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Criterion Validation of the Scales of Autonomy, Collaboration, Empathy, Problem-solving and Self-confidence of the 3SQ

Soft Skills Self-evaluation Questionnaire Adapted for Lower Secondary School

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CONVALIDA PER CRITERIO DELLE SCALE DI AUTONOMIA, COLLABORAZIONE, EMPATIA, PROBLEMS-SOLVING E FIDUCIA IN SÉ DEL 3SQ. SOFT SKILLS SELF-EVALUATION QUESTIONNAIRE ADATTATO PER LA SCUOLA SECONDARIA DI PRIMO GRADO

ABSTRACT

The Soft Skills Self-evaluation Questionnaire (3SQ, 41 items) was validated using the responses of 1216 Italian students attending the fourth and the fifth grade of upper secondary school (Lucisano & du Mérac, 2019a), demonstrating good psychometric properties (du Mérac & De Santis, 2020; du Mérac, Livi, & Lucisano, 2020). The adaptation of the 3SQ (40 items) for 8th-grade students was validated in Rome using the responses of 507 students, confirming the factorial structure, sufficient independence, and a good internal consistency (Cronbach alpha between .75 and .92 and 52.23% of the total variance explained). Here, we present the criterion-related validity of the five scales of

the adapted 3SQ: Self-confidence, Autonomy, Problem-solving, Cooperation, Empathy. During a PhD research project (Scippo, 2021), these dimensions were also measured in Rome with other instruments, using a sample of 403 8th grade students. The analysis of the data confirms good reliability of the five scales (between .79 and .92), shows good indices of the confirmatory factor analysis of all the scales (RMSEA = .05, SRMR = .08), and reveals significant correlations (between .38 and .68) between the scales of the adapted 3SQ and the other scales measuring the same dimensions. In conclusion, this concurrent validity check reinforces the validity of the adapted 3SQ construct and, consequently, its usefulness for both research and guidance.

Keywords: Criterion-related validity; Secondary school; Self-assessment; Soft Skills Self-evaluation Questionnaire – 3SQ; Transversal skills.

1. INTRODUCTION

The development of transversal skills, also known as soft skills, is widely known to help improve career opportunities and, in general, life conditions (Cappellari *et al.*, 2017). Consequently, it is considered an indispensable part of young people education.

The 2015 OECD report *Skills for social progress*, for instance, underlines the importance of developing, through education, transversal skills, since they have been shown to influence the personal life, mental health and social success of an individual, as well as the labour market and the quality of educational paths (Moscovici *et al.*, 2005; OSCE, 2015).

Transversal skills are generally not acquired during formal education, be it school or university, as there is still not enough room for active, creative and conscious participation (De Santis & du Mérac, 2019). Nevertheless, school and university do represent a real social community for the young that contributes to the sharing of knowledge, values and objectives and the creation of expectations and behaviours (Marsh, 1987; Rovai, 2002; Gerber, Wheeler, & Suls, 2018; Livi *et al.*, 2019) and the competencies they acquire during their formal and non-formal education are of extreme importance (Lucisano & du Mérac, 2015).

Consequently, it is extremely important to have means that can measure and understand specific transversal skills of young students to support their personal and future professional growth and help them know themselves and make the right choices.

Self-evaluation of one's level of personal and social competence is, by nature, subjective, and consequently, not realistic. It can be both positively and negatively biased. When the students are asked to judge and evaluate themselves, they perform self-evaluation (Shrauger & Osberg, 1981) and are involved in a metacognitive process. In many research fields, such a process has been recognised as essential for developing knowledge, control over one's cognition, and, consequently, learning (Bransford, Brown, & Cocking, 2000) and developing competencies (Boud, 1995). The process of reflecting on oneself, stimulated by self-evaluation, makes it possible to identify one's strengths and weaknesses, encourage and guide the acquisition of new knowledge and skills (Boud & Falchikov, 1989). Self-assessment is formative as it involves students making judgments about their learning and level of development (Boud & Falchikov, 1989; Ross, 2006). The more the students are involved in self-assessment, the more it gets accurate. It makes them think and compare themselves to others, reconsider their standards and criteria, adjust their self-assessment, and gain new knowledge about themselves. In addition, as Pintrich and Schunk (1996) point out, students are less likely to learn further information if they are not aware of what they can do (or are unable to do).

In many studies, the accuracy of self-evaluation of competencies has been confronted with teachers' grades and marks and other objective measures (e.g. Ackerman, Beier, & Bowen, 2002). The literature suggests that different factors can affect the accuracy of self-assessment. Some factors are related to the measures used, while others have to do with the personal characteristics of the interviewees who completed the self-assessment.

The students who tend to overestimate their level of competence, in general, are not familiar with how such competencies are demonstrated and the standards used to guide judgements about their work (Sullivan & Hall, 1997). In order to limit this risk about the 3SQ, the phrases used to describe the abilities were formulated simply and concisely. Each dimension contains 4 or 5 different items describing how these abilities are shown in terms of behaviours and way of thinking.

The discrepancies between self-assessment and objective external assessment can cause an over-assessment of one's competencies or result in their under-estimation. The latter is called bias in self-evaluation and is more relevant when students underestimate their abilities than when they over-estimate them. Several studies have reported that the perception of reality is a better predictor of how the student will react in certain situations than the reality itself (Phillips & Zimmermann, 1990; Bouffard *et al.*, 2005 and 2011). Some studies have demonstrated that the young people who believe in having low-level social competencies, when they are actu-

ally appreciated and well accepted by others, often feel social anxiety and believe that they are not accepted by their peers and have low self-esteem.

We can conclude that self-evaluation is a process that is useful not only for those who are involved in it but also for the researcher who can obtain highly relevant information. Naturally, the report's value depends on the instrument's characteristics and how the variables are defined operatively.

1.1. 3SQ description

The expression «soft skill» is often translated as «competence» even though the relevant literature provides definitions that help us distinguish between these two constructs. Without repeating what has already been written in other articles on the topic (e.g. Lucisano & du Mérac, 2019a), the first distinction that can be made is the one between soft and hard skills. The former ones make it possible to adapt, transfer, update and apply with flexibility the latter ones in different situations and contexts. Soft skills are related to neuroplasticity, and their development makes it possible to respond to the needs typical of professional contexts (Cimatti, 2016).

Another classification distinguishes between the abilities oriented towards oneself (interpsychic) and those oriented towards others (interpersonal). The former refers to what a person needs to understand and develop about and in themselves (even though Vygotsky, 1934, maintains mental functions are first set about the others and internalised later on), while the latter refers to the ability to relate to the others. This distinction can be made in terms of individual and social skills as well (Engelberg, 2015).

In this article, data on the concurrent validity of the self-evaluation questionnaire on soft skills are presented. The Soft Skill Self-evaluation Questionnaire (3SQ; Lucisano & du Mérac, 2019a) was validated using a sample of 1216 students of the fourth and fifth grade of upper-secondary school and showed to have good psychometric properties (du Mérac & De Santis, 2020; du Mérac, Livi, & Lucisano, 2020). In addition, the factorial structure of the 3SQ confirms the subdivision in two macro-categories mentioned above, relative to individual and social soft skills.

The design of the items is based on the EU document published in 2011, which offers a classification based on the distinction between soft and hard skills. The document describes 22 soft skills divided into five groups. The 22 skills were difficult to operationalise because some descriptions of the skills overlap to a certain extent and, in addition, cannot be

easily divided into different dimensions. The choice of the dimensions and the items resulted from long discussions and considerations and several tryouts with samples consisting of secondary school and university students. The aim was to formulate statements that would allow a distinction between the constructs chosen for the 5-point Likert scale (from 1 = «Never or almost never true» to 5 = «Always or almost always true»).

The ten dimensions identified by the 3SQ can be grouped into four different soft-skill categories listed in the EU document (2011):

- Self-confidence (believing in one's potential and abilities, e.g. «I believe in myself»), Curiosity (desire to know more, active search for new information, e.g. «I like to enhance my knowledge of certain arguments») and resilience the ability to resist and stay positive in difficult situations, such as «I stay positive when I encounter difficulties») both belong to personal effectiveness. As Pellerey (2017) explained, these skills «reflect some aspects of an individual's maturity about himself/herself, others, and work. They are related to the performance of an individual when dealing with environmental pressures and difficulties» (p. 19).
- Openness to other points of view and different experiences (e.g. «I tend to welcome points of view of other people»), Cooperation (ability to cooperate with others constructively, e.g. «I am glad to participate in group initiatives») and Empathy (the ability to understand the thoughts and feelings of the others, e.g. «I try to put myself in other people's shoes») are dimensions that are part of relationship and service skills, that «enable people to understand the needs of others and to collaborate with them» (*ibid.*);
- Leadership (the ability to guide the others, e.g. «There are activities where I guide the others») is part of the impact and influence skills and «reflect an individual's influence on others» (*ibid.*); and finally,
- Commitment (the ability to complete what one has started, e.g. «I attentively complete the necessary activities to achieve the result»), Autonomy (the ability to think and decide on one's own, e.g. «I can make my own choices») and Problem-solving (the ability to find solutions for the encountered problems, e.g. «When I encounter a difficult situation, I try to find the strategies to cope with it») are dimensions that belong to achievement skills, have «a tendency towards action, are directed more at task accomplishments than the impact on other people action-oriented» (*ibid.*).

The self-evaluation questionnaire did not include cognitive skills related to analytical and conceptual thinking as they can be measured more appropriately during scholastic or university activities, which often provide occasions to use these cognitive approaches.

As previously stated, the ten dimensions can be grouped into two macro factors. The first factor, called Individual Soft Skills, consists of the abilities reflected in personal behaviour or the relationship with oneself, that is, Self-confidence, Autonomy, Problem-solving, Commitment, Leadership, Resilience and Curiosity. The second factor, consisting of Empathy, Openness to others and Cooperation, encompasses social soft skills reflected in the relationships built with others.

The fact that the statements used are exclusively positive can be considered a limitation. Content creators of behaviour questionnaires often maintain that positively worded items need to be balanced with an equal number of negatively worded ones to reduce acquiescent bias (Nunnally, 1978; Anastasi, 1982; Anderson *et al.*, 1983). Nevertheless, there have been new arguments that contest this practice (Barnette, 2000), as it lowers internal consistency (Stewart & Frye, 2004), affects the factorial structure (Schriesheim & Hill, 1981; Schmitt & Stuits, 1985; Pilotte & Gaable, 1990) and reduces the cross-cultural applicability of the construct (Wong *et al.*, 2003).

1.2. 3SQ adaptation

The 3SQ was designed in 2018 and resulted from a cooperation of the Sapienza University researchers Lucisano and du Mérac with Campus Orienta. Every year, this research on young people in Italy is being conducted not only for research purposes but also to provide a useful interpretation of the data to improve the educational offer of schools and universities. In 2020, De Santis and Stanzone, the Sapienza University researchers, started the adaptation of the 3SQ for the students of lower secondary schools by adapting the items, wherever necessary, and by carrying out a pilot study with a sample of 507 both female and male students of eight schools in Rome and the province, with equally-sized gender groups. The factorial structure, sufficient independence and good internal coherence of the ten factors of the 3SQ construct were confirmed (Cronbach's alpha ranging from .75 and .92 and 52.23% of the total variance explained). After the adaptation of the questionnaire for a younger age and the exploratory factor analysis, one item was removed to standardise the number of items per scale to four. For that reason, the construct consisted of 40 items and not 41.

The results obtained from the questionnaire adaptation indicate that the 3SQ is valid as an instrument and can reliably measure the self-perception of soft skills by the students of lower secondary schools.

2. METHOD AND PROCEDURE

In 2020, the criterion-related validity for some of the scales of the 3QS adapted for lower secondary schools was examined. During a PhD research project (Scippo, 2021), there was a need to measure soft skills to verify whether there was a significant difference in a group of students of the eighth grade between those who attended a Montessori school and a non-Montessori school. Some of the dependent variables were Autonomy, Openness, Curiosity, Cooperation, Empathy, and Self-confidence, measured using self-report instruments discussed later in the paper. The adapted 3SQ was also administered to estimate the criterion-related validity, or as «the use of a second measure of the concept as a criterion by which the validity of the new measure may be checked» (Bailey, 1995, p. 91). In this case, we are dealing with concurrent validity as it describes «a measure that is valid for measuring a particular phenomenon at the present time» (*ibid.*, p. 90).

2.1. *Participants*

The adapted 3QS, containing the scales to be used as a criterion-related validity estimate, was administered online from 3rd to 13th July 2020, during distance learning, which resulted from the first wave of the Covid-19 pandemic. Four hundred fifty-four eighth grade students from 9 schools in the province of Rome completed the questionnaire.

We removed the incomplete or unreliable questionnaires from the matrix; there were 403 questionnaires left, 200 of which had been completed by male students (the mean age = 13.78), while 203 were completed by female students (the mean age = 13.8).

We thought these conditions could influence the results since the administration was conducted online during the Covid lockdown. In particular, the hypothesis was that the presence of parents could affect the students' answers. For example, parents' influence may occur in response to items on a scale of connectedness to the family, included in the questionnaire, such as «I feel loved by my family» (Waters, 2010). A question was inserted to test this hypothesis asking how much the parents had helped them answer the questionnaire. Then it was verified that, according to Spearman's Rho test, there was no significant correlation between the help received (ordinal variable) and the score on the scale of connectedness to the family (variable at intervals), so it was not necessary to eliminate any case among those who were helped most by the parents. However, there

may have been other influences on the results due to the online administration. Due to this limitation, we consider it worthwhile to replicate the present study with an in-person administration, and the outcomes deriving from the analysis of these data can be regarded as preliminary.

2.2. Research instruments

The starting point for measuring the variables was the APA's PsycTESTS database. Out of several scales found in the relevant literature, we chose the ones that were considered the most suitable in terms of their psychometric properties and the similarities between the sample through which the scales had been validated (*Tab. 1*).

Table 1. – Instruments used to examine criterion-related validity.

CONSTRUCT AND SCALE	AUTHOR	NO. & COUNTRY	AGE	CRONBACH'S ALPHA	NO. OF ITEMS
Autonomy (attitudinal, emotional, functional autonomies)	Noom <i>et al.</i> , 2001	400 (The Netherlands)	12-19	0.87	15
Self-esteem (modified Rosenberg self-esteem scale)	Zimprich <i>et al.</i> , 2005	1107 (Switzerland)	12-19	0.79	10
Creativity Openness Problem-solving (TCD-As)	Moretti <i>et al.</i> , 2017	1393 (Italy)	6-18	0.84	20
Empathy (HIFds)	Bonino <i>et al.</i> , 1998	252 (Italy)	11-13	0.67	12
Cooperation	Phillips & Springer, 1992	1055 (Canada)	11-18	0.80	6

The Italian version of Rosenberg's modified scale (Zimprich *et al.*, 2005), the one used by Caprara *et al.* (2006), was used to measure self-esteem. Noom's scale (Noom *et al.*, 2001) was used to measure Autonomy, while Phillips & Springer's (1992) scale was used to measure Cooperation. The latter two scales were translated specifically for the PhD research project.

2.3. Statistical analyses

First of all, in order to confirm the reliability of the instrument, Cronbach's alpha was calculated, using as acceptance levels the following (De Vellis, 1991): $\alpha < .60$, unacceptable, $.60 < \alpha < .65$ undesirable, $.65 < \alpha < .70$ minimally acceptable, $.70 < \alpha < .80$ respectable, $.80 < \alpha < .90$ very good, $\alpha > .90$ excellent.

Secondly, a confirmatory factorial analysis was performed to verify whether the variables explain the variance to the extent possible to confirm the model.

Finally, to verify the criterion-related validity, R correlation coefficients, between the scores obtained from the sample that completed the adapted 3SQ and the scores obtained using other scales that measured the same dimensions. The hypothesis is that all the correlations are statistically significant.

3. RESULTS

3.1. Reliability

The calculation of Cronbach's alpha using the data of the 403 participants in the study yielded results quite similar to the ones in the original studies (Tab. 2).

Table 2. – Cronbach's alpha of the scales.

SCALE	AUTHOR	CRONBACH'S ALPHA*
Autonomy	De Santis & Stanzione, 2020	0.79 (0.78)
Cooperation	De Santis & Stanzione, 2020	0.86 (0.85)
Empathy	De Santis & Stanzione, 2020	0.79 (0.79)
Self-confidence	De Santis & Stanzione, 2020	0.92 (0.92)
Problem solving	De Santis & Stanzione, 2020	0.86 (0.82)
Autonomy	Noom <i>et al.</i> , 2001	0.73 (0.87)
Cooperation	Phillips & Springer, 1992	0.73 (0.80)
Empathy	Bonino <i>et al.</i> , 1998	0.81 (0.67)
Self-esteem	Zimprich <i>et al.</i> , 2005	0.80 (0.79)
Problem-solving	Moretti <i>et al.</i> , 2017	0.84 (0.84)

Note: * = the values in brackets are Chronbach's alpha as calculated by scales' authors.

In particular, De Santis and Stanzione’s (2020) autonomy and empathy scales, Noom’s autonomy scale (Noom *et al.*, 2001) and Phillips and Springer’s (1992) cooperation scale yielded respectable reliability results; De Santis and Stanzione’s (2020) collaboration and problem-solving scales, Bonino’s empathy scale (Bonino *et al.*, 1998), Zimprich’s self-esteem scale (Zimprich *et al.*, 2005) Moretti’s problem-solving scale (Moretti *et al.*, 2017) yielded very good results; and De Santis and Stanzione’s (2020) self-confidence scale proved to be highly reliable.

3.2. Confirmatory factor analysis

The confirmatory factor analysis yielded the following results: (a) an RMSEA value (the root mean square error of approximation), which analyses the discrepancy between the hypothesised model and the population covariance matrix, was equal to .05; (b) the standardised root mean squared residual (SRMR), which is the square root of the discrepancy between the sample covariance matrix and the model covariance matrix, was equal to .08.

Considering Hu & Bentler’s (1999) criteria, who regarded acceptable RMSEA values lower than or equal to 0.06 and SRMR values lower than or equal to 0.08, we can conclude that the data indicate a good model fit.

3.3. Criterion-related validity

Table 3. – Criterion-related validity of some of the adapted 3SQ scales.

	SELF- CONFIDENCE	AUTONOMY	PROBLEM- SOLVING	COOPERATION	EMPATHY
	(De Santis & Stanzione, 2020)				
Self-esteem (Zimprich <i>et al.</i> , 2005)	0.68				
Autonomy (Noom <i>et al.</i> , 2001)		0.38			
Problem-solving (Moretti <i>et al.</i> , 2017)			0.46		
Cooperation (Phillips & Springer, 1992)				0.56	
Empathy (Empathy <i>et al.</i> , 1998)					0.68

All the correlations between the scores obtained from the 403 participants on the 3SQ and the scores obtained on other scales that measure the same dimensions are significantly positively correlated at $p < 0.01$ (2-tailed). The correlation coefficients vary from .38 to .68 (*Tab. 3*).

4. DISCUSSION

The procedures and results relative to the criterion-related validity of the 3SQ adapted to the lower secondary school for Self-confidence, Autonomy, Problem-solving, Cooperation, and Empathy scales have been presented in this article.

Focusing on the instruments used for the evaluation is necessary to be able to respond to the European policies and requests and the needs of the teachers and students so they can learn to know themselves, to choose the right direction for themselves and proceed along their development path, in an environment where indicators are still vague and difficult to operationalise.

Self-evaluation is a significant starting point for the teachers to explore the path followed with the students and continue developing transversal skills. Also, it is helpful as an information source to be linked to the characteristics of the teaching and experience contexts to understand the development of the skills. In the publication on monitoring *Teens' Voice* (Lucisano & du Mérac, 2019b), the relationship between the 3SQ scales and other instruments as well as the original questionnaire are discussed.

Although future studies using probability sampling would be helpful to avoid misinterpretation of the data, the 3SQ for the upper secondary school and university and its version for the lower secondary school have shown good psychometric properties. The questionnaire is relatively straightforward as it consists of 41 items (40 in its adapted version) and measures ten factors: Self-confidence, Empathy, Curiosity, Leadership, Openness, Cooperation, Autonomy, Commitment, Problem-solving and Resilience. In addition, the factors have shown a good internal consistency. Two macro factors have been identified – Individual Soft Skills and Interpersonal Soft Skills. Each of the scales and the macroscales can be used on its own or together, depending on the study aim. In addition, the instrument is appropriate both for research purposes and for practical aims such as guidance¹.

¹ To help guide the students of upper secondary schools and universities, an online platform has been designed for them. It can be accessed from a website, where the students

The validity of the 3SQ construct has been confirmed through concurrent validity that has shown significant positive correlations ($p < .01$) between the five factors of the adapted 3SQ and other validated scales that measure the same dimensions. The highest level of correlation has been found in the scores between Self-confidence and Empathy of the 3SQ and the scales of self-esteem (Zimprich *et al.*, 2005) and empathy (Bonino *et al.*, 1998) (both $r = .68$). A slightly weaker correlation has been found between the 3SQ Cooperation and Phillips & Springer's (1992) cooperation ($r = .56$). The degree of correlation is good between the Problem-solving of the 3SQ and the problem-solving scale of Moretti and colleagues (2017) ($r = .46$), as between the factor of Autonomy and autonomy scale of Noom, Dekovic and Meeus (2001) ($r = .38$).

The 3SQ scale has been demonstrated to be useful both for research and teaching. It is an instrument useful to foster the students' awareness and perception of essential aspects for establishing a relationship with different contexts and others.

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can check the results of their self-evaluations, compared to the reference population. Access to the platform will be available from the Sapienza University website and the *Salone dello Studente* – Campus Orienta website.

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RIASSUNTO

Il 3SQ è un questionario (41 item) per l'autovalutazione delle soft skills, validato su 1216 studenti di quarto e quinto anno di scuola secondaria (Lucisano & du Mérac, 2019a), con buone proprietà psicometriche (du Mérac & De Santis, 2020; du Mérac, Livi, & Lucisano, 2020). L'adattamento del 3SQ per studenti di scuola secondaria di primo grado (40 item), è stato validato a Roma con 507 studenti, confermandone la struttura fattoriale, la sufficiente indipendenza e una buona coerenza interna (alfa di Cronbach compresi tra .75 e .92 e varianza totale spiegata del 52.23%). In questo articolo presentiamo la convalida per criterio di cinque scale del 3SQ adattato: Fiducia in sé, Autonomia, Problem-solving, Cooperazione, Empatia. In occasione di una ricerca di dottorato (Scippo, 2021) queste dimensioni sono state misurate a Roma anche con altri strumenti su 403 studenti di scuole secondarie di primo grado. L'analisi dei dati conferma una buona affidabilità delle cinque scale considerate (tra .79 e .92), restituisce buoni indici dell'analisi fattoriale confermativa di tutte le scale considerate (RMSEA = .05, SRMR = .08), e restituisce correlazioni significative (tra .38 e .68) tra le scale del 3SQ adattato e le altre scale che misurano le stesse dimensioni. Concludendo, questo controllo della validità concorrente rinforza la validità del costruito del 3SQ adattato e, di conseguenza, la sua utilità sia per la ricerca sia per l'orientamento.

Parole chiave: Abilità trasversali; Autovalutazione; Scuola secondaria; Soft Skills Self-evaluation Questionnaire – 3SQ; Validità di criterio.

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