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Reliability and Validity Analysis of validity testing of a new scale for monitoring Students Attitudes toward Entrepreneurship Courses (SATEC)

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Abstract

Purpose – The goal of this paper is to assess the reliability and validity of a new instrument/ scale named Students Attitudes toward Entrepreneurship Courses (SATEC) consists of 45 items grouped into eight components that aimed to identify students' attitudes toward entrepreneurship courses.

Design/Methodology/Approach - To test the reliability and validity, a survey was conducted using 245 interviewees from the department of Department of Early Childhood Education from School of Humanities and Social Sciences, University of Western Macedonia in Greece. Cronbach α and Composite Reliability and AVE were used to evaluate the reliability of the scale. Explanatory Factor Analysis, was used for the validity evaluation.

Findings – The findings confirmed the reliability and validity of the SATEC scale.

1. Introduction

Increasing and endorsing entrepreneurship education has been one of the key policy goals for the EU and Member States for many years (European Commission/EACEA/Eurydice, 2016). There is a growing awareness of the potential of young people to launch and grow their own profitable or social projects thereby becoming innovators in the areas in which they live and work (Masouras, 2019). Entrepreneurship education is indispensable to shape the mind-sets of young people as well as to be responsible for the skills, abilities and competences, knowledge and attitudes that are dominant to increasing an entrepreneurial culture (European Commission/EACEA/Eurydice, 2016). The starring role and determination of entrepreneurship education does not only imitate the background of work and business but correspondingly reflect on wide-ranging context of an individual's life. Many researchers paid attention on the need entrepreneurship courses of higher education

(Giacomin et al., 2011; Lentet al., 2000; Kaseorg & Raudsaar, 2013; Giossi et al., 2019; Zirinoglou, 2020).

Bécharde & Grégoire (2005) research focus was on entrepreneurship context of higher education. They analysed a sample of 103 peer-reviewed entrepreneurship education articles and found five obstacles that may prevent management scholars from studying four major types of education preoccupations: 1. preoccupations with the social and economic roles of entrepreneurship education for individuals and society, as well as with the institutions of higher education themselves; 2. preoccupations with the systematization of entrepreneurship education (i.e., instructional design, the use of multimedia environments, and curriculum development); 3. preoccupations with the content material to be taught and how this content ought to be distributed; and 4. preoccupations with seeing the requests of individual students in organizing teaching interventions (Bécharde & Grégoire, 2005). They claimed that scholars must develop a dual expertise in management and education research (Bécharde & Grégoire, 2005).

As many researchers claimed higher education institutions are in quest of quality and excellence (Anastasiadis & Christoforidis, 2019; Anastasiadis, et al., 2016; Anastasiadou 2015; Anastasiadou, 2016c; Anastasiadou & Anastasiadis, 2019; Anastasiadou & Zirinoglou, 2015a; Anastasiadou & Zirinoglou, 2015b; Anastasiadou & Zirinoglou, 2014a; Anastasiadou et al. 2016a; Anastasiadou et al. 2016b; Anastasiadis, 2016; Anastasiadou & Papadaki, 2019; Taraza, & Anastasiadou, 2019a; Anastasiadou, & Taraza, 2019a). Many studies have been carried out pointing out the need quality of education (Anastasiadou, 2015; Anastasiadou, 2016c; Anastasiadou, 2018a; Anastasiadou, 2018b; Anastasiadou, 2018c; Anastasiadou, 2018d; Taraza & Anastasiadou, 2019a; Taraza & Anastasiadou, 2019b; Taraza & Anastasiadou, 2019c; Papadaki, & Anastasiadou, 2019; Anastasiadou & Zirinoglou, 2015b; Anastasiadou, 2018c; Anastasiadou & Taraza, 2019a; Anastasiadou & Taraza, 2019b; Anastasiadou & Taraza, 2019c; Anastasiadou et al., 2016b; Anastasiadou, & Taraza, 2020a; Anastasiadou, 2019; Anastasiadou, & Taraza, 2020b). Quality and excellence in higher education is strongly connected with entrepreneurship context of higher education. Bacigalupo et al. (2016) claimed that according to the European Commission's Entrepreneurship Competence Framework entrepreneurship as a transversal key competence related by individuals as well as society. In addition Higher education institutions are vital to establish the ways in which they respond to the economic needs of society concerning graduate employability enhancement, unemployment

reduction and students as well as dropout (Bacigalupo et al., 2016). The necessity for entrepreneurship development is one way road for higher education institutions.

According to Lent et al. (2000), beliefs connected with perceived high entrepreneurial motivation and inspiration on a country-wide level may endorse individuals' attitude towards entrepreneurship. Gacomin et al. (2011) stated that motivation parameters for students in order to start-up business is the chance to implement my own ideas, the idea of creating something of their own, personal independence, being at the head of an organization and many others. On the other hand obstacles for such an activity and barriers to create an enterprise according to students are that this activity is disproportionately, there is lack of initial capital, current economic situation, there is fear of failure, there is a lot fiscal charges (taxes, legal fees), there is lack of legal assistance or counselling as well as there is lack of formal help to start a business (Gacomin et al., 2011). Kaseorg & Raudsaar (2013) claimed that according to students being an entrepreneur is go through as a career choice that is filled with more uncertainty, anxiety, insecurity, obstacles, disappointments, failures and frustrations, which are related to business creation, but also the freedom, opportunities and challenges regarding being self-employed.

In Greece kindergarten students were looking to be appointment in public sector as kindergarteners. The fiscal crisis have changed the scene and post graduate students have to face unemployment. The solution can be founded in the initiative entrepreneurship. In this direction the Department of Early Childhood Education from School of Humanities and Social Sciences, University of Western Macedonia has decided to offer quality assurance and innovation courses in education in recent years. The question is what are students' perceptions, attitudes and behaviors toward the subject of entrepreneurship and more especially students' feelings concerning entrepreneurship courses. An instrument is needed in order to measure these attitudes, a reliable and valid instrument. The writers looked for such an instrument but they did not find anyone appropriate for their research. Thus, they developed a new one named Students Attitudes toward Entrepreneurship Courses (SATEC) consists of 45 items grouped into eight components named Affect, Cognitive Competence, Understanding, Effort, Interest, Difficulty, Value and Knowledge that measure students' attitudes toward entrepreneurship courses. Some of the components related to conceptual constructs based on Survey of Attitude Towards Statistics (SATS) instrument (Shau 2003), and Survey of Attitudes Toward Statistics (SATS©) (Bond, 2007).

2. Purpose of the study

The objective of current study is to evaluate the reliability and validity of a new instrument/ scale named Students Attitudes toward Entrepreneurship Courses (SATEC) consists of 45 items grouped into eight components named Affect, Cognitive Competence, Understanding, Effort, Interest, Difficulty, Value and Knowledge that measure students' attitudes toward entrepreneurship courses.

3. The instrument

The study used a 5-point response scale, higher scores then correspond to more positive attitudes. The scale named Students Attitudes toward Entrepreneurship Courses (SATEC) consists of 45 items grouped into eight components identified students attitudes toward entrepreneurship courses. The eight components structure were named Affect (6 items, Aff_i) (e.g. Aff1: I like the subject of entrepreneurship in education) Cognitive Competence (CoC_i, 13 items) (e.g. CoC1: I have no trouble understanding the business plan preparation process because of how I think.), Understanding (Und_i, 6 items) (Und1: I understand the sources of new innovative ideas), Effort (Eff_i, 4 items) (e.g. Eff1: I plan to complete all of my entrepreneurial assignments), Interest (Int_i, 4 items) (e.g. Int1: I am interested in being able to communicate business ideas and information to others), Difficulty (Dif_i, 9 items) (e.g. Dif1: Analyzing the reasons for failure / success of new businesses is easy to understand), Value (Val_i, 9 items) (e.g. Val1: Entrepreneurship is not a worthless subject), and Knowledge (Kno_i, 6 items) (e.g. Kno1: I can understand the entrepreneurship subject). Additional items ask for relevant demographic characteristics.

4. Profiles of the respondents

The demographic profiles includes the following characteristics of the despondences; gender, age and year of education. The demographic profiles shown in Table 1 is based on frequency and relative frequency distributions.

The sample comprised of 245 interviewees from the Department of Early Childhood Education from School of Humanities and Social Sciences, University of Western Macedonia, of whom 16 (6.5%) were men and 229 (93.5%) were women. With respect to the ages of participants, 14 (5.7%) of them were 18 years old, 16 (6.5 %) of them were 19 years old, 30 (12.2 %) of them were 20 years old and, finally, 185 (77.5%) were 21 years or more. With respect to their year of studies, 14 (5.7%) of them were

during their first year of their studies, 16 (6.5 %) of them were during the second year, 30 (12.2 %) of them were during the third year 176 (71.8 %) of them were during the fourth year and 9 (3.7%) of them were during the fifth year and above (Table 1).

Table 1: Demographic data of the sample (N = 245)

,Variables	Classes	N=245	%
Gender	Male	16	6.5
	Female	229	93.5
Age	18 years	14	5.7
	19 years	16	6.5
	20 years	30	12.2
	21 years or more	185	75.5
Year of Studies	First year	14	5.7
	Second year	16	6.5
	Third year	30	12.2
	Fourth year	176	71.8
	Fifth year and above	9	3.7

4. Methodology

The current study attempts to measure the reliability and validity of a new scale new scale for monitoring Students Attitudes toward Entrepreneurship Courses (SATEC).

Reliability: Reliability is related to the extent an instrument provides constant outcomes regarding the measurements and every deviation, which is offered between two separated measurements, is in a line with the measurement error (Nunnally, 1978). The study is consecrated on internal consistency of the total scale as well as of its dimensions. Internal consistency can be calculated with the use of the Cronbach's a coefficient (Croanbach, 1984) with acceptable values over 0.7 (Anastasiadou, 2012a; Anastasiadou, 2012b; Anastasiadou, 2012c; Anastasiadou, 2013) and with the composite reliability of Formell & Laarcker (1981), which is a measure of internal consistency of the structure indexes (Anastasiadou, 2012a; Anastasiadou, 2012b; Alevriadou, et al., 2014). Values of the Cronbach's a coefficient over 0.6 are considered as acceptable and over the cut of point of 0.7 are considered as satisfactory (Spector, 1992; Nunnally, 1978; Croanbach, 1984; Anastasiadou, 2006). The composite

reliability should be over the cut of point of 0.7 (Formell & Laarcker, 1981; Anastasiadou, 2013; Anastasiadou 2014; Anastasiadou & Anastasiadis, 2011). The extracted variance is another measure of reliability that represents the total amount of structure's variance which is due to the variance of the determining variables.

Validity: Validity definition is related to the extent that the instrument (questionnaire) processes what is intended to measure (Cohen et al., 1988). In the current study the construct validity will be evaluated by Explanatory Factor Analysis. Its part lies on the structure recognition of the questionnaires (Anastasiadou, 2013; Anastasiadou, 2014) and the recognition of the appropriate variables that characterized the structures (Kline, 1994). The construct validity: The construct validity refers to the level of the correspondence between themes and factors that are recognized under the test of factorial structure or have been proposed from the theoretical base of the examining model as well as to the evaluation of the adequacy of the factorial structure of the examining model (Bagozzi et al., 1995). Convergent and discriminant validity are both considered subcategories and subtypes of construct validity (Anastasiadou, 2013; Anastasiadou, 2014). The convergent validity is related to the level at which many different methods of variable measurements lead to the same results (Spector, 1992; Churchill, 1979). Wixon & Watson (2001) state that the convergent validity is acceptable when the loadings of all the variables are over .50 while Kim (2008) supports that the items of all the structures should load on one factor with eigenvalue over 1 in order the convergent validity be acceptable. Chin (1998) suggests that the convergent validity should be controlled by the evaluation of the composite reliability with the cutoff of 0.7 and the variance extracted with the cutoff of 0.5 (Fornell & Lacker, 1981). The discriminant validity refers to the hypothesis that dissimilar structures should be different (Burns & Bush, 1995) and the conceptual constructs / components/ factors of a scale evaluate different issues (Bagozzi, 1990; Anastasiadou, 2013; Anastasiadou, 2014).

5. Results

Results of Principal Component Analysis: Both the Kaiser-Meyer-Olkin (KMO) index, equal to 0.788 and considered very satisfactory as it exceeds the accepted value criterion (0.60), as well as Bartlett's Test of Sphericity ($\chi^2=3642.632$ $df=1225$, $p<0.001$) have shown that the application of Principal Components Analysis is permitted (Hair et al., 1995; Hair et al., 2005).

The table that follows presents the results of principal components analysis for all of the items on the Students Attitudes toward Entrepreneurship Courses (SATEC) scale, from which it follows that the criterion of the eigenvalue or characteristic root (eigenvalue > 1), is verified for eight components. The first component, responsible behavior, relates to the degree by which the interviewees responded to Affect conceptual construct, and with an eigenvalue of 10.416, interprets 20.833% of the total dispersion of the data, a percentage considered satisfactory (Hair, 2005), and includes, items Aff1, Aff2, Aff3, Aff4, Aff5, Aff6 and indeed with very high loads, 0.787, 0.761, 0.586, 0.549, 0.745 and 0.689 correspondingly. The eigenvalue or characteristic root criterion (eigenvalue>1) verifies that the six items, Aff1, Aff2, Aff3, Aff4, Aff5, Aff6 represent the same conceptual construct. The values of the Common Variance (Communalities) for statements Aff1, Aff2, Aff3, Aff4, Aff5, Aff6 assume the values 0.641, 0.571, 0.533, 0.414, 0.541 and 0.536, respectively, and exceed the value criterion (0.40), posed as the verification limit for the satisfactory quality of the statements for factor responsible behavior (Table 2).

Table 2: Affect – students’ feelings concerning statistics

Affect	Affect – students’ feelings concerning statistics (6 items).	Eigenvalues	% of Variance	Loadings	Communalities
Aff1:	I like the subject of entrepreneurship in education.	10.416	20.833	.787	.641
Aff2:	I do not feel insecure when I have to do a business plan.			.761	.571
Aff3:	I do not get frustrated going over Market and Competition Analysis.			.586	.533
Aff4:	I do not be under stress during the design of the Production Process and Operation of a business.			.549	.414
Aff5:	I enjoy taking entrepreneurial courses.			.745	.541
Aff6:	I am not scared when I have to do the financial analysis of a business.			.689	.536

The second component, Cognitive Competence, refers to students' attitudes about their intellectual knowledge and skills when applied to entrepreneurship courses, while with an eigenvalue of 3.644, it interprets 12.288% of the total dispersion of data (Table 3). The eigenvalue criterion (eigenvalue>1) verifies that the 13 items, CoC1, CoC2, CoC3, CoC4, CoC5, CoC6, CoC7, CoC8, CoC9, CoC10, CoC11, CoC12 and CoC13, represent the same conceptual construct/ component. The values of the Common Variance (Communalities) of statements CoC1, CoC2, CoC3, CoC4, CoC5, CoC6, CoC7, CoC8, CoC9, CoC10, CoC11, CoC12 and CoC13 assume the values 0.715, 0.690, 0.682, 0.599, 0.582, 0.570, 0.562, 0.546, 0.541, 0.525, 0.524, 0.507 and 0.499 respectively and exceed the value criterion (0,40), posed as the limit for the verification of the satisfactory quality of statements for component/ construct Cognitive Competence. Included in this conceptual construct/ component, which interprets 12.288% of the total inertia, items CoC1, CoC2, CoC3, CoC4, CoC5, CoC6, CoC7, CoC8, CoC9, CoC10, CoC11, CoC12 and CoC13 and indeed with very high loads, 0.813, 0.805, 0.789, 0.736, 0.735, 0.735, 0.726, 0.684. 0.675, 0.597, 0.585, 0.572 and 0.477 correspondingly (Table 3).

Table 3: Cognitive Competence – students' attitudes about their intellectual knowledge and skills when applied to entrepreneurship courses

Cognitive Competence	Cognitive Competence – students' attitudes about their intellectual knowledge and skills when applied to entrepreneurship courses (13 items).	Eigenvalues	% of Variance	Loadings	Communalities
	CoC1: I have no trouble understanding the business plan preparation process because of how I think.	3.644	12.288	.813	.715
	CoC2: I know what's going on entrepreneurship courses.			.805	.690
	CoC3: I do not make a lot of math errors in the analysis of financing methods.			.789	.682
	CoC4: I do business opportunity assessment.			.736	.599

CoC5: I can develop a business model.	.735	.582
CoC6: I understand the reasons for a company's survival or not.	.735	.570
CoC7: I do not find it difficult to understand entrepreneurial concepts.	.726	.562
CoC8: I know the business risks.	.684	.546
CoC9: I know the stages of entrepreneurship.	.675	.541
CoC10: I know the obstacles to starting a new business.	.597	.525
CoC11: I know the basic ingredients of a successful business idea.	.585	.524
CoC12: I know the reasons for the success or failure of a new business.	.572	.507
CoC13: I know the sources of funding.	.477	.499

The third component, Understanding, relates to students' attitudes about their understanding toward entrepreneurship courses, and with an eigenvalue of 2.467, interprets 9.935% of the total dispersion of the data, a percentage considered satisfactory (Hair, 2005), and includes items Und1, Und2, Und3, Und4, Und5 and Und6 and indeed with very high loads, 0.722, 0.712, 0.719, 6.34, 0.542 and 0.489 correspondingly. The eigenvalue or characteristic root criterion (eigenvalue>1) verifies that the 6 items, Und1, Und2, Und3, Und4, Und5 and Und6, represent the same conceptual construct. The values of the Common Variance (Communalities) for items Und1, Und2, Und3, Und4, Und5 and Und6 assume the values 0.711, 0.624, 0.626, 0.559, 0.585 and 0.489, respectively, and exceed the value criterion (0.40), posed as the verification limit for the satisfactory quality of the statements for the third conceptual construct/ component named Understanding (Table 4).

Table 4: Understanding - students' attitudes about their understanding toward entrepreneurship courses

Understanding	Understanding - students' attitudes about their understanding toward entrepreneurship courses (6 items).	Eigenvalues	% of Variance	Loadings	Communalities
	Und1: I understand the sources of new innovative ideas.	2.467	9.935	.722	.711
	Und2: I understand the need to develop a business plan.			.712	.624
	Und3: I know the reasons for the success or failure of a new business.			.719	.626
	Und4: I can analyze the possibilities of entering the market.			6.34	.559
	Und5: I can analyze the ways of financing.			.542	.585
	Und6: I can evaluate the possible and possible ways of marketing.			.428	.489

The fourth component, Effort relates to amount of work the student expends to learn entrepreneurship courses, and with an eigenvalue of 2.284, interprets 4.568% of the total dispersion of the data, a percentage considered satisfactory (Hair, 2005), and includes items Eff1, Eff2, Eff3 and Eff4 and indeed with very high loads, 0.720, 0.748, 0.571, 0.635 correspondingly. The eigenvalue or characteristic root criterion (eigenvalue>1) verifies that the 4 items, Eff1, Eff2, Eff3 and Eff4, represent the same conceptual construct. The values of the Common Variance (Communalities) for items Eff1, Eff2, Eff3 and Eff4 assume the values 0.604, 0.638, 0.600, 0.602 respectively, and exceed the value criterion (0.40), posed as the cut off point for the satisfactory quality of the statements for the fourth conceptual construct/ component named Effort (Table 5).

Table 5: Effort - amount of work the student expends to learn entrepreneurship courses

Effort	Effort - amount of work the student expends to learn entrepreneurship courses (4 items).	Eigenvalues	% of Variance	Loadings	Communalities
	Eff1: I plan to complete all of my entrepreneurial assignments.	2.248	9.568	.720	.604
	Eff2: I plan to work hard in my entrepreneurship courses			.748	.638
	Eff3: I plan to study hard for every entrepreneurship courses' test.			.571	.600
	Eff4: I plan to attend every class session.			.635	.602

The fifth component, Interest relates to students' level of individual interest in entrepreneurship courses', and with an eigenvalue of 2.066, interprets 9.132% of the total dispersion of the data, a percentage considered satisfactory (Hair, 2005), and includes items Int1, Int2, Int3 and Int4 and indeed with very high loads, 0.665, 0.757, 0.578, 0.695 correspondingly. The eigenvalue or characteristic root criterion (eigenvalue>1) verifies that the 4 items, Int1, Int2, Int3 and Int4, represent the same conceptual construct. The values of the Common Variance (Communalities) for items Int1, Int2, Int3 and Int4 assume the values 0.547, 0.689, 0.549 and 0.638, respectively, and exceed the value criterion (0.40), posed as the cut off point for the satisfactory quality of the items for the fifth conceptual construct/ component named Interest (Table 6).

Table 6: Interest – students' level of individual interest in entrepreneurship courses'

Interest	Interest – students' level of individual interest in entrepreneurship courses' (4 items).	Eigenvalues	% of Variance	Loadings	Communalities
	Int1: I am interested in being able to communicate business ideas and information to others.	2.066	9.132	.665	.547
	Int2: I am interested in using entrepreneurial concept.			.689	.689
	Int3: I am interested in understanding business incentives.			.549	.549

Int4: I am interested in learning the development of market entry opportunities.	.695	.638
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The sixth component, Difficulty relates to students' attitudes about the difficulty of entrepreneurship course as a subject, and with an eigenvalue of 1.951, interprets 8.902% of the total dispersion of the data, a percentage considered satisfactory (Hair, 2005), and includes items Dif1, Dif2, Dif3, Dif4, Dif5, Dif6, Dif7, Dif8 and Dif8 and indeed with very high loads, 0.685, 0.768, 0.775, 0.485, 0.489, 0.476, 0.577, 0.458, 0.469 correspondingly. The eigenvalue or characteristic root criterion (eigenvalue>1) verifies that the 9 items, Dif1, Dif2, Dif3, Dif4, Dif5, Dif6, Dif7, Dif8 and Dif8 represent the same conceptual construct. The values of the Common Variance (Communalities) for items Dif1, Dif2, Dif3, Dif4, Dif5, Dif6, Dif7, Dif8 and Dif8 assume the values 0.557, 0.646, 0.599, 0.459, 0.497, 0.467, 0.545, 0.427, 0.458, respectively, and exceed the value criterion (0.40), posed as the cut off point for the satisfactory quality of the items for the sixth conceptual construct/ component named Difficulty (Table 7).

Table 7: Difficulty – students' attitudes about the difficulty of entrepreneurship course as a subject

Difficulty	Difficulty – students' attitudes about the difficulty of entrepreneurship course as a subject (9 items).	Eigenvalues	% of Variance	Loadings	Communalities
	Dif1: Analyzing the reasons for failure / success of new businesses is easy to understand.	1.951	8.902	.685	.557
	Dif2: The analysis of the concepts of entrepreneurship and innovation is easy to understand.			.768	.646
	Dif3: Analyzing the reasons for the survival of a new business is easy to understand.			.775	.599
	Dif4: Innovation analysis is not a complicated process.			.485	.459

Dif5: Entrepreneurship is a subject quickly learned by most people.	.489	.497
Dif6: Learning entrepreneurship course do not require a great deal of discipline.	.476	.467
Dif7: Entrepreneurship does not involves a lot of risk	.577	.545
Dif8: Entrepreneurship course is highly technical.	.427	.427
Dif9: Most people have to learn a new way of thinking to do Entrepreneurship courses.	.458	.458

The seventh component, Value relates to students' attitudes about the usefulness, relevance, and worth of Entrepreneurship in personal and professional life, and with an eigenvalue of 1.781, interprets 8.561% of the total dispersion of the data, a percentage considered satisfactory (Hair, 2005), and comprises items Val1, Val2, Val3, Val4, Val5, Val6, Val7, Val8 and Val9 and indeed with very high loads, 0.681, 0.649, 0.623, 0.603, 0.542, 0.519, 0.485, 0.449, 0.438 correspondingly. The eigenvalue or characteristic root criterion (eigenvalue>1) verifies that the 9 items, Val1, Val2, Val3, Val4, Val5, Val6, Val7, Val8 and Val9, represent the same conceptual construct. The values of the Common Variance (Communalities) for items Val1, Val2, Val3, Val4, Val5, Val6, Val7, Val8 and Val9 assume the values 0.741, 0.713, 0.682, 0.635, 0.602, 0.581, 0.534, 0.503 and 0.481, respectively, and exceed the value criterion (0.40), posed as the cut off point for the satisfactory quality of the items for the seventh conceptual construct/ component named Value (Table 8).

Table 8: Value – students' attitudes about the usefulness, relevance, and worth of Entrepreneurship in personal and professional life

Value	Value – students' attitudes about the usefulness, relevance, and worth of Entrepreneurship in personal and professional life (9 items).	Eigenvalues	% of Variance	Loadings	Communalities
Val1: Entrepreneurship is not a worthless subject.		1.781	8.561	.681	.741

Val2: Entrepreneurship should be a required part of my professional training.	.649	.713
Val3: Entrepreneurship skills will make me more employable.	.623	.682
Val4: Entrepreneurship is useful to the typical teacher.	.603	.635
Val5: Entrepreneurship thinking is not applicable in my life outside my job.	.542	.602
Val6: I use entrepreneurship concepts in my everyday life.	.519	.581
Val7: Entrepreneurship concepts are not rarely presented in everyday life.	.485	.534
Val8: I will have application for entrepreneurship in my profession.	.449	.503
Val9: Entrepreneurship is not irrelevant in my life.	.438	.481

The eighth component, Knowledge relates to students' attitudes about their knowledge related to the subject of Entrepreneurship, and with an eigenvalue of 1.653, interprets 8.307% of the total dispersion of the data, a percentage considered satisfactory (Hair, 2005), and consist of items Kno1, Kno2, Kno3, Kno4, Kno5 and Kno6 and indeed with very high loads, 0.661, 0.645, 0.589, 0.687, 0.586, 0.449 correspondingly. The eigenvalue or characteristic root criterion (eigenvalue>1) verifies that the 6 items, Kno1, Kno2, Kno3, Kno4, Kno5 and Kno6, represent the same conceptual construct. The values of the Common Variance (Communalities) for items Kno1, Kno2, Kno3, Kno4, Kno5 and Kno6 assume the values 0.588, 0.574, 0.498, 0.622, 0.533 and 0.414, respectively, and exceed the value criterion (0.40), posed as the cut off point for the satisfactory quality of the items for the seventh conceptual construct/ component named Knowledge (Table 9).

Table 9: Knowledge – students' attitudes about their knowledge related to the subject of Entrepreneurship

Knowledge	Knowledge – students' attitudes about their knowledge related to	Eigen5alues	% of Variance	Loadings	Communalities
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the subject of Entrepreneurship (6 items).				
Kno1: I can understand the entrepreneurship subject.	1.653	8.307	.661	.588
Kno2: I can identify entrepreneurship opportunities.			.645	.574
Kno3: I have the understanding of the workings of the economy.			.589	.498
Kno4: I can realize ethical position of enterprises.			.687	.622
Kno5: I know the processes of innovation & creativity.			.586	.533
Kno6: I have the knowledge on the process of entrepreneurship.			.449	.414

Besides, all of the components loadings are large and significant, indicating convergent validity. As well, convergent validity is confirmed due to the fact that the loadings of all the variables are over 0.4 (Wixon & Watson, 2001) and the items of all the structures load on one factor with eigenvalue over 1 (Kim, 2008). Based on the recommendation by Hair et al. (1992), factor loadings greater than 0.4 are deemed as very significant and all of the factor loadings for the items in the research model were greater than 0.40. Thus, all factors in the measurement model had adequate convergent validity. The communalities were greater than 0.40, indicating the quality of all items. The cumulative percentages of variance explained by each factor were greater than 87% (87.526%) for all conceptual constructs.

AVEs' for Affect, Cognitive Competence, Understanding, Effort, Interest, Difficulty, Value and Knowledge are equal to 0.579, 0.581, 0.504, 0.552, 0.525, 0.543, 0.514 and 0.562 correspondingly, indicating convergent validity.

Table 10 presents factor loadings and reliability estimates for each construct. Specifically, the composite reliability scores for Affect, Cognitive Competence, Understanding, Effort, Interest, Difficulty, Value and Knowledge constructs equal to 0.844, 0.922, 0.798, 0.765, 0.746, 0.817, 0.801 and 0.776 respectively. Cronbach's *a* is equal to 0.895 for Students Attitudes toward Entrepreneurship Courses (SATEC) scale. Cronbach's *a* is equal to 0.818, 0.898, 0.711, 0.757, 0.702, 0.802, 0.720 and 0.769 for Affect, Cognitive Competence, Understanding, Effort, Interest, Difficulty, Value and Knowledge components respectively. The composite reliability scores range from

0.746 to 0.922 and Cronbach's α estimates range from 0.702 to 0.898, indicating the reasonable reliability and internal consistency of the measures (Formel and Larcker 1981; Nunally 1978).

The average variances extracted were all above the recommended 0.5 level (Hair et al. 1992), which implies that more than one-half of the variances observed in the items were accounted for by their hypothesized components.

Table 10: Table of Loadings, Cronbach's α , CR and AVE

Construct	Loadings	Cronbach's Alpha	CR	AVE
Students Attitudes toward Entrepreneurship Courses (SATEC) scale		.895		
Affect – students' feelings concerning statistics (6 items).		.818	.844	.579
Aff1: I like the subject of entrepreneurship in education.	.787			
Aff2: I do not feel insecure when I have to do a business plan.	.761			
Aff3: I do not get frustrated going over Market and Competition Analysis.	.586			
Aff4: I do not be under stress during the design of the Production Process and Operation of a business.	.549			
Aff5: I enjoy taking entrepreneurial courses.	.745			
Aff6: I am not scared when I have to do the financial analysis of a business.	.689			
Cognitive Competence – students' attitudes about their intellectual knowledge and skills when applied to entrepreneurship courses (13 items).		.898	.922	.581
CoC1: I have no trouble understanding the business plan preparation process because of how I think.	.813			
CoC2: I know what's going on entrepreneurship courses.	.805			

CoC3: I do not make a lot of math errors in the analysis of financing methods.	.789		
CoC4: I do business opportunity assessment.	.736		
CoC5: I can develop a business model.	.735		
CoC6: I understand the reasons for a company's survival or not.	.735		
CoC7: I do not find it difficult to understand entrepreneurial concepts.	.726		
CoC8: I know the business risks.	.684		
CoC9: I know the stages of entrepreneurship.	.675		
CoC10: I know the obstacles to starting a new business.	.597		
CoC11: I know the basic ingredients of a successful business idea.	.585		
CoC12: I know the reasons for the success or failure of a new business.	.572		
CoC13: I know the sources of funding	.477		
Understanding - students' attitudes about their understanding toward entrepreneurship courses (6 items).	.711	.798	.504
Und1: I understand the sources of new innovative ideas.	.722		
Und2: I understand the need to develop a business plan.	.712		
Und3: I know the reasons for the success or failure of a new business.	.719		
Und4: I can analyze the possibilities of entering the market.	6.34		
Und5: I can analyze the ways of financing.	.542		
Und6: I can evaluate the possible and possible ways of marketing.	.428		
Effort - amount of work the student expends to learn entrepreneurship courses (4 items).	.757	.765	.552

Eff1: I plan to complete all of my entrepreneurial assignments.	.720		
Eff2: I plan to work hard in my entrepreneurship courses	.748		
Eff3: I plan to study hard for every entrepreneurship courses' test.	.571		
Eff4: I plan to attend every class session.	.635		
Interest – students' level of individual interest in entrepreneurship courses' (4 items).	.702	.746	.525
Int1: I am interested in being able to communicate business ideas and information to others.	.665		
Int2: I am interested in using entrepreneurial concept.	.689		
Int3: I am interested in understanding business incentives.	.549		
Int4: I am interested in learning the development of market entry opportunities.	.695		
Difficulty – students' attitudes about the difficulty of entrepreneurship course as a subject (9 items).	.802	.817	.543
Dif1: Analyzing the reasons for failure / success of new businesses is easy to understand.	.685		
Dif2: The analysis of the concepts of entrepreneurship and innovation is easy to understand.	.768		
Dif3: Analyzing the reasons for the survival of a new business is easy to understand.	.775		
Dif4: Innovation analysis is not a complicated process.	.485		
Dif5: Entrepreneurship is a subject quickly learned by most people.	.489		
Dif6: Learning entrepreneurship course do not require a great deal of discipline.	.476		

Dif7: Entrepreneurship does not involves a lot of risk	.577		
Dif8: Entrepreneurship course is highly technical.	.427		
Dif9: Most people have to learn a new way of thinking to do Entrepreneurship courses.	.458		
Value – students’ attitudes about the usefulness, relevance, and worth of Entrepreneurship in personal and professional life (9 items).	.720	.801	.514
Val1: Entrepreneurship is not a worthless subject.	.681		
Val2: Entrepreneurship should be a required part of my professional training.	.649		
Val3: Entrepreneurship skills will make me more employable.	.623		
Val4: Entrepreneurship is useful to the typical teacher.	.603		
Val5: Entrepreneurship thinking is not applicable in my life outside my job.	.542		
Val6: I use entrepreneurship concepts in my everyday life.	.519		
Val7: Entrepreneurship concepts are not rarely presented in everyday life.	.485		
Val8: I will have application for entrepreneurship in my profession.	.449		
Val9: Entrepreneurship is not irrelevant in my life.	.438		
Knowledge – students’ attitudes about their knowledge related to the subject of , Entrepreneurship (6 items).	.769	.776	.562
Kno1: I can understand the entrepreneurship subject.	.661		
Kno2: I can identify entrepreneurship opportunities.	.645		
Kno3: I have the understanding of the workings of the economy.	.589		
Kno4: I can realize ethical position of enterprises.	.687		

Kno5: I know the processes of innovation & creativity.	.586
Kno6: I have the knowledge on the process of entrepreneurship.	.449

6. Conclusions

The aim of this paper is to assess the reliability and validity of a new instrument/ scale named Students Attitudes toward Entrepreneurship Courses (SATEC) consists of 45 items grouped into eight components named Affect, Cognitive Competence, Understanding, Effort, Interest, Difficulty, Value and Knowledge that seeking to identify students' attitudes toward entrepreneurship courses. 245 examinees from the department of Department of Early Childhood Education from School of Humanities and Social Sciences, University of Western Macedonia in Greece took part in the study. The results showed that Cronbach α and Composite Reliability as well as AVEs were acceptable indication the reliability of the conceptual constructs of the instrument. Explanatory Factor Analysis revealed acceptable loadings and communalities on the components, as well as AVEs. On the whole validity of the SATEC scale was verified.

References

- Alevriadou, A. Anastasiadou S. & Damianidou, D. (2014). Reliability and validity of the "Reading-free Vocational Interest Inventory (R-FVII)" in adolescents and adults with intellectual disabilities. *Procedia - Social and Behavioral Sciences* 114, 388 – 393.
- Anastasiadis, L., Anastasiadou, S. & Iakovidis, G. (2016). Malcolm Baldrige National Quality Award (MBNQA) dimensions in Greek Tertiary Education System. 8th International Conference 'The Economies of Balkan and Eastern Europe Countries in the changed world', EBEEC 2016, Split, Croatia. *KnowledgeE Publishing-the Economies of Balkan and Eastern Europe Countries in the Changed World (EBEEC)* | pages 436-455.
- Anastasiadis, L. & Christoforidis, C. (2019). Evaluating citizens' actual perceptions and expectations and assessing e-Service Quality Gap in Public Sector related to e-Government Services, *International Journal of Entrepreneurship and Innovative Competitiveness* – *IJEIC*, Vol. 1 – Iss. 1.

<http://hephaestus.nup.ac.cy/bitstream/handle/11728/11395/Paper5.pdf?sequence=1&isAllowed=y>.

Anastasiadou, S. (2006). *Factorial validity evaluation of a measurement through principal components analysis and implicative statistical analysis*. In D.X.Xatzidimou, K. Mpikos, P.A. Stravakou, & K.D. Xatzidimou (eds), 5th Hellenic Conference of Pedagogy Company, Thessaloniki, pp. 341-348.

Anastasiadou S. (2011). Reliability and validity testing of a new scale for monitoring attitudes toward learning statistics with technology. *Acta Didactica Napocencia*, vol. 4 number 1, pp. 1-10. <http://adn.teaching.ro/>.

Anastasiadou, S. (2012a). Structural Equation Modelling in the Construction of a Structural Model of the Repercussions and Consequences in the Greek society and economy of Balkan and Eastern Europe Countries immigrants' entrance. *International Review of Applied Economic Research*, Vol.6. No.1-2, pp1-9.

Anastasiadou S. (2012b). Evaluating a structural equation model measuring lifelong learning and continuing education factors. *The International Journal of Knowledge, Culture and Change Management*, Volume 12, Issue 3, pp.21-34.

Anastasiadou S. (2012c). Diversifications between expected and perceived attitudes toward learning statistics with technology. *The International Journal of Learning*, vol 18, Issue 3, pp.161-176.

Anastasiadou, S., (2013). Developing and Evaluating a Structural Equation Model Measuring Leadership Changes in a Lifelong Learning World. *The International Journal of Educational Organization and Leadership*, Volume 19, Issue 2, pp.1-17.

Anastasiadou, S. (2013). Developing and Evaluating a Structural Equation Model Measuring Leadership Changes in a Lifelong Learning World. *The International Journal of Educational Organization and Leadership*, Volume 19, Issue 2, pp.1-17.

Anastasiadou, S. (2014). A structural equation model describes factors affecting Greek students' consumer behavior. *Procedia Economics and Finance*. Volume 9, pp. 402–406.

Anastasiadou, S. (2015). The Roadmaps of the Total Quality Management in the Greek Education System according to Deming, Juran and Crosby in light of EFQM Model. *Procedia Economics and Finance*, vol. 33 pp. 562 – 572.

Anastasiadou, S. (2018a). *Gap analysis between perceived and expected of service quality in Greek Tertiary Education*. Proceedings of EDULEARN18: 10th annual International Conference on Education and New Learning Technologies Palma de Mallorca, Spain, pp. 8373-8382. doi:10.21125/edulearn.2018.1951.

Anastasiadou, S. (2018b). Evaluating Perception, Expectation of Students/Pre-service Teachers and Service Quality Gap in Greek Tertiary Education. *KnE Social Sciences | The Economies of the Balkan and the Eastern European Countries in the changing World (EBEEC 2018) | pages: 294–308.*

Anastasiadou, S. (2018c). *Leadership according to EFQM Model in Tertiary education: The case of Greek Universities*. Proceedings of 10th International Conference The Economies of the Balkan and the Eastern European Countries in the changing world, EBEEC 2018, Warsaw, Poland, pp. 20-24.

Anastasiadou, S. (2018d). *Total quality management in Greek Tertiary Educational System: The case of Greek Universities*. Proceedings of 10th International Conference EBEEC 2018 - The Economies of the Balkan and the Eastern European Countries in the changing world, Warsaw, Poland, pp. 59-64.

Anastasiadou, S. (2019). *Comparison of contemporary advanced statistical methods regarding construct validity evaluation of TEIQue-SF instrument: Statistical Implicative Analysis vs. Principal Components Analysis*. 9ème Colloque International sur Analyse Statistique Implicative (ASI 10). Belfort – France. pp. 148-163.

Anastasiadou, S. & Anastasiadis, L. (2011). Reliability and validity testing of a new scale for monitoring attitudes toward electronics and electrical constructions subject. *International Journal of Applied Science and Technology (IJAST)*, Vol 1, No 1, pp. 1-10.

Anastasiadou S. & Anastasiadis L. (2019). *Quality Assurance in Education in the Light of the Effectiveness of Transformational School Leadership*. In: Sykianakis N., Polychronidou P., Karasavvoglou A. (eds) *Economic and Financial Challenges for Eastern Europe*. Springer Proceedings in Business and Economics. Springer, Cham, pp. 323-344. https://doi.org/10.1007/978-3-030-12169-3_21.

Anastasiadou, S.D, Fotiadou, X.G. & Anastasiadis, L. (2016a). Estimation of Vocational Training School (IEK) students' contentment in relation to quality of their

studies. *New Trends and Issues Proceedings on Humanities & Social Sciences*, [On line].10, pp 09-18. Available from: www.prosoc.

Anastasiadou, S.D, Florou, G.S, Fotiadou, X.G. & Anastasiadis, L. (2016b). Evaluation of the satisfaction of preservice educators of Primary Education from their work and faithfulness to their work. *New Trends and Issues Proceedings on Humanities and Social Sciences*. [On line].10, pp35-41. Available from: www.prosoc.eu.

Anastasiadou, S. & Papadaki, Z. (2019). Consumers' perceptions toward E-Service Quality, Perceived Value, Purchase and Loyalty Intentions. *International Journal of Entrepreneurship and Innovative Competitiveness – IJEIC*, Vol 1, Issue 1, <https://hephaestus.nup.ac.cy/bitstream/handle/11728/11391/paper1.pdf?sequence=1&isAllowed=y>.

Anastasiadou, S. & Taraza, E. (2019a). *Total Quality Management: Implementation of the Six Sigma Methodology for Improving Quality in Higher Education*. ICERI2019, the 12th annual International Conference of Education, Research and Innovation, Seville (Spain), ICERI2019, pp. 9533-9537.

Anastasiadou S. & Taraza, E. (2019b). *Pre-service teachers' perceptions toward leadership regarding the MBVQA Model*. 11th annual International Conference on Education and New Learning Technologies, Palma de Mallorca, Spain, EDULEARN 19, pp. 533-543.

Anastasiadou S. & Taraza, E. (2019c). *The structure and paths of Malcolm Baldrige National Quality Award (MBNQA) dimensions applied in Greek Tertiary educational systems dimensions in Greek Tertiary Education System*. 11th annual International Conference on Education and New Learning Technologies, Palma de Mallorca, Spain, EDULEARN 19, pp. 455-463.

Anastasiadou, S. & Taraza, E. (2020a). *Six Sigma in Tertiary Education: A Win of Change regarding Quality Improvement in Education*. Proceedings of of 14th annual International Technology, Education and Development Conference (INTED2020), Valencia, Spain, pp. 9595-9601.

Anastasiadou, S. & Taraza, E. (2020b). *Resistance to Change as an Obstacle Regarding Quality in Higher Education Institutions (HEIS)*. Proceedings of of 14th annual International Technology, Education and Development Conference (INTED2020), Valencia, Spain, pp. 396-401.

Anastasiadou, S. & Zirinolou, P. (2014a). Reliability testing of EFQM scale: The case of Greek secondary teachers. *Procedia - Social and Behavioral Sciences*, Volume 143, pp. 990–994.

Anastasiadou, S. & Zirinoglou P. (2015a). Teachers' attitudes toward Quality Assurance Dimensions regarding EFQM Model in Primary Education in Greece, *Procedia Economics and Finance*, vol. 33, pp. 411-431.

Anastasiadou, S. & Zirinoglou P. (2015b). EFQM dimensions in Greek Primary Education System. *Procedia Economics and Finance*, vol 33, pp. 411 – 431.

Anastasiadou, S., Zirinoglou, P., Karasavoglou, A., Florou, G. (2016c). Total Quality Management in Education: The case of Primary and Secondary Education for the implementation of the best educational policy. *Data Analysis, Bulletin* 17, 110-130.

Bacigalupo, M., Kampylis, P., Punie, Y. & Van den Brande, G. (2016). *EntreComp: The Entrepreneurship Competence Framework*. Luxembourg: Publication Office of the European Union; EUR 27939 EN; doi:10.2791/593884.

Bagozzi, R.P. & Kimmel, S.K. (1995). A comparison of leading theories for the prediction of goal-directed behaviors. *British Journal of Social Psychology*, 34, 437-461.

Béchar, J., & Grégoire, D. (2005). Entrepreneurship Education Research Revisited: The Case of Higher Education. *Academy of Management Learning & Education*, 4(1), 22-43. Retrieved July 19, 2020, from www.jstor.org/stable/40214261.

Bond, M. E. (2007). Looking at the Survey of Attitudes Toward Statistics (SATS©). USCOTS 2007 Breakout Session.

https://www.causeweb.org/cause/sites/default/files/uscots/uscots07/breakout2_5.pdf

Burns, A.C. & Bush, R.F. (1995). *Marketing Research*. Englewood Cliffs, NJ: PrenticeHall.

Chin W. W. (1998). Issues and opinion on structural equation modeling, *Mis Quarterly*, 22(1), pp 7-16.

Churchill, G.A. (1979). A paradigm for developing better measures for marketing constructs. *Journal of Marketing Research*, 16, pp 64-73.

Cohen, R.T., Monlaque, P., Nathason, L.S., & Swerdlik, M.E. (1988). *Psychological testing: An introduction to tests of measurement*. Mountain View, CA: Mayfield Publishing Company.

Croanbach, L.J. (1984). *Essentials of psychological testing* (4th ed.). New York: Harper & Row.

European Commission/EACEA/Eurydice, 2016. Entrepreneurship Education at School in Europe. Eurydice Report. Luxembourg: Publications Office of the European Union.

Fornell C. & Larcker D. (1981). Evaluating Structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, 18, pp 39-50.

Giacomin, O., Janssen, F., Pruett, M., Shinnar, R.S., Llopis, F. & Toney, B. (2011). Entrepreneurial intentions, motivations and barriers: Differences among American, Asian and European students. *International Entrepreneurship and Management Journal*, 7, 219–238.

Giossi, S., Anastasiadou, S., Gamanis, A. & Gamanis G. G. (2019). Tracing the concept of entrepreneurship and the role of an entrepreneur: A critical review. *International Journal of Entrepreneurship and Innovative Competitiveness – IJEIC*, Vol 1, Issue 1, <https://hephaestus.nup.ac.cy/bitstream/handle/11728/11394/Paper4.pdf?sequence=1&isAllowed=y>.

Hair, J., Anderson, R., Tatham, R. & Black, W. (1995). *Multivariate Data Analysis With Readings*, p.373. USA: Prentice-Hall International, Inc.

Hair, F.J., Black C.W., Badin, N.J., Anderson, E.R. & Tatham, R.L. (2005). *Multivariate Data Analysis*. New Jersey, Pearson Education Inc.

Kaseorg, M. & Raudsaar, M. (2013). Students' Attitudes toward Entrepreneurship. *International Journal of Business and Management Studies*, CD-ROM. ISSN: 2158-1479: 2(2):31–43.

Lent, R. W., Brown, S. D., & Hackett, G. (2000). Contextual supports and barriers to career choice: a social cognitive analysis. *Journal of Counselling Psychology*, 47 (1), 36–49.

Masouras, A. (2019). Young entrepreneurship in Cyprus. *Zeszyty Naukowe Małopolskiej Wyższej Szkoły Ekonomicznej w Tarnowie*, 42(2), 27-42.

- Nunnally, C.J. (1978). *Psychometric Theory*. New York: McGraw Hill Book Co.
- Spector P.E. (1992). *Summated Rating Scale Construction: An Introduction*. Sage University Paper Series on Quantitative Application in the Social Sciences. Newbury Park, CA.
- Schau, C. (2003). Survey of Attitudes toward Statistics. <http://www.unm.edu/~cschau/satshomepage.htm>.
- Taraza, E. & Anastasiadou, S. (2019a). *Evaluation of Total Quality Management (TQM) in Greek Higher education Using advanced statistical methodologies*. ICERI2019, the 12th annual International Conference of Education, Research and Innovation will be held in Seville (Spain), ICERI2019, pp. 9450-9460.
- Taraza, E. & Anastasiadou, S. (2019b). *EFQM Excellence Model in Vocational Lyceum: Reliability and Validity of EFQM Instrument*. Proceedings of 13th annual International Technology, Education and Development Conference (INTED2019), Valencia, Spain, pp. 2273-2285.
- Taraza, E.I. & Anastasiadou, S.D. (2019c). Personality traits in the light of the effectiveness of transformational vocational school leadership and leaders. *New Trends and Issues Proceedings on Humanities and Social Sciences*. [Online]. 6(1), pp 184–191. Available from: www.prosoc.eu.
- Wixon, B.H & Watson, H.J. (2001). An empirical investigation of the factors affecting data warehousing. *MIS Quarterly* 25(1), pp 17-41.
- Zirinolou, P. (2020). Students' attitudes towards the subject of entrepreneurship in education. *International Journal of Entrepreneurship and Innovative Competitiveness – IJEIC*, under publication.