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Assessing students' beliefs, emotions and causal attribution: Validation of 'Learning Conception Questionnaire'

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Students' conceptions of learning represent an influential factor for learning, yet the few existing studies used measures with limited validity and lacked to provide a model for middle school students. This research aimed to provide a preliminary validation of 'Learning Conception Questionnaire' (LCQ) by Liverta Sempio and Marchetti (2001) aimed to measure conceptions of learning in a holistic way by including belief, academic emotion, and causal attributions. In the current study, the factor structure was tested in a sample of 212 middle school students. Exploratory factor analysis (EFAs) and Confirmatory factor analysis (CFAs) showed that the factor structure of the comprehensive measure of conceptions of learning used could be described across three domains (Belief: Comparative Fit Index [CFI] = .98, Standardised Root Mean Square Residual [SRMR] = .06; Emotions: CFI = .89, SRMR = .07; Causal attribution: CFI = .92, SRMR = .06), with significant relationships. Implications and future ways of research were discussed.

Keywords: academic emotion; belief; causal attribution; statistical validation; students' conceptions of learning

The Investigation on Students' Conceptions of Learning: A Research Field of Priority for the Education Policy Agendas

The process of learning represents a change of perspective in observing the surrounding world (Ramsden, 2003). Learning permits us to acquire life skills and competences that are necessary for personal development, but it also affects our own place in society (Eurostat, 2015). Taking this into account, the way in which drop-out students and students who have not acquire the relevant skills represent a risk category in societies for educational as well as employment prospects and opportunities becomes clear. In addition, it is necessary to consider the related high costs for society. Poorly educated people cannot, or have limited access to work life, indirectly affecting an economies' capacity to produce and improve. But also, we are obliged to consider the negative impact on social cohesion, mobility, and additional costs on public budgets (i.e., higher spending on public health, on social support) (Organisation for Economic Co-operation and Development [OECD], 2012).

Recent data inform us that South Africa (see Van Wyk, 2015), as well as European countries (Eurostat, 2014) are in an alarming situation, since dropout and school failure remain commonplace.

Research and actions addressed to promote adjustment and reducing school failure reveal a priority in education policy agendas. Literature emphasises educational guidance and counselling as an efficient approach to promoting individual wellbeing and resilience (Di Fabio, 2015). One other major field of research addressing these aims was the investigation on what students think about and approach to the learning process that denote the field of research on 'conceptions of learning' dating back to the pioneering works of Marton and Säaljö (1976). The literature recognised these to be important factors affecting learning processes (Chiou, Lee & Tsai, 2013; Sadi & Lee, 2015), through their effect on motivation and learning strategies (Vermunt & Vermetten, 2004), while indirectly influencing the quality of learning and academic performance (Cano, 2005; McLean, 2001). Considering a larger framework, these factors influence whether students continue in their course of study and contribute to institutional quality. Indeed, for universities, student performance is an integral part of higher education evaluations (i.e., those set by ANVUR, the Italian National Agency for the Evaluation of the University and Research Systems or by CHE, the South African Council on Higher Education through the HEQC, Higher Education Quality Committee). Evaluations that can negatively impact the university's access to funding. However, very few studies have considered middle school students as an important sample to investigate conceptions of learning (Berry & Sahlberg, 1996; Pérez-Tello, Antonietti, Sempio Liverta & Marchetti, 2005). Given their relevance in the promotion of adjustment to school, with this study, we proposed to investigate conceptions of learning focusing on middle school students. Before delving into the study, we proceed in presenting in greater depth firstly the construct of conceptions of learning, and secondly the instrument used to provide a preliminary validation.

What do Students Think about Learning?

A convincing body of research has indicated that students think about learning in qualitatively different ways (Purdie & Hattie, 2002) and approach this situation with a very large range of predetermined views about what it means. Students' conceptions of learning can be defined as the different representations owned on learning and they result from how individuals interpret and reflect upon their experiences (Lin, Liang & Tsai, 2012).

Conceptions of learning have been investigated across ages and school grades, showing a developmental trend from the early predisposition to make sense to the surrounding world (see for example Gopnik, 2012), and through several cultures (Cantoia, Giordanelli, Pérez-Tello & Antonietti, 2011), discovering the deep connection

these conceptions hold with the socio-cultural context. An 'individualistic' conception of learning is linked to an individual identity, a sense of uniqueness and independence, and an individual's pursuit of success. Instead, a 'socio-centric' or 'collectivistic' conception of learning is linked to group identity, interdependence, and social responsibility (Greenfield, Trumbull & Rothstein-Fisch, 2003). In comparing the ways to conceive learning through a cross-cultural point of view, on the one hand, an 'individualistic' conception of learning is characterised by a close bond between learner and expert model (such as a teacher) (Greenfield, Keller, Fuligni & Maynard, 2003; Zambrano, 1999). On the other hand, a 'socio-centric' or 'collectivistic' conception of learning is characterised by the activation of emotions and by comparison and sharing of information (Li, 2002). Beyond this distinction, it is important to point out that in any kind of culture there are always elements of both 'individualistic' and 'collectivistic' conceptions of learning (Raeff, Greenfield & Quiroz, 2000). Italian, like American, German, French, despite belonging to a pre-dominantly 'individualistic' typology, differ in some features, due to ethnic heterogeneity and/or regional differences (Greenfield, Trumbull, et al., 2003).

Conceptions of learning informed us about the nature ('what is learning') and the ways of knowing ('how someone learns'). Several approaches have succeeded (Gonida & Metallidou, 2015). One interesting field of investigation focused primarily on beliefs about knowledge (see, Conley, Pintrich, Vekiri & Harrison, 2004; Sandoval, 2005; Schommer-Aikins, Mau, Brookhart & Hutter 2000), which informs the recent field of epistemic cognition (Chinn, Buckland & Samarapungavan, 2011). The developmental trend of personal beliefs has been a primary research interest for some (see for example Burr & Hofer, 2002), in conjunction with the open question: 'what is actually meant by learning?' Several conceptions of learning moving through a constructive versus a reproductive dimension of learning have emerged. A reproductive conception of learning comprises acquisition, storing, reproduction, and use of knowledge; and predominantly equates learning to an increase in quantity of information as well as to memorisation (see, i.e. Chiou, Liang & Tsai, 2012). Instead, constructive conceptions of learning implied the construction of meaning and personal change, as for example 'learning as a co-constructive and cultural process'; 'learning as personal challenge, self-efficacy, and personal growth' (see, Vezzani, Vettori & Pinto, 2017); and 'learning as changing as a person' (Marton, Dall'Alba & Beaty, 1993; Purdie & Hattie, 2002) emerged in university students. In this field, studies have continued the investigation predominantly with university students or with preschoolers (Burr & Hofer, 2002); children attending primary school (Steketee, 1996); and upper primary school (Klatter, Lodewijks & Arnoutse, 2001). However, few have considered middle school students (Berry & Sahlberg, 1996; Pérez-Tello et al., 2005).

An instrument to investigate middle school students' conceptions of learning

The period of development in middle school is crucial for the subsequent choices of the educational path. Students are in their early- to mid-adolescence, which is a time of significant developmental change (Kim, Gloppen, Rhew, Oesterle & Hawkins, 2015) both for the academic and social-emotional worlds (Ireson & Hallam, 2005). Even though not all individuals respond in the same way, in this period many students undergo a worse performance in school (Barber & Olsen, 2004), and their motivation can also decline (Maehr & Midgley, 1996) with strong repercussions on students' sense of belonging in school (Wang & Eccles, 2012). The low performances shown by the OECD Programme for International Student Assessment (PISA) could be interpreted as a risk factor for their subsequent educational and working opportunities. In the effort to reduce risk factors for the educational and working path, research in the field of conceptions of learning appeared necessary. In fact, the conception of learning harboured by students influences their learning behaviour and their academic performance. Furthermore, middle school represents a precious moment, since at this point students choose what kind of educational path overlaps with their interests, aims, and expectations. It is therefore possible that conceptions of learning might function as driver of their decision of their future educational path. Working with adolescents is challenging. The possibility of taking advantage of a good instrument to measure conceptions of learning appears to be necessary. Self-reporting, widely used with students, is a beneficial approach to assessment, and proves to give valuable information (Ricco, Schuyten Pierce & Medinilla, 2010; Schommer-Aikins et al., 2000). The self-report 'Learning Conception Questionnaire' (LCQ) proposed by Liverta Sempio and Marchetti (2001) is nowadays available, and it has yet been used by Vezzani et al. (2017) to investigate university students' conceptions of learning. The questionnaire allowed the possibility to be able to conceive of the representational world of a student in a holistic way by including not only beliefs, but also 'academic emotions' (see Pekrun & Linnenbrink-Garcia, 2012) and causal attributions of success and failure. The theoretical domain of beliefs on learning referred to the Bruner's studies on the active or passive approach of learners and their relations with knowledge (see, Bruner, 1996). The academic emotions' domain referred to the phenomenographic approach, which explores the emotional experience of

an individual. Finally, the inclusion of the theoretical domain of causal attribution aimed to take into account the control of learners on his/her success and failure, in function of their internal or external locus of control (Cantoia et al., 2011). Specifically, the beliefs' domain concerned the way in which to conceive knowledge (internal/external), individual disposition (individual/social dimension), and the relationship between the student and knowledge (active/passive disposition). As widely discussed above, beliefs were strongly related to socio-cultural context, such that they moved from an 'individualistic' (Zambrano, 1999) to a 'collectivistic' pole (Li, 2002; Raeff et al., 2000; Vandello & Cohen, 1999). The academic emotions' domain referred to the emotional experience in learning. Ranging from the positive side of feelings, such as self-efficacy (i.e., Linnenbrink & Pintrich, 2003), to the negative side, such as high level of anxiety (i.e., Pekrun, Goetz, Titz & Perry, 2002). Finally, the causal attributions' domain reflected the traditional distinction between internal and external attribution of locus of control: students are able to seek explanations of success and failure in themselves (trying to understand why they may or may not be doing well); or in external factors (such as, teacher, task difficulty) (see Weiner, 2010). As reported in the literature, a perception of uncontrollability of events leads to the adoption of pessimistic expectations of future failure, contributing to poor academic results (e.g., Au, Watkins & Hattie, 2010); since low self-efficacy, avoidance and limited effort to react to adversity became central points (Swinton, Kurtz-Costes, Rowley & Okeke-Adeyanju, 2011). On the other hand, an adaptive attribution styles linked to higher levels of self-concept, dedication, and resilience (Marsh & Martin, 2011). Despite the relevance of the construct and face validity of the 'Learning Conception Questionnaire' (LCQ; Liverta Sempio & Marchetti, 2001), the instrument was administered by Cantoia et al. (2011) using a cross-cultural approach, and by Pérez-Tello et al. (2005) with relatively small samples. Even where such samples provide important information, there is a necessity for further research.

Research Questions and Hypotheses

With this study, we aimed to provide a preliminary validation of the self-report 'Learning Conception Questionnaire' (LCQ; Liverta Sempio & Marchetti, 2001) in a sample of middle school students.

Specifically, the aims of this study were to:

1) identify the latent factor composition of the instrument; and
2) verify the existence of significant relationships between factors.

Our expectations were as follows:

1) Regarding the first aim, and in line with literature (Liverta Sempio & Marchetti, 2001; Pérez-Tello et al., 2005), we expected that a factor composition consistent with the three domains of belief, academic emotions, and causal attribution to emerge.
2) Regarding the second aim, we expected the existence of pattern of relationships between factors. Specifically:
   a) conceptions of learning involving both awareness of social dimension and personal significance of learning with a conception of learning linked to internal locus of control could be positively correlated. We proposed this because in literature, a sense of getting involved in learning emerged in association with positive emotions and adaptive attribution styles (Marsh & Martin, 2011; Marton et al., 1993).
   b) A conception of learning featured by negative emotions could be positively correlated with a conception of learning linked to external locus of control. We proposed this because in literature a sense of uncontrollability of events was associated with negative experiences in learning, avoidance, and limited effort to react to adversity (e.g., Au et al., 2010; Swinton et al., 2011).

Method

Participants

Two hundred and twelve students were recruited from medium-sized urban middle schools (106 males, *M*-aged 12.58 ± 1.02 years; 106 females, *M*-aged 12.76 ± .99 years). Sixty-seven attending Sixth Grade, sixty-eight Seventh Graders, and seventy-seven Eighth Graders.

All our schools were in the urban area of Prato, a town near Florence. They were comparable in terms of socio-economic status (SES), viz. with parents having qualifications and occupations ranging from lower-middle class to middle class. This information was gleaned from school registers.

The participants of our research attended public schools, as the majority (99%) of Italians do. Subjects with certified learning and/or disorder disability (National Laws 104/1992 and 170/2010) and foreigners who have been in Italy for less than five years were excluded.

The project built upon a larger framework of cooperation with schools and families. Schools advanced us a request to helping in deepening knowledge about dispositional/motivational factors useful to support a good school adjustment in learners. This project obtained the consent of parents, school authorities, as well as adolescents themselves, and it was endorsed by the Departmental Ethics Committee, Department of Education and Psychology, University of Florence. At the end of the project a final meeting with qualitative evaluation was planned. Participants expressed positive feedback for this project (around 78%).

Procedure and Measures

Students' conceptions of learning were measured with the self-report 'Learning Conception Questionnaire' (LCQ; Liverta Sempio & Marchetti,

2001). The instrument was handed out collectively during the school-time with the presence of teacher and researcher. Students took from 20 to 30 minutes to complete it.

The questionnaire consisted of 49 items, concerning statements about learning to be answered on a five-point Likert-scale (scores ranging from (*1*) 'I strongly disagree' to (*5*) 'I strongly agree') (see Table 1). It included three sections as follows: (1) the beliefs' domain, that investigated opinions about the learning process (18 items); (2) the academic emotions' domain, that explored emotional experience in learning (17 items); and (3) the causal attributions' domain addressed to deepen causal explanations of academic successes or failures (14 items).

Data Analysis

In order to test the first purpose of the study aimed at identifying conceptions of learning in Italian middle school students, the normality assumptions for the several items of each section of the questionnaire were verified. We considered as normally distributed the variables with skewness and kurtosis coefficient ranging between -1 to +1 (Marcoulides & Hershberger, 1997). In all the cases in which a variable didn't respect the normality assumption, increasing monotonic transformations (quadratic elevation, square root, natural logarithm, etc.) were applied (Fox, 2008). Subsequently, three Exploratory Factor Analyses (EFAs) for the three-item sections of the questionnaire were carried out on the total sample of 212 subjects, with Principal Axis Factoring (PAF) being used as extraction method, and a Promax procedure was followed as rotation criterion. Unlike the Principal Component Analysis (PCA), PAF is a method of factor analysis that obtains the final factors converting them from the common variance into a set of variables, while traditional PCA extracts several factors from both the total (common plus unique) variance contained in a correlation matrix (Thompson, 2004). PAF utilises the same strategy as PCA, but estimates communalities through an iterative procedure, using R^2 as a reliable estimation of communality of each variable). For this reason, PAF is preferred to PCA, as it considers just covariation among the variables and not the total variance. A Promax rotation is a particular factor oblique rotation that is simpler that a Direct Oblimin rotation. An oblique rotation is coherent with the general hypotheses of this paper, which assumes that the dimensions underlying variables are correlated with one another. At a later time, the measures pertaining to the factors with a low Cronbach's Alpha were eliminated, and the EFA was carried out again. The final resulting factor structure was checked through three Confirmatory Factor Analyses (CFAs), one for each section of the questionnaire. Since the χ^2 test is sensitive to sample size, other indices were taken into account (Bollen, 1989). We considered the *CFI* (*Comparative Fit Index*), and the *SRMR* (*Standardized Root Mean square Residual*) (Hu & Bentler, 1998), which both evaluated the discrepancy between the model and the observed data. We considered CFI value of .90 to reflect a fair fit (Bentler, 1990). For the SRMR, a value of .08 or less was considered to reflect an adequate fit (Hu & Bentler, 1998).

The EFAs were carried out by Statistical Package for Social Science (SPSS) statistical package (v. 23.0, 2015), whereas the CFAs were implemented by MPLUS (v. 3.0).

Results

Descriptive statistics of all items of the questionnaire are reported in the tables below (Table 1).

It should be pointed out that the mean and the standard deviation of the statistical distribution of the item is not ranged between 1 to 5, because the original item was transformed using an increased monotonic transformation.

The reliability of all the scale (49 items) resulted very good ($\alpha = .77$).

The 'Beliefs' section pointed out two factor dimensions, named 'Learning as a co-constructive and cultural process' ($\alpha = .65$) and 'Learning as a reduction of deficit through individual effort' ($\alpha = .55$). The variance explained by the first factor was equal to 14.6% and of 7.5% for the second dimension of the 'Beliefs' section.

With regards to the 'Academic emotions' section, there were two latent dimensions pointed out, viz.: 'Negative experience and anxiety' ($\alpha = .83$) and 'Personal challenge, self-efficacy and personal growth' ($\alpha = .79$). The variance explained by the first factor was equal to 25.0% and of 10.8% for the second dimension of the 'Emotions' section.

Finally, two factors for the 'Causal Attributions' section were extracted, viz.: 'Internal attribution for success and failure' ($\alpha = .61$) and 'External attribution for failure' ($\alpha = .54$). The variance explained by the first factor was equal to 16.1%, and the variance explained by the second factor was equal to 11.7% of the 'Causal Attributions' section. The results for that first EFA are presented in Table 2.

Table 1 Items of the questionnaire and descriptive statistics: Mean, standard deviation, skewness and kurtosis

Item	*M*	*SD*	Skewness	Kurtosis
1) A person really learns through discussion and debating with others.*	17.86	5.72	-.27	-.28
2) Learning is mostly a matter of concentration and commitment.	3.75	.87	-.63	.31
3) A good teacher is one who knows how to explain well.	3.74	.78	-.49	.54
4) You really learn when you listen to the explanations provided by an expert.	3.15	.88	-.08	-.10
5) A good teacher primarily makes his students compare and discuss among themselves the views that they have about that which the school teaches.	3.84	.86	-.50	.09
6) Real learning occurs by observing someone acting and thinking in a competent manner.	3.38	.95	-.24	-.26
7) The student is a person who always has some idea about the things that the school will teach.	2.95	1.09	.12	-.67
8) Teaching really means concretely demonstrating to students how to behave and think in a competent way.	3.77	.96	-.63	.04
9) I learn when I collaborate with others.	3.60	.93	-.57	.15
10) Only by testing one's knowledge does a person come to authentic learning.	3.64	1.05	-.39	-.63
11) I learn when I work alone.	3.06	1.05	-.16	-.56
12) Learning is mostly a question of intellectual work.	3.00	1.00	-.11	-.41
13) The student is a person who can produce culture himself during his course of study.	3.92	.80	-.50	.12
14) Real learning involves not only intellectual skills, but also includes feelings and emotions.*	18.39	6.73	-.58	-.63
15) A good teacher brings the student to distinguish between personal views and ideas shared by culture.	3.89	.90	-.64	.19
16) A student is a person who basically is not yet able to do things that the course of study will teach him.	3.13	1.07	-.09	-.64
17) To really learn I need someone to teach me.	3.27	1.04	-.20	-.36
18) The student is a person who has no knowledge of what the school will teach him.	2.79	1.05	.19	-.54
I see learning as:				
19) a duty	2.45	1.00	.77	.03
20) a challenge	2.73	1.18	.44	-.77
21) something that irritates me	1.32	.29	.58	.11
22) an opportunity to enhance my skills*	18.69	6.25	-.53	-.61
23) an effort	1.51	.26	.78	.97
24) an act of willpower	3.62	1.08	-.56	-.43
25) a bore	1.38	.26	.41	.85
26) a pleasure	3.35	.87	-.09	-.46
27) suffering	.37	.43	.69	-.61
28) something that makes me anxious	2.36	1.05	.80	.13
29) the opportunity to show what I am worth	3.32	1.19	-.30	-.83
30) an opportunity to evaluate my intellectual capacity	3.40	1.08	-.38	-.52

Item	*M*	*SD*	Skewness	Kurtosis
31) something that is based on self-reliance	3.30	1.13	-.27	-.81
32) a time of personal growth and change	3.73	1.03	-.46	-.60
33) something that depresses me	-.83	.25	.88	-.97
34) an interesting opportunity	3.58	.94	-.49	-.25
35) the road to success*	10.19	7.62	.62	-.67
The mistakes that I make in school situations depend on:				
36) me	3.13	.99	.24	-.96
37) the teacher	1.49	.21	.98	.26
38) the task	1.52	.24	.32	.80
39) Do you learn from the mistakes made in school situations?	3.56	1.01	-.12	-.87
For teachers, students make mistakes that depend on:				
40) the task	.51	.37	-.10	-.34
41) the student*	19.01	6.05	-.55	-.55
42) the teachers themselves	1.28	.24	.55	-.96
The last time I successfully passed a school test I felt:				
43) capable	3.80	.75	-.34	.55
44) lucky	2.54	.90	.26	.10
45) interested in the matter	3.58	.84	-.33	.43
46) happy to have done my duty	4.10	.89	-.93	.66
47) grateful to who taught me	2.79	.92	.21	.10
48) surprised	1.40	.30	.24	-.22
49) collocated in a good class	1.34	.34	.60	-.56

Note. *The mean and the standard deviation of the statistical distribution of the item does not range between 1 and 5 because the original item was transformed using an increased monotonic transformation.

Table 2 Explorative Factor Analysis: Factor loading and inter-correlations

Item	Factor: Learning as a co-constructive and cultural process	Factor: Learning as a reduction of deficiency in knowledge through individual effort
	Factor loadings	
Beliefs section		
1. A person really learns through discussion and debating with others.	.60	
13. The student is a person who can produce culture himself during his course of study.	.53	
6. Real learning occurs by observing someone acting and thinking in a competent manner.	.51	
5. A good teacher primarily makes his students compare and discuss among themselves the views that they have about the things that the school teaches.	.48	
14. Real learning involves not only intellectual skills, but also includes feelings and emotions.	.43	
15. A good teacher helps the student to distinguish between personal views and ideas shared by culture.	.38	
17. To really learn I need someone to teach me.		.55
18. The student is a person who has no knowledge of what the school will teach him.		.49
2. Learning is mostly a matter of concentration and commitment.		.37
4. You really learn when you listen to the explanations provided by an expert.		.36
10. Only by testing one's knowledge does a person come to authentic learning.		.36
16. A student is a person who basically is not yet able to do things that the course of study will teach him.		.35
	Factor inter-correlations	
Learning as a co-constructive and cultural process	--	
Learning as a reduction of deficiency in knowledge through individual effort	.30	--

	Factor: Negative experiences and anxiety	Factor: Personal challenge, self-efficacy and personal growth
	Factor loadings	
Emotions section		
I see learning as:		
25. a bore	.77	
27. suffering	.76	
33. something that depresses me	.71	

21. something that irritates me	.73	
23. an effort	.63	
28. something that makes me anxious	.53	
31. something that is based on self-reliance		.71
29. an opportunity to show what I am worth		.66
32. a time of personal growth and change		.62
30. an opportunity to evaluate my intellectual capacity		.57
35. the road to success		.50
24. an act of willpower		.50
34. an interesting opportunity		.46
26. a pleasure		.44
22. an opportunity to enhance my skills		.42
20. a challenge	.31	.41
19. a duty		.35
	Factor inter-correlations	
Negative experiences and anxiety	--	
Personal challenge, self-efficacy and personal growth	-.49	--

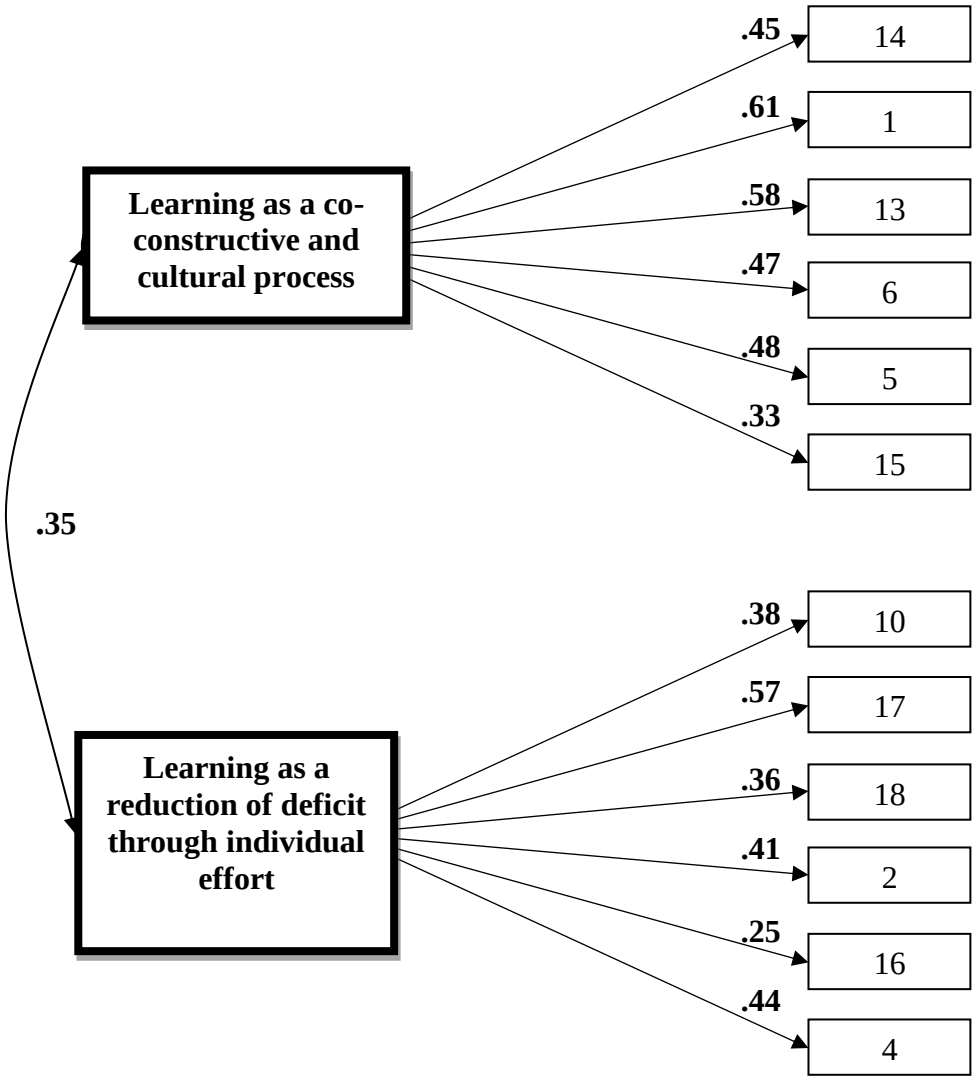
	Internal attribution for success and failure	External attribution for failure
	Factor loadings	
Attributions section		
The last time I successfully passed a school test I felt:		
47. grateful to those who taught me	.65	
45. interested in the matter	.56	
46. happy to have done my duty	.46	
39. Do you learn from the mistakes made in school situations?	.42	
The last time I successfully passed a test school I felt:		
49. collocated in a good class	.33	

The mistakes that I make in school situations depend on:		
37. the teacher	.70	
For teachers, students make mistakes that depend on:		
42. the teachers themselves	.62	
The mistakes that I make in school situations depend on:		
38. the task	.42	
The last time I successfully passed a school test I felt:		
43. capable		
For teachers, students make mistakes that depend on:		
41. the student		
40. the task		
	Factor inter-correlations	
Internal attribution for success and failure	--	
External attribution for failure	-.13	--

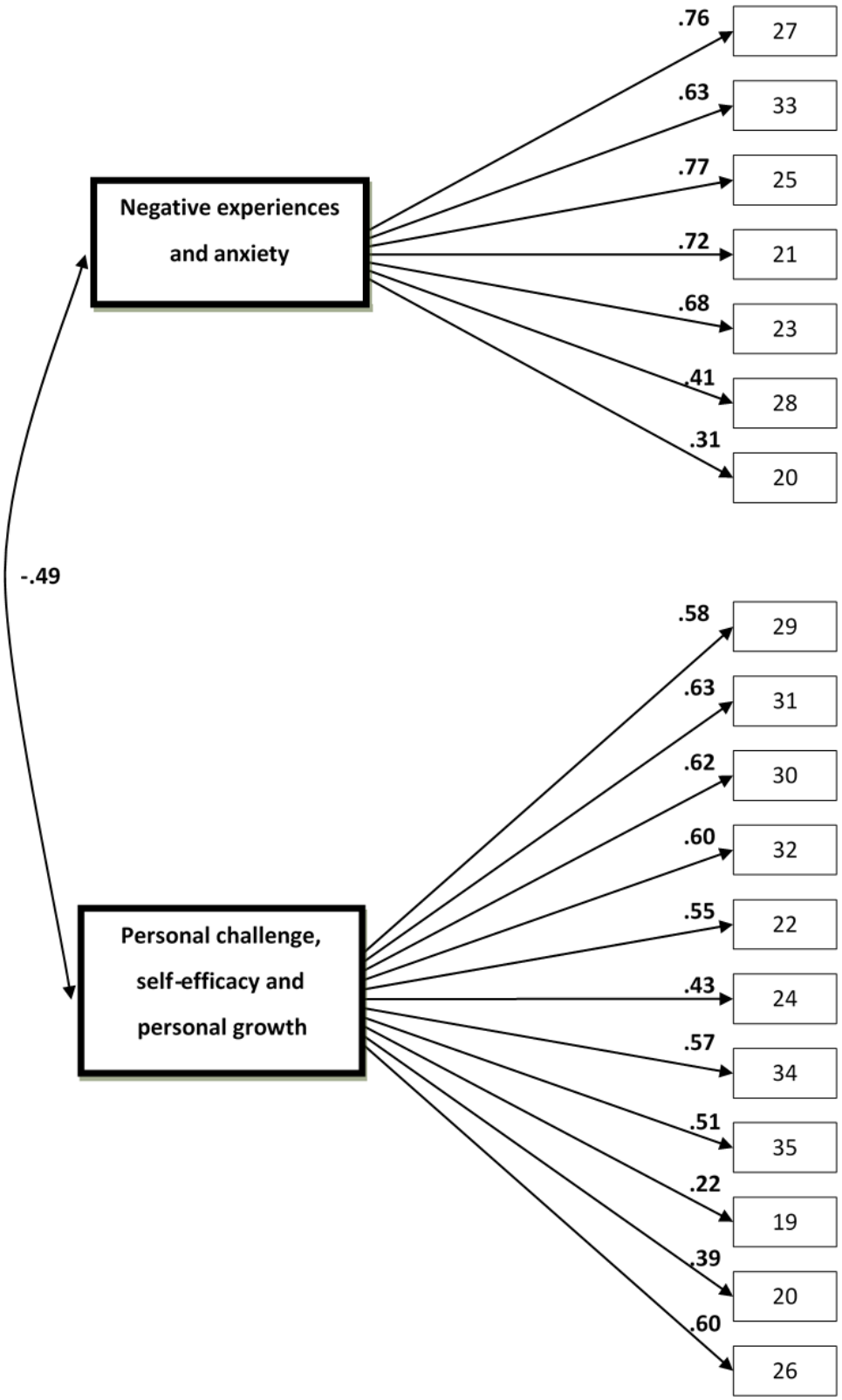
The item "3. A good teacher is one who knows how to explain well"; "7. The student is a person who always has some idea about the things that the school will teach"; "8. Teaching really means concretely demonstrating to students how to behave and think in a competent way"; "9. I learn when I collaborate with others"; "11. I learn when I work alone"; and "12. Learning is mostly a question of intellectual work"; for the "Beliefs" section, and the item "36. The mistakes that I make in school situations depend on: me," "44. The last time I successfully passed a school test I felt: lucky" and "48. The last time I successfully passed a school test I felt: surprised" were removed from the EFA because they had low loadings (< .30) or they didn't respect the simple structure criterion (Comrey & Lee, 1992).

The successive CFAs, implemented on the three content sections of the questionnaire, showed how the goodness of fit indexes resulted satisfactory for all of them: for the 'Beliefs' (CFI = .98, SRMR = .06), 'Emotions' (CFI = .89, SRMR = .07) and 'Causal attributions' (CFI = .92, SRMR = .06) sections.

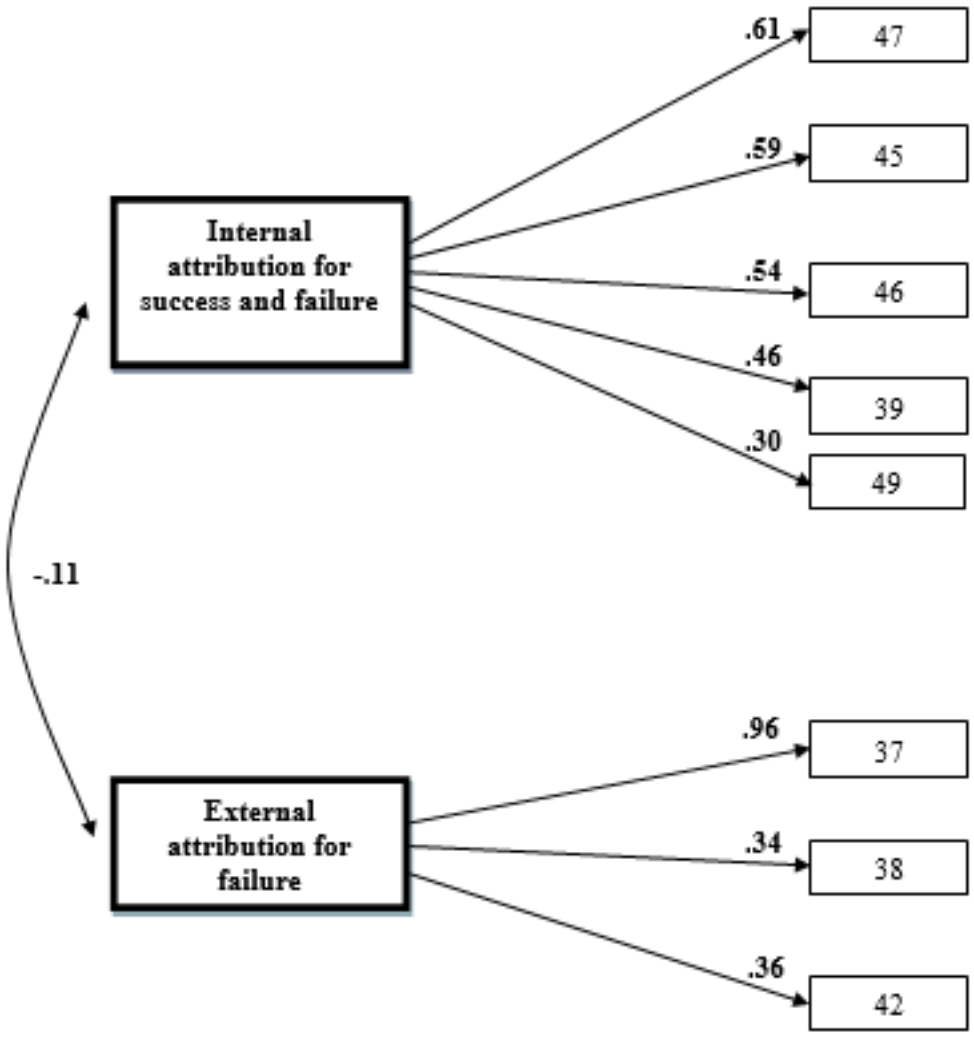
The factor structure of the three content sections of the questionnaire, i.e. for the Beliefs, Emotions and Casual attributions, are reported in the respective graphs below (graphs 1, 2 and 3).



Graph 1 Diagramme for the factor structure of the "Beliefs" section: Factor loading and inter-correlations



Graph 2 Diagramme for the factor structure of the "Emotions" section: Factor loading and inter-correlations



Graph 3 Diagramme for the factor structure of the "Causal attributions" section: Factor loading and inter-correlations

Pearson's correlation between the two factor dimensions ('Learning as a co-constructive and cultural process' and 'Learning as a reduction of deficit through individual effort') resulted significant (r = .35. p < .001) (see, Graph 1), while in the second graph, the correlation coefficient between 'Negative experience and anxiety' and 'Personal challenge, self-efficacy and personal growth' assumed a higher value, as one would reasonably expect (r = -.49, p < .001) (Graph 1 and 2). As for the third content section, 'internal attribution for success and failure' and 'external attribution for failure' were not significantly correlated, as one would reasonably expect (r = -.11, p < *ns*) (Graph 3).

The summary inter-correlations between factors of all the three sections are reported below (Table 3).

As it is possible to see in Table 3, the factor dimensions that were positively correlated to others were: 'Learning as co-constructive and cultural process', 'Reduction of deficiency in knowledge through dedication concentration and relationship with an expert model,' 'Personal challenge, self-efficacy and personal growth,' and 'Internal attribution for success and failure'; whereas 'Negative experience and anxiety' was negatively correlated with all the factor dimensions, except for the positive relation with 'External attribution for failure.' 'External attribution of failure' was significantly correlated with no factor dimensions, except for the positive association with 'Negative experience and anxiety.'

Table 3 Correlational analyses between all the factor dimensions pointed up from the CFAs

	Learning as a co-constructive and cultural process	Learning as a reduction of deficiency in knowledge through individual effort	Negative experiences and anxiety	Personal challenge, self-efficacy and personal growth	Internal attribution for success and failure	External attribution for failure
Learning as a co-constructive and cultural process	--					
Learning as a reduction of deficiency in knowledge through individual effort	.35***	--				
Negative experiences and anxiety	-.23**	-.20**	--			
Personal challenge, self-efficacy and personal growth	.43***	.31***	-.49***	--		
Internal attribution for success and failure	.44***	.33***	-.41***	.56***	--	
External attribution for failure	.02	-.09	.16*	.08	-.11	--

Discussion

At this stage, high drop-out rates and school failure in many countries (see, i.e. Eurostat, 2014) give rise to challenges to build up research and actions addressed to promote adjustment and reducing school failure. Many students will succeed in finding employment after their educational path, but many others will still have little choice in their career opportunities, due to having left school early, or lacking the relevant skills. These events represent a priority in education policy agenda, due to their impact on individual and social's well-being, but also when it comes to the high cost of the educational system (OECD, 2012).

There seems to be general agreement among researchers that the construct of students' conceptions of learning represents a key factor in the prospective of promoting scholastic adjustment and prevent scholastic failure. Even if, the significant impact of conceptions of learning on affecting learning processes (Chiou et al., 2013; Sadi & Lee, 2015), motivation (Vermunt & Vermetten, 2004), quality of learning, and academic performance (Cano, 2005; McLean, 2001), little effort has been made to comprehend middle school students' conceptions of learning (Berry & Sahlberg, 1996; Pérez-Tello et al., 2005). With this in mind, the necessity of an instrument by means of which to investigate conceptions of learning with validity evidence emerged. This study provided a preliminary validation of the self-report 'Learning Conception Questionnaire' (LCQ; Liverta Sempio & Marchetti, 2001) in a sample of middle school students.

With regards to the first aim, as we expected (Hypothesis 1) a factor composition consistent with the domains of belief, academic emotions, and causal attribution emerged. All three sections of the questionnaire pointed out a bi-factorial structure, with inter-correlations between factors moderate or low, with absence of multi-collinearity. Furthermore, the results of the three EFAs showed that all loadings were higher than .32 (Costello & Osborne, 2005; Tabachnick & Fidell, 2001), where the 'very simple structure' criterion has been always respected (Comrey & Lee, 1992). The internal coherence results were 'very good' for the overall questionnaire (α = .77), and for four factors ('Learning as a co-constructive and cultural process': α = .65; 'Negative experience and anxiety': α = .83; 'Personal challenge, self-efficacy and personal growth': α = .79; 'Internal attribution for success and failure': α = .61), but less good for two dimensions ('Learning as a reduction of deficit through individual effort': α = .55; 'External attribution for failure': α = .54); where some factorial intercorrelations gave moderate or low results. However, the three CFAs showed optimum values about the 'goodness of fit indeces' of 'Beliefs' (CFI = .98, SRMR = .06), 'Academic emotions' (CFI = .89, SRMR = .07) and 'Causal attributions' (CFI = .92, SRMR = .06) sections, confirming that the CFA models obtained in this research reproduce the data observed by good reliability (Hu & Bentler, 1998).

In line with literature (see, Marton et al., 1993; Marton & Säaljö, 1976; Purdie & Hattie, 2002) the beliefs section showed two factors: a conception of learning as 'co-constructive and cultural process' and a conception of learning as 'reduction of deficiency through individual effort.' From these results, middle school students conceived learning both as a dimension which requires the comparison with one's classmates and as a self-determined process. In line with extant literature (see Raeff et al., 2000), both 'individualistic' and 'collectivistic' typologies of conceptions emerged in the same context, the former more linked to the model in which expert purveys technical knowledge; and the latter related to the activation of emotions and relationships. These results promoted an integrated view of individual and collective dimensions of learning, rather than conceiving of them as mutually exclusive (see, Greenfield, Trumbull, et al., 2003). Furthermore, the emergent multifaced pattern of conceptions of learning was consistent with the age of middle schools' student and with the typical features of the period of preadolescence. Klatter et al. (2001) have argued that for middle school pupils it is difficult to give clear personal statements about learning, and to share their sense of what it means. That could be referring to the phase of life in which they are living characterised by continuous deconstructions and reconstructions in several domains, through the progressive acquisition of awareness on schooling, education, learning, and knowledge.

Regarding the section pertaining to academic emotions, results showed two factors: a conception of learning as 'negative experience and anxiety'; and a conception of learning as 'personal challenge, self-efficacy and personal growth.' On the one hand, learning is experienced as a challenge, as increase of self-efficacy, and as personal growth, in keeping with the findings of Linnenbrink and Pintrich (2003). On the other hand, it can either be a source of anxiety and negative emotions, as also stated by other authors (see, Pekrun et al., 2002). The conception of learning as 'personal challenge, self-efficacy and personal growth' showed that middle school students conceived learning as an occasion to evaluate their capacity, their values, that in turn constitute an opportunity for challenge and growth. In addition to the conception of learning as 'learning as a co-constructive and cultural process,' the conception of learning as 'personal challenge, self-efficacy and personal growth' could be seen to overlap with a constructive view of learning (see Marton et al., 1993; Purdie & Hattie, 2002), where

the construction of meaning and personal change came into play.

Finally, the causal attributions section showed two factors consistent of the traditional distinction internal versus external locus of control: a conception of learning as 'internal attribution for success and failure,' and a conception of learning as 'external attribution of failure.' This is in line with Weiner (2010). Students with a conception of learning linked to internal attribution tended to seek explanations of failure and success in themselves. In doing so, they tried to understand why they may or may not be doing well at school. This kind of personal style represented a significant resource to achieve future success and to improve upon past errors (Weiner, 2010).

As for our second aim, in agreement with Hypothesis 2, two patterns of relationships between factors emerged. In line with hypothesis 2a, the conception of learning as 'co-constructive and cultural production' and the conception of learning as 'personal challenge and growth' were positively correlated with the conception of learning as 'internal attribution of failure and success.' The results highlighted the link that clearly emerged in literature (see Marsh & Martin, 2011; Marton et al., 1993) between attributions of personal controllability; a sense of becoming involved in learning; and positive emotions accompanied by high levels of self-efficacy. Surprisingly, this pattern of relationships also included the conception of learning as 'reduction of deficiency through individual effort.' We proposed to interpret this result pointing our attention on a common aspect shared by the conceptions of learning as 'personal challenge and growth,' 'reduction in deficiency of knowledge and individual effort,' and 'internal attribution of failure and success' that could be detected in the internal dimension to which factors referred. Furthermore, these last results could lead us to suppose that students may possess different conceptions of learning (in terms of different involvement of social or individual aspects in learning) in relation to disciplinary specificity. Beyond this, the results of the present study reinforced the theorisation of conceptions of learning through a more holistic perspective, which included beliefs, academic emotions, and causal attribution for success and failure. This awareness reveals that students have in mind different aspects that account for the complex nature of learning, viz. their fellow classmates as measurement of their performance, but concomitantly, as co-protagonists of the process.

As for our second aim, in agreement with hypothesis 2b, the conception of learning as 'negative emotions and anxiety' was positively correlated with the conception of learning as 'external attribution of failure.' In line with literature such as the study conducted by Au et al. (2010), a perception of uncontrollability of events lead to the experience of negative emotions in learning, to which the development of a pessimistic expectation about future failures, poor academic results, as well the reverse situation might be attributed. This result was in line with literature (Swinton et al., 2011), since a vicious circle emerges between low levels of self-efficacy, avoidance, with limited effort to react to adversity.

Conclusion

This study showed the degree to which middle school students' conceptions of learning is both rich and varied. They embraced the three domains of belief, academic emotions, and academic causal attributions of success and failure. This study serves as a reflection for researchers, teachers, and students themselves on the different representations of learning owned in a significant period of the educational path, that is middle school. This is in line with Fraser and Killen (2003) and authors like Kotzé (2002), who argue for a deepening of the factors that motivate students to persistently engage with their educational path, and to improve their school performance. In this context, the promotion of awareness about conceptions of learning emerged, and could be further spread through different socio-educational context (Van Deventer & Kruger, 2003).

Furthermore, the results of the present study would inform educational institutions about the psychological features, in terms of conceptions of learning, of their students for to construct ad hoc interventions. For example, mentoring programmes would gain support from the availability of a valid and reliable instrument to address/identify those children at-risk of failure, in order to prevent drop-out.

These results need to be interpreted in the light of several limitations. Firstly, this study investigated conceptions of learning without considering any disciplinary specificities. For this reason, they didn't grasp possible changes in conceptions of learning that might arise in considering disciplinary specificities (such as, conceptions of maths, conceptions of science, etc.) In future research, it might be useful to take into consideration that aspect. Secondly, this study using a self-report questionnaire assumes a certain level of students' awareness of their personal ways to conceive and approach to learning, however, it was not certain as to whether students' statements about what learning means to them corresponded to coherent actions in learning. It could be very interesting to investigate the way in which conceptions of learning effectively coincided with the activities implemented by students in the reality. Finally, our study identified the factor of dimensions of middle school students' conceptions of learning, such that future research could extend to the way in which those factors

dimensions are associated with learning outcomes, possibly considering the participation of a wider sample, and using a longitudinal research design.

Note

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