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Evaluating a University Entrepreneurial Programme in a Developing Country: Applying Rasch Measurement Theory to Attitude to Enterprise

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Abstract:

This paper examines the impact of an educational programme developed in Senegal with university students and designed to encourage entrepreneurship by influencing personal attitudes toward enterprise. The instrument to measure the entrepreneurial potential of young people has been applied in different socio-demographic contexts in some previous empirical research. Improvements in students' perception of attitudinal factors associated with leadership, creativity, achievement and intuition can be inferred from the results of the longitudinal analysis conducted. Moreover, a positive and significant relationship between students' perceived behavioural control and their attitudes toward starting a business at the end of the entrepreneurial programme is confirmed. Rasch Measurement Theory is applied to analyse the validity of the measurements and findings suggest that the scale used seems to be a reliable and valid tool for measuring entrepreneurial attitude in a university setting. Results confirm that entrepreneurship programmes have the potential to improve the entrepreneurial attitudes of students in a developing country.

Keywords: entrepreneurial education, attitude toward enterprise, developing countries, Rasch Measurement Theory

1 Introduction

A positive relationship between economic growth and entrepreneurship has been widely established for the African context (Antonites and Nonyane-Mathebula 2012). In recognition of the importance of entrepreneurship as a driver of economic growth and national prosperity, universities now offer entrepreneurial education as part of their curricula. Promoting entrepreneurship through education programmes aimed at providing knowledge and developing entrepreneurial skills could become a major force in the economic growth of developing countries (Antonites and Nonyane-Mathebula 2012). This is true of Senegal, a country which – according to the Ibrahim Index of African Governance in 2017 – was ranked 10th overall (out of 54), 13th for business environment, 23rd in satisfaction with employment creation and 21st in terms of absence of restrictions on foreign investment. Moreover, Senegalese university students have been shown in previous studies to possess important entrepreneurship potential (García-Rodríguez et al. 2015).

In view of the above, and bearing in mind that one of the key challenges for the future development of entrepreneurial education is the consolidation of approaches and methodologies to promote the link between entrepreneurship and education (Fayolle 2013; Fayolle and Liñán 2014), this work examines the impact of an entrepreneurship education programme in a university context in Senegal. Specifically, the study was conducted at the University of Gaston Berger, founded in 1990, and located in the north of the country, 10 km from the city of Saint Louis. The university had 5,347 students registered in the academic year 2010–2011.

From a methodological perspective, this study represents a new contribution in that, for the first time, Rasch Measurement Theory (RMT; Rasch 1961) – a technique for constructing linear measures from ordinal observations (Linacre 2002) – is incorporated into the evaluation of an entrepreneurship education programme.

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The paper is organised as follows. Section 2 presents the theoretical aspects justifying the conceptualisation of the model. Section 3 provides details of the empirical study carried out and the results obtained. Section 4 discusses the results and main conclusions, while also noting some implications, limitations and suggestions for future research.

2 The Role of Entrepreneurship Education in Attitudes toward Entrepreneurship

Among other conclusions, a review of the literature allows us to establish the growing consensus that "an entrepreneurial perspective can be developed in individuals" (Kuratko 2005, 578). Nevertheless, despite the abundance of literature on the importance of education in fostering entrepreneurial intention (Farashah 2013; Fayolle 2013; Fayolle and Gailly 2015; Souitaris, Zerbinati, and Al-Laham 2007; Zhang, Duysters, and Cloodt 2014; Lans, Blok, and Wesselink 2014), there is, as yet, no unanimous position on whether entrepreneurs are "born or made" (Henry, Hill, and Leitch 2005).

Authors such as Alvarez and Barney (2007) argue that success among entrepreneurs stems from their capacity to discover and exploit a business opportunity (discovery theory) and, on other occasions, their ability to create such opportunities based on their beliefs or previous experience (creation theory). These two approaches – discovery and creation – are not mutually exclusive and entrepreneurship education may therefore be defined as a process for providing individuals with the concepts and skills to recognise opportunities that others have overlooked and to have the insight and self-esteem to act where others have hesitated (Zhang, Duysters, and Cloodt 2014).

Entrepreneurship requires the application of energy and passion toward the creation and implementation of new ideas and creative solutions, and is much more, therefore, than simple business creation (Raposo and Do Paço 2011). Educational programmes can help fill the void and encourage more young people to consider business creation and ownership as a viable and reasonable option. From an educator's point of view, one of the aims of any entrepreneurship education is to give younger people a more realistic picture of entrepreneurship rather than an idealistic view of this professional choice (Joensuu et al. 2013). Thus, on commencing their studies students may overrate their intention to start a business, whereas after graduation they are more realistic about their own skills, the requirements for starting their own business and other career options.

Evidence exists in previous entrepreneurship education studies that it is possible to influence certain personality traits to strengthen the cognitive factors of entrepreneurial intention (Peterman and Kennedy 2003; Kuratko 2005; Souitaris, Zerbinati, and Al-Laham 2007; Zhao, Seibert, and Lumpkin 2010; Raposo and Do Paço 2011; Athayde 2012; Farashah 2013; Yang 2013). Furthermore, it is not clear that the most suitable indicator to evaluate the results of entrepreneurship education is the rate of new business creation, since the results of such programmes are not immediate (Raposo and Do Paço 2011). Therefore, instead, entrepreneurial intention is introduced as the main variable to be analysed (Athayde 2012; Farashah 2013; Yang 2013). However, most studies not only consider entrepreneurial intention, but also the desirability and feasibility of starting a business and students' degree of contact with entrepreneurial experiences within their environment. Previous studies have also found that entrepreneurial experience at school has a positive impact on pupils (Souitaris, Zerbinati, and Al-Laham 2007; Peterman and Kennedy 2003).

However, some authors have drawn attention to contradictory results and methodological weaknesses among the studies analysed (Fayolle 2013; Joensuu et al. 2013; Volery et al. 2013; Martin, McNally, and Kay 2013; García-Rodríguez et al. 2016; Nabi et al. 2018; Fayolle and Gailly 2015). Fayolle and Gailly (2015) point out that positive effects of entrepreneurship education are greater when previous entrepreneurial exposure has been weak or inexistent. Other results indicate that the differences between groups that participate in entrepreneurship programmes and groups that do not are due more to a loss of entrepreneurial intention in the group not participating in the programme than to an improvement in participating students' entrepreneurial intention (García-Rodríguez et al. 2016).

In this work, entrepreneurship education is assumed to play an influential role in the behaviour of potential entrepreneurs given that, through the knowledge acquired and practices developed, programmes of this nature can contribute to strengthening perceptions of security, confidence and personal self-esteem (Ferreira et al. 2012; García-Rodríguez et al. 2015; Martin, McNally, and Kay 2013; Pruett 2012; Volery et al. 2013; Zhang, Duysters, and Cloodt 2014). Most of these studies have been developed in American and European contexts. However, there has been little research into other territories with different cultural and economic issues, with only a few exceptions (e.g. Farashah 2013; Yang 2013). If we focus specifically on the African continent, there is clearly a lack of comparative studies in entrepreneurial education (García-Rodríguez et al. 2016).

With the previous antecedents in mind and taking into account that perceived entrepreneurial behaviour is a predictive factor for entrepreneurial attitude, the following hypothesis is posited:

H$_1$: The influence of perceived entrepreneurial behaviour on entrepreneurial attitude increases following an entrepreneurship education programme in a university context.

3 Methodology

3.1 Measurement Instrument

Athayde (2009) conceptualised the "entrepreneurial potential" of young people as the capacity to start a business based on five distinctive skills associated with entrepreneurial attitude:

– *Leadership:* skills and abilities such as "team building ", "building trust", being a "self-starter", "persuasiveness", "negotiation", "planning" and "decision taking".

– *Creativity:* students' attitudes toward the importance of creativity, how they felt about creativity and whether they thought they themselves were creative.

– *Achievement:* degree of interest aimed at achieving goals and objectives, included "being active", "busy" and "initiative".

– *Personal Control*: degree of self-esteem and personal confidence.

– *Intuition*: associated with the ability to cope with uncertainty and unstable circumstances associated with enterprise creation.

Based on an initial approach by Caird (1991), who developed the General Enterprise Tendency Test, Athayde (2009) designed a scale in which *intuition* was not included as a variable, since it was less commonly associated with entrepreneurship than the others and "it was not possible to find a solution that included the "intuition" construct and therefore this construct was omitted from the measure" (Athayde 2009, 489). However, Athayde did include intuition in subsequent research (Athayde 2012; Athayde and Hart 2012) to resolve weaknesses encountered in the definition of the construct domain.

In this work, the measurement instrument designed by Athayde (2009) to measure the effect of an educational programme (Young Enterprise Company Programme) on young people's attitudes toward enterprise is adapted for the purpose of evaluating entrepreneurial attitude among students.

Assuming that perceived behavioural control reflects the perceived ease or difficulty of starting a business and is related to the evaluation of personal capacities or entrepreneurial self-efficacy (Krueger, Reilly, and Carsrud 2000), we propose an analysis model (see Figure 1) in which the five entrepreneurial attitude skills or factors are related with a further dimension representing perceived entrepreneurial behavioural control.
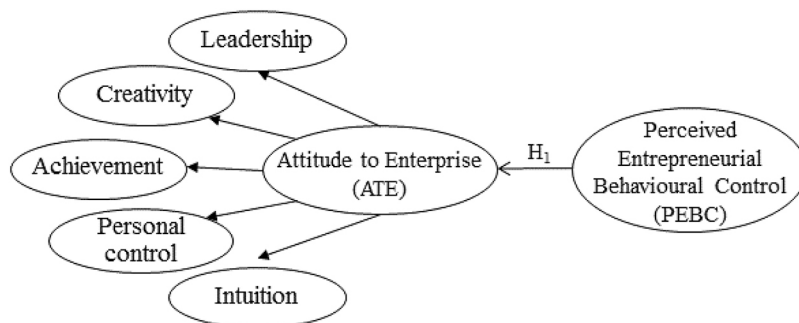

Figure 1: Analysis model.

Table 1 lists the questionnaire items classified into five groups which explain entrepreneurial attitude according to the personality traits set out in the ATE test (Athayde 2009). Control variables were included to categorise the students according to certain demographic factors and their perceptions concerning their intention to start a business, their future career preferences and their parents' entrepreneurial experience.

Table 1: Attitude to enterprise items.

Attitude to enterprise[b]

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Leadership
L1   I enjoy talking the class round to my point of view
L2   I usually take the initiative in any project I'm involved in
L3   I think I can easily carry my classmates with me when I have an idea
L4   I enjoy talking responsibility for things in the classroom
L5   I like taking the lead in projects at school
L6   When we do a school project, I'm right there at the centre of things

Creativity
C1   I believe that a good imagination helps you do well at school
C2   I enjoy lessons where the teacher tries out different ways of teaching
C3   Being creative is an advantage in lessons
C4   I like lessons that really stretch my imagination

Achievement
A1   I have a lot more energy than most people at school
A2   I like to get things off the ground when we're doing a project
A3   I'm usually the "driving force" among my friends
A4[a]   I like to have a role at the margins of a project

Personal control
P1   I like to get on with things in class rather than be taken through step-by-step by the teacher
P2   I usually get on with things in class rather than wait for everyone else
P3[a]   I don't like lessons where we are left on our own to get on with our work
P4   I prefer to figure things out on my own rather than rely on a teacher to explain everything

Intuition
I1   Making mistakes is a good way to learn
I2   I don't like making decisions unless I have all the facts
I3   I'll have a guess at a solution to a problem rather than give up

Perceived Behavioural Control[c]: Perception of the ease or difficulty of entrepreneurship
Pbc1   To what degree do you think it would be difficult to start up a firm?
Pbc2   To what degree do you feel sure about being successful with it?
Pbc3   Do you think starting up a firm would require a great effort?
Pbc4   Do you think you have the necessary knowledge to start up a firm?
Pbc5   To what degree do you have confidence in yourself to start up a firm?

[a]Scores reversed for these items
[b]Athayde (2009)
[c]Kolvereid (1996) and Peterman and Kennedy (2003)

A Likert-type scale featuring 7 categories (1 = Very strongly disagree to 7 = Very strongly agree) was used for the responses. The questionnaire was adapted to the context and translated into the language of the study sample population.

3.2   Sample and Data Analysis

The study was conducted with a group of university students who volunteered to take part in an entrepreneurship programme[1] at the Université Gaston Berger in Saint-Louis (Senegal) during the 2011–2012 and 2012–2013 academic years. Data were collected using a questionnaire distributed directly in the classroom under the supervision of the lecturer responsible. The questionnaire was distributed at the beginning of the programme (February 2012) and again at the end (November 2013). Of the 166 participating students a sample of 128 was obtained (response rate = 77 %). A total of 256 questionnaires were received from students who took the questionnaire at the start and end of the programme. These students were studying for degrees in Business (39 %), Education (37 %) or Engineering (24 %).

Following coding and preliminary analysis of missing data, 22 questionnaires were eliminated (2 from the initial and 20 from the final sample). The gender distribution of the resulting sample was 76 % male and 24 % female. This proportion is similar to that described by Efionayi and Piguet (2014) for the student profile at the Université Gaston Berger during 2009–2010, where 61 % of the students were male and 39 % female. In relation to the above percentages it should be noted that in 2011, the literacy rate among Senegalese women aged 15–24 was 59 %,[2] in a country characterised by a highly specific cultural context presenting multiple and important cultural differences compared to a developed country. Table 2 summarises the statistics for some of

the descriptive variables in the two samples taken at the beginning and end of the entrepreneurial programme, respectively.

Table 2: Entrepreneurial programme results.

	Before $n = 126$ Mean (std. dev)	After $n = 108$ Mean (std. dev)	Asympt. sig. (bilateral)[a]
Students with high intention	0.72	0.91	
Age	21 (2.2)	23.7 (2.5)	
Ent. intention[b]	5.7 (1.5)	6.4 (1.4)	0.000
Work preferences[c]	6.2 (1.5)	6.6 (1.1)	0.004
Parental experience[d]	3.6 (2.3)	3.6 (2.1)	0.876

Notes: [a]Mann–Whitney test. Grouping variable: before/after entrepreneurial programme
[b]Do you think that one day you will start up a firm? (1 = I am absolutely sure I won't to 7 = I am absolutely sure I will)
[c]Among your alternatives for future work, would you prefer to start up a firm or work as an employee? (1 = I am very clear that I want to work as an employee to 7 = I am very clear that I want to have a firm)
[d]Parents' experience of starting up a firm (1 = they have never started up a firm, nor even thought about it to 7 = They have been starting up firms all their lives)

In contrast to the results obtained in the study by Joensuu et al. (2013), who observed a decline in entrepreneurial intention in a sample of Finnish students analysed over a 3-year period, Table 2 shows an increase in the mean value of the intention to start up a firm on completion of the entrepreneurial programme (Ent. Intention: 5.7 < 6.4) and in the intention to seek self-employment (Work Preferences: 6.2 < 6.6). The differences are statistically significant ($p < 0.05$), and thus the hypothesis of equality of measurements in the two samples analysed is not confirmed. As expected, and in line with the results obtained by Steenekamp, Van der Merwe, and Athayde (2011), said equality is observed in the case of the variable Parental Experience in starting a business ($p > 0.05$).

3.3   Fundamentals of Rasch Measurement Theory

Wright and Mok (2004) established that in order to construct inference from observation of a phenomenon, the measurement model used must, among others, produce linear measures. The family of Rasch measurement models (Rasch 1961) constitutes the only available technique for the construction of linear measures from ordinal observations. Two fundamental properties stand out among the main advantages of RMT. Firstly, so-called specific objectivity or the capacity of a measurement to be considered valid and generalisable. Secondly, "unidimensionality" which uses conjoint measurement to facilitate interpretation of the interactions between the scores of the subjects and the items along the same linear continuum, thus giving the tool great diagnostic richness.

It should be noted that the RMT model differs from Likert scales in that it does not rely on the following assumptions: (a) all items have the same descriptive impact on the scoring of the scale and (b) all item categories maintain the same distance from the adjacent category for all items (Fischer, Frewer, and Nauta 2006). RMT has been widely used in educational settings to create and validate the psychometric properties of scales of measurement (Waugh 2002).

For a more accurate analysis of the data and to ensure metric equivalence of the scores obtained in the samples taken at the beginning and end of the entrepreneurial programme, the data structure shown in Figure 2 was adopted. Shaded areas in the matrix represent missing data given that, although the responses obtained correspond to the same group of participants, no individualised identification of participants was carried out in the questionnaire for subsequent matching of the start and end responses given by each student.
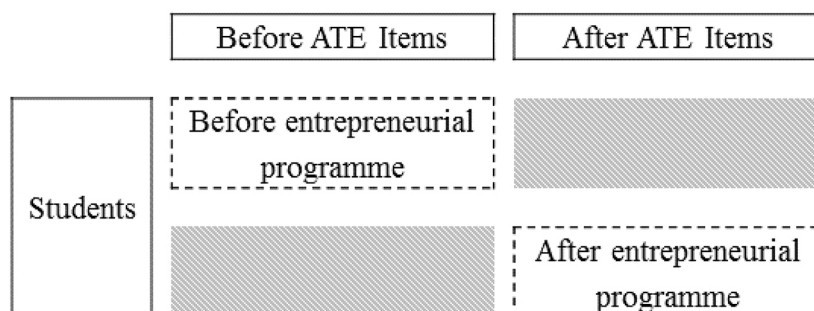
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Figure 2: Longitudinal Rack analysis of attitude toward enterprise.

A preliminary analysis of the functioning of the categories used in the measurement scale was carried out to gain insight into how the data cooperate to construct measures. The results reflected in Figure 3 show the category probability curves of the ATE scale with the initial rating for seven scores and the final rating for four scores.
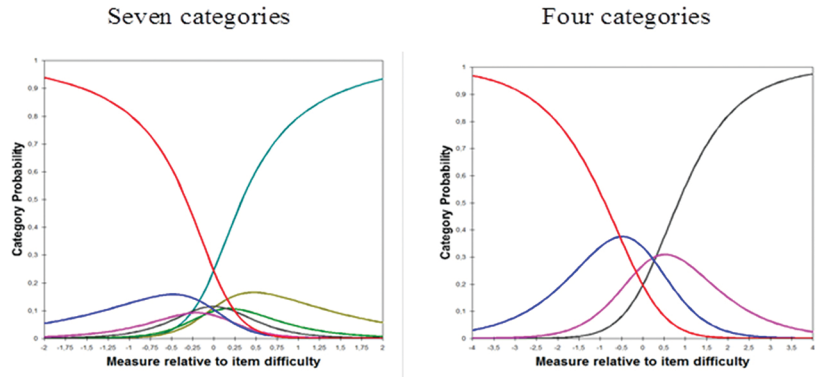

Figure 3: Category probability curves of the seven and four categories of the ATE scale.

Furthermore, we describes in Table 3 the functioning of the seven categories of the ATE scale. All are sufficiently well represented, although category 7 displays a high frequency with 2,032 observations (42 %). The observed average measures advance monotonically in a smooth distribution from −0.17 to 0.60. The outfit values are below 2, indicating – in accordance with Linacre (2002) – that observations support useful information. Categories 3, 4 and 5 are never the most probable category on the latent variable (see left side of Figure 3), leading to disordered Rasch–Andrich thresholds. The threshold of category 4 (−0.34) shows a disorder that may indicate that this category represents too narrow a segment of the latent variable or corresponds to a concept that is poorly defined in the minds of respondents (Linacre 2002).

Table 3: Summary of the 7-category structure of the ATE scale.

Category level	Category count	Category %	Average measure	Expected measure	Outfit MNSQ	Threshold
1	679	14	−0.17	−0.24	1.24	NONE
2	300	6	−0.14	−0.08	1.07	0.63
3	255	5	−0.01	0.06	0.95	0.16
4	408	8	0.11	0.19	0.80	−0.34
5	443	9	0.30	0.32	0.72	0.17
6	691	14	0.47	0.45	0.85	−0.06
7	2032	42	0.60	0.59	1.36	−0.56

Consequently, the scale categories were recorded, and the number of levels reduced from seven to four. As shown in Table 4 and the right-hand side of Figure 3, category 1 remained 1; categories 2, 3 & 4, and 5 & 6, respectively, were combined; and category 7 became new category 4, thus producing a four-category structure in total. Table 4 shows that the threshold of the categories increases monotonically with less than 1.4 logits and none shows a misfit.

Table 4: Summary of the 4-category structure of the ATE scale.

Category level	Category count	Category %	Average measure	Expected measure	Outfit MNSQ	Threshold
1	679	14	−0.32	−0.46	1.21	None
2	963	20	−0.02	0.13	0.9	−0.54
3	1134	24	0.66	0.64	0.79	0.22
4	2032	42	1.17	1.15	1.19	0.31

In short, the recoding of the ATE scale improves the functioning of the scale and increases the usefulness of the measures obtained for measuring attitude toward entrepreneurship, as described in the sections that follow.

4 Results

4.1 Reliability and Validity of the ATE Scale Measures

The scores obtained in the questionnaire process were adjusted by means of a reliability and validity analysis using RMT. Winsteps software (version 3.81.0) was implemented to estimate the model parameters using the maximum likelihood method. The statistics representing the variance-weighted Mean Square Residuals (MNSQ) were used to test the fit to the model (see Table 5). The expected value of the statistics is 1 and values between 0.50 and 1.50 are deemed acceptable by convention (Linacre 2002). To analyse the reliability of the measurements Winsteps reports Person Separation Index, values 0.7 or more indicating a well-fitting Rasch model (Nunnally 1978).

Table 5: ATE scale quality statistics.

	Measure		Infit MNSQ		Outfit MNSQ		Separation index	Reliability
	Mean	SD	Mean	SD	Mean	SD		
Students	0.61	0.68	1.00	0.50	1.06	0.70	2.26	0.84
Items	0.00	0.62	0.99	0.29	1.06	0.51	5.26	0.97

The quality of the measurements is confirmed given that, on the one hand, a good global fit of the data to the model is obtained – MNSQ infit and outfit values falling within the optimum interval – and, on the other, the reliability of the student and item scores exceeds 0.80. For its part, the variance explained by the model reaches 39.7 %, with an eigenvalue of 3.2 in the first contrast. Following Linacre (2014), this result lends support to the premise of the unidimensionality of the scale since it meets the requirement that the variance explained by the items (25.9 %) is more than four times higher than that explained by the first contrast (4.6 %).

4.2 ATE Scale Longitudinal Study

Once it was confirmed that attitudes toward entrepreneurship can be analysed using the questionnaire scores, a longitudinal Rack analysis (Wright 2003) applying RMT was conducted to identify variations in personal attitudes toward entrepreneurship between the beginning and the end of the entrepreneurial programme. To perform this comparative analysis, 234 observations for each of the 21 latent variable items corresponding to the two reference periods (i.e. 126 student scores before and 108 after the programme) were used. Running the joint sample allowed the measurements for the items and students to be placed on the same scale for comparison, as shown in Table 6, which summarises the global fit results. Outfit and infit values quite close to 1 and positive PTMEA values (point-measure correlation between the observations on the item and the corresponding person measures) reflect relatively good overall results.

Table 6: ATE scale Rack analysis: before/after entrepreneurial programme.

Items	Score	Count	Measure	S.E.	Infit		Outfit		PTMEA	Mean
					MNSQ	ZSTD	MNSQ	ZSTD		
bA1	270	118	0.75	0.10	0.64	−3.90	0.64	−3.50	0.50	2.29
aA1	274	105	0.57	0.11	0.70	−2.90	0.74	−2.20	0.47	2.61
bA2	340	123	0.18	0.10	0.67	−3.60	0.65	−3.40	0.56	2.76
aA2	335	104	−0.20	0.12	0.74	−1.90	0.71	−1.80	0.62	3.22
bA3	281	123	0.72	0.10	0.68	−3.40	0.75	−2.30	0.45	2.28
aA3	295	102	0.26	0.11	0.67	−3.10	0.65	−2.80	0.64	2.89
bA4	236	121	1.16	0.10	1.53	3.90	1.93	5.40	0.12	1.95
aA4	203	98	1.19	0.11	1.59	4.10	1.66	3.80	0.23	2.07
bC1	398	125	−0.33	0.11	1.21	1.60	1.15	1.00	0.51	3.18
aC1	372	106	−0.73	0.14	0.72	−1.70	0.68	−1.50	0.65	3.51
bC2	437	126	−0.83	0.13	1.17	1.10	1.17	0.90	0.51	3.47
aC2	382	106	−0.98	0.16	1.08	0.40	0.92	−0.20	0.59	3.60
bC3	416	125	−0.57	0.12	1.01	0.10	0.96	−0.20	0.54	3.33
aC3	375	104	−0.93	0.16	1.01	0.10	1.03	0.20	0.55	3.61

bC4	393	123	−0.37	0.11	1.08	0.70	1.03	0.20	0.53	3.20
aC4	370	104	−0.87	0.15	0.73	−1.50	0.62	−1.80	0.65	3.56
bI1	395	122	−0.43	0.11	1.46	3.20	1.54	3.10	0.36	3.24
aI1	347	105	−0.33	0.13	1.12	0.90	1.10	0.60	0.47	3.30
bI2	427	124	−0.79	0.13	1.28	1.70	1.53	2.50	0.40	3.44
aI2	380	106	−0.93	0.16	1.15	0.80	1.16	0.70	0.53	3.58
bI3	410	125	−0.49	0.11	1.23	1.70	1.22	1.30	0.43	3.28
aI3	373	108	−0.62	0.14	0.94	−0.30	1.03	0.20	0.54	3.45
bL1	346	125	0.19	0.10	1.02	0.30	1.03	0.30	0.49	2.77
aL1	345	108	−0.17	0.12	0.82	−1.30	1.16	1.00	0.55	3.19
bL2	380	125	−0.15	0.10	0.80	−1.90	0.76	−2.00	0.56	3.04
aL2	344	107	−0.21	0.12	0.83	−1.30	0.84	−0.90	0.63	3.21
bL3	380	125	−0.15	0.10	0.77	−2.10	0.72	−2.30	0.58	3.04
aL3	354	104	−0.51	0.14	0.68	−2.10	0.60	−2.20	0.69	3.40
bL4	328	124	0.32	0.10	1.15	1.50	1.10	0.90	0.50	2.65
aL4	346	106	−0.29	0.12	0.95	−0.30	1.00	0.10	0.51	3.26
bL5	297	118	0.46	0.10	0.81	−1.90	0.79	−2.00	0.55	2.52
aL5	332	104	−0.12	0.12	0.66	−2.80	0.66	−2.30	0.66	3.19
bL6	293	124	0.65	0.10	0.73	−2.90	0.81	−1.80	0.53	2.36
aL6	323	105	−0.01	0.11	0.67	−2.90	0.67	−2.40	0.59	3.08
bP1	320	126	0.45	0.09	1.01	0.20	1.03	0.30	0.45	2.54
aP1	286	108	0.53	0.10	0.89	−1.00	0.91	−0.70	0.54	2.65
bP2	338	125	0.26	0.10	0.82	−1.80	0.84	−1.40	0.48	2.70
aP2	302	108	0.36	0.11	1.11	1.00	1.16	1.20	0.47	2.80
bP3	269	126	0.91	0.10	1.75	5.80	1.88	5.90	0.16	2.13
aP3	199	107	1.51	0.12	1.61	4.00	1.75	4.36	0.00	1.86
bP4	354	124	0.10	0.10	1.03	0.30	1.09	0.80	0.44	2.85
aP4	290	106	0.43	0.11	1.11	1.00	1.11	0.90	0.49	2.74

To facilitate the interpretation of the results given in Table 6, the results of the Rack analysis measurements are illustrated in Figure 4. Points situated very close to the diagonal represent items which underwent very little variation in students' perception during the time interval studied (A4, P1, P2). Items situated above the diagonal (A4, I1, P1, P2, P3 and P4) represent attitudinal factors which evolved negatively during the programme given that students' perception of these items, as factors that determine entrepreneurship, declined. Conversely, those below the diagonal indicate improved perception on the part of students with respect to the importance of the items in measuring attitude toward enterprise.
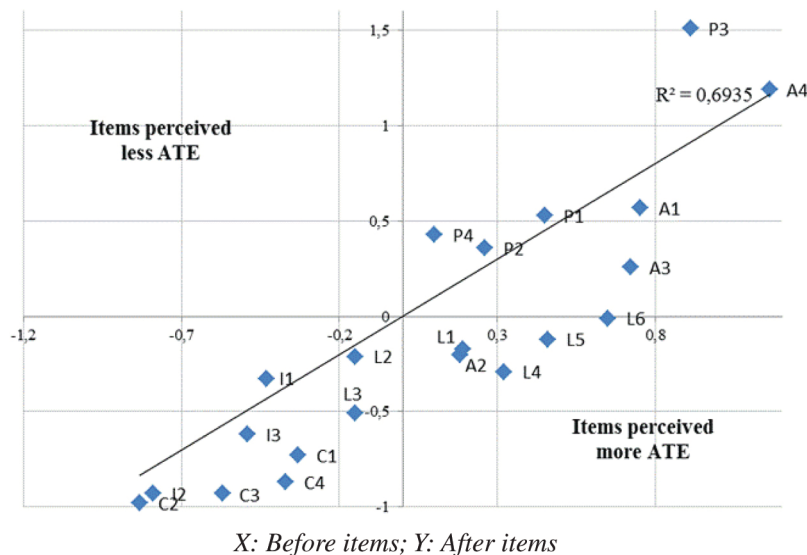

X: Before items; Y: After items

Figure 4: ATE scale Rack analysis.

Broadly speaking, students manifested a better attitude toward entrepreneurship at the end of the programme in almost all the variables defining the construct, except for those grouped under the factor identified with Personal Control. In other words, students' perceptions of their level of self-esteem and personal confidence to undertake work and solve problems diminished. To the contrary, attributes associated with leadership capacity, creativity, academic achievement and intuition showed clear improvement in students' perceptions.

In order to identify possible differences in the entrepreneurship programme participants' perception of the five attitudinal factors defined by the personal traits of the measurement scale, a DIF analysis by item sub-categories was conducted (see Table 7).

Table 7: Analysis of perceived differences by ATE category items.

Difference measure	Size dif	SE	t	p < 0.05
Achievement	0.25	0.35	−0.71	0.51
Creativity	0.36	0.13	−2.79	0.05
Intuition	0.06	0.20	−0.28	0.80
Leadership*	0.44	0.15	−2.93	0.02
Personal control	0.28	0.43	0.43	0.43

The interpretation of the results highlights statistically significant differences (p <0.05) in the variables of the Leadership attribute. However, based on the classification offered by Linacre (2014) for determining the effect size of the differences proposed by the *Educational Testing Service,* a low value (Dif Size < 0.43) is considered non-significant and the effect of the difference can be disregarded. Here the difference is 0.44 and the effect is therefore assumed to be between non-significant and moderate.

In the case of the students, the interpretation of the Rasch analysis results helps confirm statistically significant differences ($p = 0.02$) in the scores accorded to the items at the start and end of the programme. However, in view of the size of the difference (0.23 < 0.43), the effect can be considered non-significant (Linacre 2014) and, consequently, it can be assumed that the students follow the same mental reasoning processes when interpreting the questionnaire items at the beginning and at the end of the entrepreneurial programme.

4.3   Influence of the Entrepreneurial Programme

A structural equations methodology, in this case the Partial Least Squares Structural Equation Modeling (PLS-SEM) estimation technique, was used for the path analysis represented in the model of Figure 1. The latent variable ATE is a second-order construct on which five first-order factors depend, each representing one of the five attitudinal categories proposed by Athayde and Hart (2012). The hierarchical components method was used to estimate the molar second-order construct (ATE). The effect of the entrepreneurial programme on the relationship between the latent variables PBC and ATE was analysed through multigroup comparison and both models were tested based on the intensities of path coefficients (β), whose values need to be at least 0.2 and ideally be above 0.3 to be considered significant. The stability of the estimations was tested with t-statistics obtained using a bootstrap with 500 samples.

The results confirm an increase in the intensity of the relationship between PEBC and ATE in the sample taken at the end of the entrepreneurship program ($\beta_{\text{after}} = 0.36 > \beta_{\text{before}} = 0.25$). The relationship is not statistically significant in the initial sample but is significant at the end of the program ($\beta_{\text{after}} = 0.36$, $p < 0.05$). In consequence, we confirm the hypothesis posited in the research model (see Figure 1), namely, the entrepreneurial program influences the relationship between perceived entrepreneurial behavioural control and participating students' attitudes toward entrepreneurship.

Regarding the predictive power of the model (R^2), according to Sarstedt et al. (2014), as a ''rough'' rule of thumb, R^2 values of 0.75, 0.50 and 0.25 may be considered substantial, moderate and weak. In the case studied here, despite the model's weak predictive power (R^2 below 0.25 in both samples), the results reveal an increase in the ATE variance explained by PEBC at the end of the program (1.6 > 4.4 %).[3]

Finally, the model's predictive relevance was analysed (Q^2 test). As a rule of thumb, Q^2 values greater than zero for a particular endogenous construct indicate that the path model's predictive accuracy is acceptable for that particular construct (Chin 1998). This study used the cross-validated redundancy approach for calculating Q^2 (Hair et al. 2014). Running the blindfolding procedure with an omission distance of seven yielded cross-validated redundancy values, well above zero for all endogenous constructs, providing support for the model's predictive relevance in both samples.

5   Discussion and Conclusions

Theoretical and empirical research on entrepreneurship education seems to have consolidated in the last two decades with important works focused on the impact of the programmes on students' entrepreneurial intention

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(Souitaris, Zerbinati, and Al-Laham 2007; Athayde 2009, 2012; Athayde and Hart 2012; Pruett 2012; Fayolle 2013; Farashah 2013; Joensuu et al. 2013; Volery et al. 2013; Zhang, Duysters, and Cloodt 2014; Lans, Blok, and Wesselink 2014; Fayolle and Gailly 2015 or Nabi et al. 2018). However, there is still little understanding of how entrepreneurship programmes impact on intention, even with some studies' results suggesting that the sense of the relationship is unclear (Fayolle 2013; Joensuu et al. 2013; Volery et al. 2013; Martin, McNally, and Kay 2013; García-Rodríguez et al. 2016; Nabi et al. 2018).

Moreover, in most cases empirical literature has focused on developed countries, despite previous literature highlighting that application of entrepreneurship education programmes in each country should be different and based on the cultural context (Mueller and Thomas 2001; Lee, Chang, and Lim 2005; Lee et al. 2006). A few recent studies have provided a review of the effectiveness of various entrepreneurship programmes in developing countries (Cho and Honorati 2014; Grimm and Paffhausen 2015). However, these authors have focused on answering the question *what type of intervention is most effective for whom and with what outcomes?* For example, Cho and Honorati (2014) were interested in which interventions and combinations of programmes were most effective in enabling the poor to start up and grow their own businesses rather than their attitudes to enterprise. Similarly, Grimm and Paffhausen (2015) focused on the impact of the entrepreneurial programs mainly on job creation, income stabilisation and poverty reduction.

Bearing in mind the theoretical considerations drawn from a review of the specific literature, we analysed the psychometric capacity of the ATE test proposed by Athayde (2009) to evaluate changes in the five factors that determine attitudes towards enterprise: leadership, creativity, achievement, personal control and intuition. The main aim has been to evaluate the influence of an entrepreneurship education programme on entrepreneurial attitude in a group of students from a developing country (Senegal).

The empirical study conducted here represents a new contribution and an alternative methodology for testing the impact of an entrepreneurship programme on entrepreneurial potential. RMT methodology is applied for the first time to evaluate Athayde's ATE test. Consequently, we overcome the limitations of classical test theory as regards the creation and validation of measurements (Waugh 1999, 2002).

Based on the "specific objectivity" property of RMT, the results obtained have enabled us to establish that the comparisons between students are independent of the items. Similarly, the item parameter estimations are not influenced by the distribution of the sample used for the calibration. Accordingly, the application of the RMT approach in the process of the construction and validation of measurements affords new evidence of the validity of the ATE test (Athayde 2009, 2012). The reliability and fit indicators shown in Table 5 confirm the validity of the measurement instrument and, taken together with the results of previous works (Athayde 2009, 2012; Chell and Athayde 2011; Steenekamp, Van der Merwe, and Athayde 2011; Athayde and Hart 2012), they contribute to the generalisation of the attitude to enterprise construct.

The conjoint analysis provided by RMT of the score positions with respect to the mean value of the distribution reveals that the students' mean is situated above the mean of the item calibrations. In other words, students' perception of the entrepreneurial attitude factors is higher than the mean score obtained by the items.

The longitudinal analysis using the Rack approach to evaluate the effect of the entrepreneurial programme has allowed us to identify items which evolved positively in the sense that students' mean evaluation of the attitude to enterprise variables improved at the end of the programme. Specifically, the mean scores for 90 % of the items making up the latent variable increased at the end of the programme. These attitudinal variables correspond to the distinctive individual capacities associated with "leadership", "creativity", "achievement" and "intuition". Similarly, it can be inferred that the programme did not positively influence the variables that measure the "personal control" attitudinal factor (see Figure 4). As noted by Joensuu et al. (2013), on completing an entrepreneurial programme, students acquire a more realistic view of the process of starting a new business and this can negatively influence self-esteem and personal confidence.

Differential item functioning (DIF) analysis reveals no significant differences in four of the five ATE categories. In other words, Achievement, Creativity, Intuition and Personal Control are interpreted similarly by the students irrespective of when they completed the questionnaire. Significant, albeit moderate, differences are detected only in the variables identified with Leadership (see Table 7). Overall, the results show that students follow the same mental reasoning in responding to the items determining entrepreneurial attitude at the two time points studied.

The results of the structural analysis allow us to infer new evidence in the study of entrepreneurship. The case examined here illustrates the increase in the positive and significant effect obtained in the relationship between the latent variables PEBC and ATE ($\beta_{\text{after}} = 0.36 > \beta_{\text{before}} = 0.25$). This outcome confirms the hypothesis concerning the positive influence of an entrepreneurial programme on the relationship between entrepreneurial behaviour and university students' attitude toward starting a business.

Our results have several important theoretical and practical implications. For researchers, this study provides a conceptual model of attitude to enterprise and a robust methodology for the evaluation of entrepreneurial programmes in higher education, clarifying and explaining contradictory results of some pre-

vious studies (Fayolle 2013; Joensuu et al. 2013; Volery et al. 2013; Martin, McNally, and Kay 2013; García-Rodríguez et al. 2016; Nabi et al. 2018). For practitioners (public and private sector managers, teachers and politicians) the above results are of major interest to the extent that they highlight the effectiveness of entrepreneurial programmes in developing countries as a tool for improving economic activity through promoting positive attitudes towards this activity. The study provides a measurement scale that is useful to identify the most and least relevant aspects of university students' entrepreneurial potential. Moreover, through different classification criteria, the use of RMT facilitates a deeper knowledge, based on groups of students or groupings of items, to design specific training actions. Thus, efforts could be directed toward converting the entrepreneurial potential of students displaying greater attitude to enterprise into a firm intention to start a business. By contrast, the group displaying least attitude could be steered toward the successful attainment of those items that are most difficult to achieve but which influence entrepreneurial potential the greatest. Encouraging an "attitude to enterprise" of young people should be a policy priority in response to the recognition of the contributions enterprises and small firms make to economies in developing countries. This is especially relevant in many parts of the developing world that are facing a 'youth bulge' and aspiring to provide young people with meaningful opportunities.

Contributions aside, this study is subject to a number of potential limitations. Firstly, in the design of future analyses, it would be useful to include control groups that would confirm and isolate the differences identified in groups or individual students undergoing the intervention from external effects. Secondly, given the paucity of studies on entrepreneurial programmes in cultural and socioeconomic contexts such as that analysed here, further research is needed to corroborate the results obtained in this work. In this sense, it would be necessary to determine to what extent other developing countries' specific contexts produce the same results in entrepreneurship education programmes. Additionally, in the design of future analysis, it would be useful to include control groups that would allow the differences identified in students undergoing the intervention to be confirmed and isolated from possible external effects.

Notes

1 EMSECAN is part of a European cooperation project funded by the European Regional Development Fund through the Transnational Cooperation Programme (2007–2013). March 2016. http://www.pct-mac.org/registroficha?id=4efc7f7b-f2cd-4ee9-9148-c4d5ef9e6169.
2 World Development Indicators: Statistics in Africa (Last updated database: 9/24/2014) http://data.worldbank.org/country/senegal#cp_wdi.
3 Results for SmartPLS software: $R^2_{before} = 0.064$; correlation $_{before}$ (ATE-PEBC) = 0.252; $R^2_{after} = 0.123$; correlation $_{after}$ (ATE-PEBC) = 0.359.

References

Alvarez, S. A., and J. B. Barney. 2007. "Discovery and Creation: Alternative Theories of Entrepreneurial Action." *Strategic Entrepreneurship Journal* 1 (1–2): 11–26.
Antonites, A., and B. Nonyane-Mathebula. 2012. "Engineers as Entrepreneurs: Entrepreneurial Orientation of Engineers in South Africa." *South African Journal of Industrial Engineering* 23 (1): 1–17.
Athayde, R. 2009. "Measuring Enterprise Potential in Young People." *Entrepreneurship: Theory & Practice* 33 (2): 481–500.
Athayde, R. 2012. "The Impact of Enterprise Education on Attitudes to Enterprise in Young People: An Evaluation Study." *Education Training* 54 (8/9): 709–26.
Athayde, R., and M. Hart. 2012. "Developing a Methodology to Evaluate Enterprise Education Programmes." *International Review of Entrepreneurship* 10 (3): 1–24.
Caird, S. 1991. "The Enterprising Tendency of Occupational Groups." *International Small Business Journal* 9 (4): 75–81.
Chell, E., and R. Athayde. 2011. "Planning for Uncertainty: Soft Skills, Hard Skills and Innovation." *Reflective Practice* 12 (5): 615–28.
Chin, W. W. 1998. "The Partial Least Squares Approach to Structural Equation Modeling." *Modern Methods for Business Research* 295 (2): 295–336.
Cho, Y., and M. Honorati. 2014. "Entrepreneurship Programs in Developing Countries: A Meta Regression Analysis. The World Bank." *Labour Economics* 28: 110–30.
Efionayi, D., and E. Piguet. 2014. "Les étudiants d'Afrique de l'Ouest face à la globalisation du savoir." *International Development Policy. Revue Internationale de Politique de Développement*. February 2015. http://www.snis.ch/system/files/partir_rester_rapport_senegal_2.pdf.
Farashah, A. D. 2013. "The Process of Impact of Entrepreneurship Education and Training on Entrepreneurship Perception and Intention: Study of Educational System of Iran." *Education Training* 55 (8/9): 9–9.
Fayolle, A. 2013. "Personal Views on the Future of Entrepreneurship Education." *Entrepreneurship and Regional Development* 25 (7–8): 692–701.
Fayolle, A., and B. Gailly. 2015. "The Impact of Entrepreneurship Education on Entrepreneurial Attitudes and Intention: Hysteresis and Persistence." *Journal of Small Business Management* 53 (1): 75–93.
Fayolle, A., and F. Liñán. 2014. "The Future of Research on Entrepreneurial Intentions." *Journal of Business Research* 67 (5): 663–66.
Ferreira, J. J., M. L. Raposo, R. G. Rodrigues, A. Dinis, and A. Do Paço. 2012. "A Model of Entrepreneurial Intention: An Application of the Psychological and Behavioral Approaches." *Journal of Small Business and Enterprise Development* 19 (3): 424–40.

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Fischer, A. R., L. J. Frewer, and M. J. Nauta. 2006. "Toward Improving Food Safety in the Domestic Environment: A Multi-Item Rasch Scale for the Measurement of the Safety Efficacy of Domestic Food-Handling Practices." *Risk Analysis* 26 (5): 1323–38.

García-Rodríguez, F. J., E. Gil-Soto, I. Ruiz-Rosa, and P. M. Sene. 2015. "Entrepreneurial Intentions in Diverse Development Contexts: A Cross-cultural Comparison between Senegal and Spain." *International Entrepreneurship and Management Journal* 11 (3): 511–27.

García-Rodríguez, F. J., C. I. Ruiz-Rosa, E. Gil-Soto, and D. Gutiérrez-Taño. 2016. "Promoting Entrepreneurship Education among University Students: Design and Evaluation of an Intervention Programme." *Cultura y Educación* 28 (3): 565–600.

Grimm, M., and A. L. Paffhausen. 2015. "Do Interventions Targeted at Micro-entrepreneurs and Small and Medium-sized Firms Create Jobs? A Systematic Review of the Evidence for Low and Middle Income Countries." *Labour Economics* 32: 67–85.

Hair, J. F., Jr., M. Sarstedt, L. Hopkins, and V. G. Kuppelwieser. 2014. "Partial Least Squares Structural Equation Modeling (PLS-SEM): An Emerging Tool in Business Research." *European Business Review* 26 (2): 106–21.

Henry, C., F. Hill, and C. Leitch. 2005. "Entrepreneurship Education and Training: Can Entrepreneurship Be Taught? Part I." *Education Training* 47 (2): 98–111.

Joensuu, S., A. Viljamaa, E. Varamäki, and E. Tornikoski. 2013. "Development of Entrepreneurial Intention in Higher Education and the Effect of Gender–A Latent Growth Curve Analysis." *Education Training* 55 (8/9): 4–4.

Kolvereid, L. 1996. "Organizational Employment versus Self-employment: Reasons for Career Choice Intentions." *Entrepreneurship Theory and Practice* 20 (3): 23–31.

Krueger, N. F., Jr., M. D. Reilly, and A. L. Carsrud. 2000. "Competing Models of Entrepreneurial Intentions." *Journal of Business Venturing* 15 (5): 411–32.

Kuratko, D. F. 2005. "The Emergence of Entrepreneurship Education: Development, Trends and Challenges." *Entrepreneurship Theory and Practice* 29 (5): 577–98.

Lans, T., V. Blok, and R. Wesselink. 2014. "Learning Apart and Together: Towards an Integrated Competence Framework for Sustainable Entrepreneurship in Higher Education." *Journal of Cleaner Production* 62: 37–47.

Lee, S. M., D. Chang, and S. B. Lim. 2005. "Impact of Entrepreneurship Education: A Comparative Study of the US and Korea." *International Entrepreneurship and Management Journal* 1 (1): 27–43.

Lee, S. M., S. B. Lim, R. D. Pathak, D. Chang, and W. Li. 2006. "Influences on Students Attitudes toward Entrepreneurship: A Multi-country Study." *International Entrepreneurship and Management Journal* 2 (3): 351–66.

Linacre, J. M. 2002. "Optimizing Rating Scale Category Effectiveness." *Journal of Applied Measurement* 3 (1): 85–106.

Linacre, J. M. 2014. Winsteps® Rasch Measurement Computer Program User´s Guide. Beaverton, Oregon: Winsteps.com. (Version 3.81.0).

Martin, B. C., J. J. McNally, and M. J. Kay. 2013. "Examining the Formation of Human Capital in Entrepreneurship: A Meta-analysis of Entrepreneurship Education Outcomes." *Journal of Business Venturing* 28 (2): 211–24.

Mueller, S. L., and A. S. Thomas. 2001. "Culture and Entrepreneurial Potential: A Nine Country Study of Locus of Control and Innovativeness." *Journal of Business Venturing* 16 (1): 51–75.

Nabi, G., A. Walmsley, F. Liñán, I. Akhtar, and C. Neame. 2018. "Does Entrepreneurship Education in the First Year of Higher Education Develop Entrepreneurial Intentions? The Role of Learning and Inspiration." *Studies in Higher Education* 43 (3): 452–67.

Nunnally, J. C. 1978. *Psychometric Theory*. New York: McGraw-Hill.

Peterman, N. E., and J. Kennedy. 2003. "Enterprise Education: Influencing Students' Perceptions of Entrepreneurship." *Entrepreneurship: Theory & Practice* 28 (2): 129–44.

Pruett, M. 2012. "Entrepreneurship Education: Workshops and Entrepreneurial Intentions." *Journal of Education for Business* 87 (2): 94–101.

Raposo, M., and A. Do Paço. 2011. "Entrepreneurship Education: Relationship between Education and Entrepreneurial Activity." *Psicothema* 23 (3): 453–57.

Rasch, G. 1961. "On General Laws and the Meaning of Measurement in Psychology." In *Proceedings of the Fourth Berkeley Symposium on Mathematical Statistics and Probability*, vol. IV, edited by J. Neyman, 321–34. Berkeley: University of California Press.

Sarstedt, M., C. M. Ringle, D. Smith, R. Reams, and J. F. Hair, Jr. 2014. "Partial Least Squares Structural Equation Modeling (PLS-SEM): A Useful Tool for Family Business Researchers." *Journal of Family Business Strategy* 5 (1): 105–15.

Souitaris, V., S. Zerbinati, and A. Al-Laham. 2007. "Do Entrepreneurship Programmes Raise Entrepreneurial Intention of Science and Engineering Students? The Effect of Learning, Inspiration and Resources." *Journal of Business Venturing* 22 (4): 566–91.

Steenekamp, A. G., S. P. Van der Merwe, and R. Athayde. 2011. "Application of the Attitude toward Enterprise (ATE) Test on Secondary School Learners in South Africa." *South African Journal of Economic and Management Sciences* 14 (3): 314–32.

Volery, T., S. Müller, F. Oser, C. Naepflin, and N. Rey. 2013. "The Impact of Entrepreneurship Education on Human Capital at Upper-Secondary Level." *Journal of Small Business Management* 51 (3): 429–46.

Waugh, R. F. 1999. "Approaches to Studying for Students in Higher Education: A Rasch Measurement Model Analysis." *British Journal of Educational Psychology* 69 (1): 63–79.

Waugh, R. F. 2002. "Creating a Scale to Measure Motivation to Achieve Academically. Linking Attitudes and Behaviours Using Rasch Measurement." *British Journal of Educational Psychology* 72 (1): 65–86.

Wright, B. D. 2003. "Rack and Stack: Time 1 Vs Time 2." *Rasch Measurement Transactions* 17 (1): 905–06. Marz 2017. http://www.rasch.org/rmt/rmt171a.htm.

Wright, B. D., and M. M. Mok. 2004. "An Overview of the Family of Rasch Measurement Models," in *Introduction to Rasch Measurement: Theory, Models and Applications*, edited by R. M. Smith. Maple Grove, MN: Jam Press.

Yang, J. 2013. "The Theory of Planned Behavior and Prediction of Entrepreneurial Intention among Chinese Undergraduates." *Social Behavior and Personality: An International Journal* 41 (3): 367–76.

Zhang, Y., G. Duysters, and M. Cloodt. 2014. "The Role of Entrepreneurship Education as a Predictor of University Students' Entrepreneurial Intention." *International Entrepreneurship and Management Journal* 10 (3): 623–41.

Zhao, H., S. E. Seibert, and G. T. Lumpkin. 2010. "The Relationship of Personality to Entrepreneurial Intentions and Performance: A Meta-analytic Review." *Journal of Management* 36 (2): 381–404.