect on the entrepreneurial intent, creativity and attitude towards entrepreneurs among teenage pupils, and whether the effect of such programs differs depending on such objective program characteristics as intensity and experientiality or subjective program evaluations. We addressed these questions by using a combination of a retrospective pretest-posttest and perceived change research design.

Our results first show that, in general, there are significant differences between the pre- and post-test phase, as indicated by both the retrospective pretest-posttest differences and the self-perceived changes. Our findings are thus in line with earlier studies on the effects of entrepreneurship education programs, but nevertheless present some differences as well. First, our results confirm earlier analyses that, in general, entrepreneurial intentions change significantly as a result of entrepreneurship education programs (Peterman & Kennedy, 2003; Souitaris et al., 2007; Wilson et al., 2007; Charney & Libecap, 2000; Athayde, 2009). However, our data reinforce the notion that entrepreneurship programs also have a significant effect on the self-perceived feasibility to start-up a company (Peterman & Kennedy, 2003; Wilson et al., 2007), for which Souitaris and colleagues (2007) did not find confirmation in their data. Furthermore, we also found confirmation for the impact of entrepreneurship education programs on the perceived desirability (Peterman & Kennedy, 2003), propensity to act (Athayde, 2009), creativity (Athayde, 2009) and a positive attitude towards entrepreneurs. As we do not have an explicit control group in our research design, one could argue that these significant retrospective pretest-posttest differences may be due to either a natural progress made by pupils during a school year, or as a result of a bias in the response as a result of the natural tendencies of people to answer in way that

reflects progress (Hill & Betz, 2005). However, given that we have two methods indicating in the same direction, we can assume that the programs do have an impact.

In order to further explore the significance of entrepreneurship education programs, we can use our comparisons between different program types as control groups for one another. Doing so indicates that the more intensive (time-consuming) and the more experiential the programs become, the more effective they become in stimulating shifts in perceived desirability, perceived feasibility and creativity. Although with less significance, more intense and more experiential programs also have higher impacts on entrepreneurial intentions and propensity to act. The only variable on which differences in intensity and experientiality do not seem to have an effect is on attitude towards entrepreneurs. These findings also reinforce the tenet in much of the entrepreneurship education literature that entrepreneurship education is particularly successful when it employs a more hands-on experiential learning approach (Solomon et al., 2002; Kuratko, 2005; Aronsson, 2004b; Izquierdo, 2008). Despite the many difficulties that may be involved in engaging students in real-life experiences of starting-up and running a business or any kind of organization or project, our findings suggest that overcoming these challenges is well worth the effort.

Finally, the finding that the evaluation of the program is a significant and stronger predictor for the changes made in all of the variables of interest than the program characteristics puts further emphasis on the role of tweaking these entrepreneurship programs as much as possible to what pupils find fun and important. Furthermore, given that passion and emotion are increasingly acknowledged as having an vital role in various aspects of entrepreneurship (Baron, 2008; Cardon, Wincent, Singh, & Drnovsek, 2009), such reaffirmed attention to the emotional aspects of entrepreneurship may well be one of the most important contributions of entrepreneurship education research (Souitaris et al., 2007).

LIMITATIONS OF THE RESEARCH

Although we were very careful in ensuring rigour in both the design, the execution and the analysis of the research in this paper, we believe the generalizability of our findings may be limited in some ways. First, although we maintain that the retrospective pretest-posttest design is a more appropriate way of investigating concepts that may change across time, our research design does not allow for confirming or disconfirming this hypothesis. In order to fully understand the impact of retrospective bias on entrepreneurship education impact studies research, future research should

therefore use a combination of pretest-posttest and retrospective pretest-posttest design to test to what extent both methods differ and which one is preferred under what conditions.

Second, Cronbach's alpha values for perceived feasibility and creativity may in some ways be just below accepted levels for use in research (0.6). Future research could therefore assess whether our findings also hold, or even have better predictive power, when more complete questionnaires are used. One problem that researchers may face in this context, is the balance between survey length and data quality, since pupils may be wary to complete questionnaires if they are too long.

Third, since most students were asked to complete the questionnaire in a voluntary way, our sampling technique may involve a selection bias on those students that had a positive experience with the entrepreneurship program. Although we both tried to cover this by explicitly taking it into account as a predictor variable in our research, and by offering respondents cinema tickets if they participated in the survey, future research could change the sampling technique to a more focussed approach using only three types of programs in randomly selected schools and then ask all students to fill in the survey.

CONCLUSION

As entrepreneurship is an increasingly important in our societies today, entrepreneurship education programs in secondary schools offer a tool to instil entrepreneurial attitudes and competencies among pupils at a young age. With our research, we have demonstrated that not only are such programs effective, but also that their effect depends on the intensity and the experientiality of the program itself and how it is evaluated by the pupils. Whereas higher levels of intensity and experientiality has some positive impact on the change in entrepreneurial intent, creativity, perceived desirability, perceived feasibility and propensity to act, it is in particular the evaluation of the program of the pupil that has a positive impact on the change in these variables. With this conclusions, we hope this research has provided ground for further exploration of the effects of entrepreneurship education and may inspire teachers and policy makers alike to foster the appropriate environments for successful entrepreneurship education.

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TABLE 1 - The entrepreneurship programs and their characteristics

Name of the program (organization)	Schools in the program	Respondents	Main pedagogical methodology	Intensity ^a	Experiential ^b
Young Enterprize (Vlajo)	230	297	Student enterprize	I	H
Entrepreneur in the classroom (VKW)	214	810	Guest lecture	S	L
Dream-Day (Dream)	145	446	Guest lecture / company visit	S	L
Jieha! (Vlajo)	124	124	Student enterprize	I	H
Practice firm (Cofep)	72	501	Simulation game	I	M
The World at your feet (KVIV)	68	153	Guest lecture	S	L
Learn enterprize (UNIZO)	54	111	Student enterprize	I	H
COOS (DBO)	50	25	Competition	S	L
Ecoman (HUB)	47	359	Simulation game	M	M
Prize entrepreneurial school (UNIZO)	46	50	Competition	M	M
Virtual office (WEB)	43	15	Simulation game	I	M
Promising entrepreneur (DBO)	31	24	Business plan competition	S	L
TMF Stressfactor (Deadline)	25	60	Organizing event	M	H
The inventors – class edition (Flanders DC)	24	20	Workshop	M	M
NFTE-course (NFTE)	16	56	Business plan and lectures	I	H
Flanders DC Fellows (Flanders DC)	12	15	Guest lecture	S	L
Company visits East-Flanders (VOKA)	11	3	Company visit	S	L
All-in All-out Limburg (VOKA)	7	28	Guest lecture / company visit	S	L
Project entrepreneurship (HUB)	7	9	Simulation game	M	M
Flying Starters Brigade Antwerp (VOKA)	7	24	Guest lecture / company visit	S	L
Economic discoveries (VOKA)	7	0	Guest lecture / company visit	S	L

^aI=intense, M=intermediate, S=short

^bH=high, M= intermediate, L=low

TABLE 2 - Measurement instruments for survey questionnaire

Entrepreneurial intention (5-point scale: totally disagree – totally agree), adapted from Krueger, 1993
1. The likelihood that I will ever run my own business is very high.
SEE-model variables (5-point scale: totally disagree – totally agree), adopted from Krueger (1993) and Krueger et al. (2000)
<i>Perceived feasibility (Cronbach's α: t1=0,58, t2=0,58)</i>
1.I think it would be very cool to start my own business. 2.I would love to start my own business. 3.If I would start my own business, I would be constantly afraid to lose all my money. (-)
<i>Perceived desirability (Cronbach's α: t1=0,65, t2=0,63)</i>
1.I know what it takes to start a business. 2.I feel sure enough of myself to start my own business at some point in the future. 3.If I would start my own business, it would certainly be a success. 4.It looks very hard to me to start your own business. (-) 5.If I would start my own business, I would definitely be overworked. (-)
<i>Propensity to act (Cronbach's α: t1=0,65, t2=0,65)</i>
1. I'd rather make my own mistakes than listen to someone else's orders. 2. I would rather someone else take over the leadership role when I'm involved in a group project.(-) 3. I like to get a good idea of what a job is all about before I begin. (-) 4. I'd rather not have too much responsibility. (-) 5. I enjoy making my own decisions. 6. I consider myself to be generally more capable of handling situations than others are. 7. When I see a problem, I prefer to do something about it rather than sit by and let it continue. 8. Others usually know what is best for me.(-) 9. I like to wait and see if someone else is going to solve a problem so that I don't have to be bothered with it.(-)
Creativity (5-point scale: totally disagree – totally agree), adapted from Marsh & O'Neill (1984)
<i>"Problem solving" (Cronbach's α: t1=0,59, t2=0,60)</i>
1. I can often see better ways of doing routine tasks. 2. I am good at combining ideas in ways that others have not tried. 3. I am not very original in my ideas thoughts and actions. (-) 4. I am never able to think up answers to problems that haven't already been figured out.(-)
Attitude towards entrepreneurs (Eurobarometer, 2007)
<i>Image of entrepreneurship (Cronbach's α: t1=0,70, t2=0,73)</i>
1. Entrepreneurs are job creators. 2. Entrepreneurship is the basis of wealth creation, benefiting us all.

TABLE 3 - T-test for program effects through retrospective pretest and perceived change methodology

	Method 1: Retrospective pretest-values		T-test	Method 2: Perceived change	Mean	T-test	Correlation
	t1	t2	t _{2-t1}	<i>Due to the program, I have a / it's become...</i>	t2-t1	M1-M2	M1/M2
Intention to start own business	2.95	2.75	20**	"higher chance of starting my own business"	2.89	-2.69**	.238**
Creativity	3.31	3.42	11**	"more creative"	2.9	-2.79**	.117**
Attitude towards entrepreneurs	3.67	3.85	19**	N/A	N/A	N/A	N/A
Perceived feasibility	2.81	3.01	19**	"more feasible to start my own business"	3.11	-2.92**	.183**
Perceived desirability	3.07	3.18	11**	"more desirable to start my own business"	3.02	-2.92**	.233**
Propensity to act	3.32	3.58	26**	"better in solving problems"	2.93	-2.66**	.104**
				"faster in taking initiative"	3.07	-2.81**	.133**
				"more confident I can realize my own goals"	3.31	-3.05**	.109**

**p<0.001

TABLE 4 - Descriptive statistics and Pearson correlations

		Mean	SD	1	2	3	4	5	6	7	8	9
1	Intention (t1)	2.95	1.19	1								
2	Creativity (t1)	3.42	.61	.225**	1							
3	Attitude towards entrepreneurs (t1)	3.85	.69	.195**	.195**	.177**	1					
4	Perceived feasibility (t1)	3.01	.61	.583**	.295**	.121**	1					
5	Perceived desirability (t1)	3.18	.84	.668**	.216**	.179**	.562**	1				
6	Propensity to act ((t1)	3.58	.50	.276**	.495**	.231**	.326**	.284**	1			
7	Intention (t2)	2.75	1.17	.776**	.177**	.122**	.467**	.543**	.199**	1		
8	Creativity (t2)	3.31	.60	.171**	.827**	.121**	.249**	.168**	.410**	.190**	1	
9	Attitude towards entrepreneurs (t2)	3.67	.73	.144**	.147**	.733**	.075**	.115**	.187**	.178**	.168**	1
10	Perceived feasibility (t2)	2.81	.64	.437**	.209**	.048*	.707**	.444**	.192**	.570**	.255**	.099**
11	Perceived desirability (t2)	3.07	.83	.576**	.182**	.128**	.476**	.797**	.211**	.629**	.194**	.151**
12	Propensity to act (t2)	3.32	.40	.211**	.399**	.187**	.258**	.218**	.741**	.236**	.445**	.208**
13	Intention (t2-t1)	.20	.79	.357**	.076**	.116**	.187**	.205**	.124**	-.312**	-.023	-.045*
14	Creativity (t2-t1)	.11	.36	.099**	.321**	.096**	.092**	.094**	.159**	-.013	-.267**	-.027
15	Attitude towards entrepreneurs (t2-t1)	.19	.52	.056**	.024	.293**	.057**	.076**	.039	-.089**	-.078**	-.436**
16	Perceived feasibility (t2-t1)	.19	.48	.163**	.102**	.091**	.336**	.127**	.164**	-.164**	-.021	-.038
17	Perceived desirability (t2-t1)	.11	.53	.170**	.066**	.086**	.152**	.349**	.131**	-.114**	-.035	-.054*
18	Propensity to act (t2-t1)	.26	.34	.159**	.256**	.115**	.180**	.167**	.596**	.014	.075**	.028
19	Intensity	.64	.78	.041	.019	.008	.072**	.044*	.029	.012	-.017	-.011
20	Experientiality	.59	.76	.039	.035	.021	.063**	.047*	.042*	.006	-.011	.001
21	Evaluation of the activity	3.51	.81	.173**	.126**	.202**	.144**	.186**	.150**	.088**	.050*	.134**

TABLE 4 (continued) - Descriptive statistics and Pearson correlations

10	11	12	13	14	15	16	17	18	19	20	21
1											
.550**	1										
.267**	.225**	1									
-.186**	-.065**	-.029	1								
-.071**	-.016	-.066**	.168**	1							
-.075**	-.043*	-.046*	.216**	.165**	1						
-.428**	-.124**	-.027	.487**	.213**	.173**	1					
-.149**	-.287**	-.003	.426**	.175**	.187**	.393**	1				
-.033	.043*	-.098**	.217**	.314**	.112**	.277**	.200**	1			
-.002	.002	.003	.046*	.064**	.024	.093**	.063**	.043*	1		
.006	.009	.016	.051*	.078**	.026	.071**	.060**	.046*	.842**	1	
.039	.118**	.048*	.129**	.127**	.075**	.132**	.116**	.167**	.091**	.085**	1

TABLE 5 - Hierarchical regression models for the evolution of intentions, creativity, attitude towards entrepreneurs and predictor variables before and after the programs (N= 2160)

	Intention (t2-t1)		Creativity (t2-t1)		Attitude towards entrepreneurs (t2-t1)		Perceived feasibility (t2-t1)		Perceived desirability (t2-t1)		Propensity to act (t2-t1)	
	Step 1	Step 2	Step 1	Step 2	Step 1	Step 2	Step 1	Step 2	Step 1	Step 2	Step 1	Step 2
<i>Step 1: control variables</i>												
Gender	-0.048		-0.082	-0.076	-0.102	-0.097			-0.083	-0.076		
Age							0.060					
Grade	-0.086	-0.074					-0.065	-0.060				
Economics major	0.059	0.050			0.076	0.077	0.062	0.045				
Intrinsic motivation			0.175	0.153	0.117	0.098	0.043		0.057		0.208	0.181
Extrinsic motivation	0.099	0.104	-0.058	-0.055	-0.065	-0.062	0.064	0.069	0.057	0.063	-0.054	-0.049
T1 values of dependent variable	-0.338	-0.349	-0.289	-0.290	-0.463	-0.477	-0.440	-0.444	-0.310	-0.324	-0.132	-0.135
<i>Step 2: predictor variables</i>												
Intensity												
Experientiality				0.090								
Evaluation of the activity		0.145		0.109		0.115		0.133		0.144		0.141
R Square	0.119	0.141	0.100	0.117	0.217	0.230	0.193	0.217	0.098	0.122	0.056	0.076
Adjusted R Square	0.116	0.137	0.097	0.113	0.215	0.226	0.190	0.213	0.095	0.117	0.052	0.071
R Square Change		0.022		0.017		0.013		0.024		0.023		0.020

TABLE 6 - ANOVA of differences between levels of intensity, experientiality and evaluation of the activity on the intention, creativity, attitude towards entrepreneurs and predictor variables.

	Intensity			Experientiality			Evaluation of the activity		
	F	Sig	Eta ²	F	Sig	Eta ²	F	Sig	Eta ²
Intention	2.252	.105	.002	2.821	.060	.003	3.166	.000	.025
Creativity	4.495	.011	.004	6.683	.001	.006	3.101	.000	.025
Attitude towards entrepreneurs	.691	.501	.001	1.024	.359	.001	1.560	.067	.013
Feasibility	9.640	.000	.009	6.570	.001	.006	3.335	.000	.026
Desirability	4.295	.014	.004	4.120	.016	.004	2.602	.000	.021
Propensity to act	2.419	.089	.002	2.235	.107	.002	6.487	.000	.050