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# Validation study of the Italian version of the Self-regulation for Learning Online (SRL-O) questionnaire in university students

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*ABSTRACT*. Lo scopo di questo studio è contribuire alla validazione dello strumento *Self-regulation for Learning Online (SRL-O) questionnaire* su un campione di 193 studenti universitari italiani. Dall'analisi fattoriale confermativa è emersa una struttura a dieci fattori, sostanzialmente equivalente alla versione originale dello strumento, suggerendo dunque una comparabilità del costrutto di apprendimento autoregolato tra le diverse culture. I dieci fattori SRL-O hanno mostrato correlazioni significative con gli orientamenti verso l'apprendimento posseduti dagli studenti. L'uso dello strumento SRL-O permetterà di identificare gli studenti universitari a rischio di fallimento accademico e intervenire per promuovere alti livelli di autoregolazione nell'apprendimento online.

*SUMMARY. With more learning occurring online, it is critical to have current ways of inferring how students in education are managing their learning in online and blended environments. The aim of this study is to contribute to the validation of the Self-regulation for Learning Online (SRL-O; Broadbent et al., 2023) questionnaire on a sample of Italian university students by analyzing its confirmatory structure and convergent validity. 193 Italian university students of master's and bachelor's degree programs completed a self-report questionnaire on online self-regulated learning (translated from the SRL-O by Broadbent et al., 2023), and a self-report instrument to assess conceptions on learning (LO-COMPASS; Vettori et al., 2020; Vezzani et al., 2023) for convergent validity. A confirmatory factor analysis confirmed the ten-factor structure for a forty-four-item version, suggesting comparability in self-regulated learning across cultures. The SRL-O factors showed significant correlations with LO-COMPASS factors. The SRL-O is a valid and reliable instrument, useful to identify university students at risk of academic failure.*

**Keywords:** *Self-regulated learning, Online learning, University students, Conceptions of learning*

# INTRODUCTION

Self-regulated learning (SRL) is defined as the learner's ability to control his/her own learning environment. SRL plays a key role in studying in higher education learning environments (Dent & Koenka, 2016; Theobald, 2021). This observation is increasingly the case given the amount of flexibility provided to students through new pedagogical approaches such as those associated with online and blended learning (Pillay, Irving & Tones, 2007; Yen, 2020). Results from numerous studies indicate that students who take a self-regulated approach are able to adopt effective study strategies and adapt their actions to different learning contexts and goals (e.g., Zimmerman, 2000), resulting in academic successes over school years (e.g., Duckworth & Carlson, 2013) until university (e.g., Kryshko, Fleischer, Waldeyer, Wirth & Leutner, 2020).

Understanding and assessing how students self-regulate their learning experiences is particularly important at university level to identify areas of strengths and areas in need of improvement. University students can find it difficult to manage learning online for several reasons. Students adapt their learning strategies and self-regulation to the characteristics of study tasks and instructional settings (García-Pérez, Fraile & Panadero, 2021). Increased flexibility in online learning means that more of the onus on decision-making is placed into students. The main critical challenges involve students making good decisions about learning strategies and staying motivated (Huang, Tu, He, Han & Wu, 2023).

The present study aimed to provide the validation of the Italian version of a new and agile measure, the *Self-regulation for Learning Online (SRL-O)* questionnaire (Broadbent et al., 2023) - originally designed specifically for undergraduate students in the [country] educational context - which assesses the profile of self-regulation approach in online learning environments. To our knowledge, there are no currently validated measures of university students' self-regulation for learning online in the Italian context. The aim of this cross-cultural validation study is to provide a reliable instrument for assessing and promoting undergraduate students' online self-regulation, easily usable by university learning support services and students' themselves.

## Self-regulated learning

Learners need to implement and integrate several cognitive, metacognitive, behavioural, motivational and affective processes to control their own learning environment and pursue learning goals (Tarchi et al., 2022). Several theoretical models have been validated for self-regulated learning (Panadero, 2017). Despite some differences, all models agree that SRL is composed of different cyclical phases: (a) preparation, in which the learner analyzes the task, plans, identifies goals; (b) performance, in which the learner implements the processes need to complete the task (task strategies) while monitoring the progress; and (c) evaluation, in which the student assesses his/her performance, seeks help and reflects on the learning process for future performances.

While self-regulated learning has received wide attention in the context of traditional learning environments, the use of online environments for learning and studying is extensively spreading across cultures and educational systems, which requires a re-consideration of our approach to SRL to better support student's learning processes and professional development activities for teachers (Matteucci & Tomasetto, 2018). Several studies have extended the relevance of SRL to online learning environments too, although with different features (Anthonysamy, Koo & Hew, 2020; Broadbent, 2017; Broadbent et al., 2015; Roth, Ogrin & Schmitz, 2016; Wong et al., 2019). For instance, online learning environments require higher resources in planning and monitoring for studying and supporting one's motivation to learn than traditional environments (Weinstein, Acee & Jung, 2011). Moreover, asynchronistic and synchronistic interaction and communication in online learning require active participation, effort regulation and strategies to stimulate motivation (Broadbent et al., 2015). It is important to determine appropriate measures to assess undergraduate students' self-regulation in online environments to support academic success challenged by the new characteristics of online learning settings.

## Self-regulated learning and academic achievement

Previous research in traditional face-to-face settings revealed that the ability to self-regulate learning is crucial to succeed at school and university. Students' ability to plan, monitor and evaluate their own learning activities allow them to reach academic goals and also be aware of the need for help-seeking. For these reasons, the most effective teaching strategies to promote students' self-regulated learning have

been illuminated by scholars (e.g., Russell, Baik, Ryan & Molloy, 2022). However, the increase of online learning in the last two decades have stimulated several researchers to examine self-regulation in online learning environments (see, systematic review by Martin, Sun & Westine, 2020). In a meta-analysis including either online or offline/web-based educational setting, Jansen and colleagues (Jansen, Van Leeuwen, Janssen, Jak & Kester, 2019) revealed a positive effect of SRL interventions on both SRL activity as well as on achievement also thanks to motivational and behavioral levels of self-regulated learning. In a recent scoping review, Xu and colleagues (Xu, Zhao, Liew, Zhou & Kogut, 2023) explored the relation between self-regulated learning (SRL) and academic achievement in online and blended learning environments from intervention and cross-sectional studies. They explored various countries, study characteristics, methodology, and SRL dimensions and strategies. They reported the importance of self-regulation on academic achievement in online and blended learning. Finally, they also reported that research on adolescents' SRL cognitive and emotion regulation strategies in online learning contexts is urgently needed to inform instructional design and approaches.

To prevent academic failure and dropout, it is important to identify reliable and practical instruments to assess students' SRL. However, SRL instruments are predominantly developed for English speaking countries, and are not often extended across countries and educational systems. Translating and validating an English-speaking SRL instrument would achieve two important goals: extending SRL assessment to non-English-speaking countries and allowing cross-cultural comparison of SRL.

From a theoretical perspective, self-regulation connected to online learning maintains its multidimensional nature being composed by several sub-dimensions, such as online self-efficacy, online intrinsic and extrinsic motivation, online negative achievement emotion, planning and time management, and online social support strategies). From the assessment perspective, it is important to evaluate undergraduate students' self-regulation in online learning through an instrument able to cover this wide range of motivational regulation and learning strategies' dimensions. Broadbent and colleagues (2023) have recently developed an instrument specifically assessing self-regulated learning in online or blended learning, the *Self-regulation for Learning Online (SRL-O)* questionnaire. SRL-O has been selected as, in comparison with other existing instruments, it has two important strengths: i) it is a comprehensive measure that includes motivational beliefs (such as self-efficacy) and learning strategies (such as metacognition); and ii) it has been specifically developed for online and blended learning contexts.

# THE PRESENT STUDY

The present study aims to analyze the psychometric properties of the Italian translation of *Self-regulation for Learning Online (SRL-O)* questionnaire (Broadbent et al., 2023) for university students with current and prior experiences with online and blended learning. We expected a substantial confirmation of the original factorial structure of the instrument. We also investigated the association between SRL-O factors and students' learning orientations for convergent validity purposes. Students' mental models about learning are a multidimensional construct encompassing regulative and motivational aspects of learning (Pérez-Tello, Antonietti, Marchetti & Liverta Sempio, 2005). Learning orientations were assessed with an instrument previously validated for the Italian population, the *Learning Orientation-Cognition Metacognition Participation Assessment questionnaire* (*LO-COMPASS*; see Vettori et al., 2020; Vettori et al., 2022; Vezzani et al., 2023).

# METHOD

## Participants and procedure

We recruited a sample of 360 Italian university students aged between 19 and 59 years ($M = 22 \pm 3.25$; 13.7% male, 85.2% female and 1.1% non-binary/third gender or "I prefer not to answer"). Moreover, 87.6% were master's degree Psychology students in the first year and 12.5% were bachelor's degree Languages, Literatures and Intercultural Studies students in the third year. All the participants had previous experience with online and blended learning. We administered our Italian translation of the *Self-regulation for Learning Online* questionnaire (SRL-O; Broadbent et al., 2023) and the Italian self-report *Learning Orientation-Cognition Metacognition Participation Assessment questionnaire* (*LO-COMPASS*; Vettori et al., 2020; Vettori et al., 2022; Vezzani et al., 2023)

used as a measure of convergent validity. The present study was approved by the ethical committee of the Department of Education, Languages, Intercultures, Literatures and Psychology, University of Florence, Italy. The study was conducted during regular class time in presence. Students accessed an online platform (Qualtrics) through their own devices. The online questionnaire included: demographic questions, the SRL-O questionnaire and the LO-COMPASS questionnaire.

## Measures

- *Self-regulation for Learning Online (SRL-O)* questionnaire: it consists of 44-items and it measures ten factors: (1) online self-efficacy, (2) online intrinsic motivation, (3) online extrinsic motivation, (4) online negative achievement emotion, (5) planning and time management, (6) metacognition, (7) study environment, (8) online effort regulation, (9) online social support, and (10) online task strategies. Students respond on a 7-point scale ranging from 1 = not true for me to 7 = very true for me. The psychometric values were the following: $\chi^2_{(850)}$= 1478.31, $p$<.001, $\chi^2/df$ = 1.74, CFI = .901, RMSEA = .048. The original English version of the SRL-O questionnaire was translated into Italian language and back-translated for language validation. See Appendix for Italian translation of the SRL-O.
- *Learning Orientation-Cognition Metacognition Participation Assessment (LO-COMPASS)*: the self-report questionnaire (see Vettori et al., 2020; Vettori et al., 2022; Vezzani et al., 2023) was used as a measure of convergent validity. LO-COMPASS consists of 20 items scored on a five-point rating scale ranging from 1 = strongly disagreeing to 5 = strongly agreeing. The self-report LO-COMPASS shows a 4-factor structure. Each factor showed a good internal coherence, and represents a specific typology of learning pattern of cognitive, affective and regulative dimensions, as follows: (1) Learning as a self-regulated and strategic experience (7 items; ω = .76); (2) Learning as a process of affective, motivational and co-constructive activation of self (5 items; ω = .71); (3) Learning as a guided practice (4 items; ω = .64); and (4) Learning as participation in school practices (4 items; ω = .64). The psychometric values were the following: CFI = .89; RMSEA = .04; SRMR = .06.

## Data analyses

Analyses were conducted using the Jamovi statistical software (2022 Version 2.3). Significant Mardia's multivariate skewness and kurtosis tests (SRL-O kurtosis coefficient: 2256, skewness coefficient: 437, $p$<.001; LO-COMPASS kurtosis coefficient: 437.3, skewness coefficient: 48.1, $p$<.001) violated multivariate normality. However, the Mardia test is sensitive to large sample sizes (Cain, Zhang & Yuan, 2017: in their article, 94% of Mardia's measures were statistically significant when the sample size was larger than 106), thus we explored skewness and kurtosis values for each item. Univariate analysis of individual items showed significant normality regarding skewness and kurtosis of all items. In fact, items ranged between −2 to +2 (Hair, Hult, Ringle & Sarstedt, 2022).

Confirmatory factor analyses (CFAs) were first conducted on each scale to evaluate model fit. The estimation method was maximum likelihood (ML). The adequacy of model fit was verified by referring to conventional cut-offs: non-significant $\chi^2$ (of notice, the chi-square has several limitations in its use as a goodness-of-fit measure), CFI/TLI≥.90, and RMSEA≤.08 (Hair et al., 2010). For the RMSEA index we also report the 90% confidence intervals.

Furthermore, convergent validity analyses were carried out through a series of correlations.

# RESULTS

## Confirmatory factor analysis and reliability estimation

The confirmatory factor analysis on the Italian translation of SRL-O questionnaire confirmed the original 10-factor structure: (1) online self-efficacy (ω = .81), (2) online intrinsic motivation (ω = .89), (3) online extrinsic motivation (ω = .76), (4) online negative achievement emotion (ω = .87), (5) planning and time management (ω = .83), (6) metacognition (ω = .79), (7) study environment (ω = .77), (8) online effort regulation (ω = .82), (9) online social support (ω = .80), and (10) online task strategies (ω = .65). Factor loadings from confirmatory factor analysis in the SRL-O are reported in Table 1 with standardized estimates.

Initially, the Italian translation of SRL-O showed a slightly sub-optimal goodness-of-fit, $\chi^2_{(857)}$ = 1635, $p$<.001,

**Table 1** – Factor loadings from confirmatory factor analysis in the SRL-O with standardized estimates

| Factor | Items | Standardized estimates | *Z* | *p* |
|---|---|---|---|---|
| Factor 1 Online self-efficacy | SE1 | .72 | 12.65 | <.001 |
| | SE2 | .69 | 13.12 | |
| | SE3 | .85 | 16.39 | |
| | SE4 | .68 | 12.93 | |
| Factor 2 Online intrinsic motivation | IM1 | .79 | 16.30 | <.001 |
| | IM2 | .91 | 19.95 | |
| | IM3 | .81 | 16.82 | |
| | IM4 | .81 | 16.83 | |
| | IM5 | .60 | 11.25 | |
| Factor 3 Online extrinsic motivation | EM1 | .75 | 12.59 | <.001 |
| | EM2 | .75 | 12.58 | |
| | EM3 | .64 | 11.01 | |
| Factor 4 Online negative achievement emotion | NE1 | .66 | 12.52 | <.001 |
| | NE2 | .66 | 12.61 | |
| | NE3 | .75 | 14.89 | |
| | NE4 | .89 | 19.45 | |
| | NE5 | .84 | 17.81 | |
| Factor 5 Online planning and time management | P&TM1 | .70 | 13.09 | <.001 |
| | P&TM2 | .81 | 15.88 | |
| | P&TM3 | .71 | 13.45 | |
| | P&TM4 | .56 | 9.79 | |
| | P&TM5 | .67 | 12.26 | |
| Factor 6 Online metacognition | Met1 | .49 | 8.22 | <.001 |
| | Met2 | .60 | 10.6 | |
| | Met3 | .64 | 11.66 | |
| | Met4 | .75 | 14.34 | |
| | Met5 | .80 | 15.59 | |
| Factor 7 Online study environment | SET1 | .60 | 9.01 | <.001 |
| | SET2 | .82 | 15.96 | |
| | SET3 | .87 | 17.14 | |
| Factor 8 Online effort regulation | ER1 | .74 | 13.70 | <.001 |
| | ER2 | .74 | 13.62 | |
| | ER3 | .65 | 11.61 | |
| | ER4 | .75 | 14.12 | |

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| Factor | Items | Standardized estimates | *Z* | *p* |
|---|---|---|---|---|
| Factor 9 Online social support | SS1 | .51 | 8.89 | <.001 |
| | SS2 | .55 | 9.49 | |
| | SS3 | .73 | 13.87 | |
| | SS4 | .75 | 14.16 | |
| | SS5 | .79 | 15.24 | |
| Factor 10 Online task strategies | TS1 | .35 | 5.76 | <.001 |
| | TS2 | .24 | 3.92 | |
| | TS3 | .79 | 15.02 | |
| | TS4 | .81 | 15.36 | |
| | TS5 | .44 | 7.51 | |

*Legenda.* SE = Factor 1 online self-efficacy; IM = Factor 2 online intrinsic motivation; EM = Factor 3 online extrinsic motivation; NE = Factor 4 online negative achievement emotion; P&TM = Factor 5 online planning and time management; Met = Factor 6 online metacognition; SET = Factor 7 online study environment; ER = Factor 8 online effort regulation; SS = Factor 9 online social support; TS = Factor 10 online task strategies.

CFI = .88, TLI = .86, RMSEA = .05 [90% CI = .05; .06]. The fit of the ten-factor model improved after correlating six residuals (all theoretically plausible), as suggested by the analysis of the modification indexes. This model had an acceptable goodness-of-fit, $\chi^2_{(851)} = 1427$, $p<.001$, CFI = .91, TLI = .90; RMSEA = .04 [90% CI = .04; .05]. More specifically, we correlated the residuals for the following items:

- online intrinsic motivation item 3 with online intrinsic motivation item 4;
- online planning and time management item 4 with online planning and time management item 5;
- online task strategies item 1 with online task strategies item 2;
- metacognition item 1 with metacognition item 2;
- online effort regulation item 1 with online effort regulation item 2;
- online self-efficacy item 3 with online self-efficacy item 1.

These residual correlations are theoretically justified, as the items are related to the same factor (absorption) and their content is much similar as compared to the other absorption item, which refers to the same component related to self-regulation for learning online.

As shown in Table 2, similarly to Broadbent and colleagues (2023), correlations among factors from CFA ranged from small or moderate to high inter-relations, suggesting that all dimensions measured by this instrument concur to determine a global score of undergraduate students' self-regulation in online learning, but also adequate conceptual separation of these subscales is present. We discuss here the most relevant relationships:

- online extrinsic motivation (SRL-O Factor 3) was significantly positively correlated with online negative achievement emotion ($p<.001$) and correlated weakly with the other SRL-O factors;
- online negative achievement emotion (SRL-O Factor 4) was strongly and negatively correlated with most of SRL-O factors covering motivational regulation and learning strategies' dimensions.

## Convergent validity

The convergent validity of the Italian version of the SRL-O was analyzed by exploring its association with LO-COMPASS, an instrument to investigate students'

**Table 2** – Correlations between SRL-O and LO-COMPASS (n = almost 311)

| | SRL-O | | | | | | | | | | LO-COMPASS | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Factor | Factor 1 SE | Factor 2 IM | Factor 3 EM | Factor 4 NE | Factor 5 P&TM | Factor 6 Met | Factor 7 SET | Factor 8 ER | Factor 9 SS | Factor 10 TS | Factor 1 SR | Factor 2 MOT | Factor 3 GP | Factor 4 Part |
| 1 (SE) | _ | | | | | | | | | | | | | |
| 2 (IM) | .41*** | _ | | | | | | | | | | | | |
| 3 (EM) | −.07 | .10 | _ | | | | | | | | | | | |
| 4 (NE) | −.32*** | −.12* | .26*** | _ | | | | | | | | | | |
| 5 (P&TM) | .26*** | .20*** | −.01 | −.3*** | _ | | | | | | | | | |
| 6 (Met) | .37*** | .24*** | .11* | −.09 | .4*** | _ | | | | | | | | |
| 7 (SET) | .25*** | .26*** | −.07 | −.35*** | .4*** | .22*** | _ | | | | | | | |
| 8 (ER) | .40*** | .25*** | .06 | −.3*** | .5*** | .54*** | .35*** | _ | | | | | | |
| 9 (SS) | .15*** | .22*** | .06 | −.12* | .4*** | .34*** | .27*** | .39*** | _ | | | | | |
| 10 (TS) | .28*** | .35*** | .07 | −.11 | .34*** | .50*** | .21*** | .39*** | .44*** | _ | | | | |
| 1 (SR) | .31*** | .33*** | −.07 | −.21*** | .3*** | .33*** | .27*** | .4*** | .25*** | .35*** | _ | | | |
| 2 (MOT) | .32*** | .39*** | −.00 | −.05 | .12 | .4*** | .12 | .26*** | .22*** | .32*** | .39*** | _ | | |
| 3 (GP) | .12 | .30*** | .23*** | .08 | .13* | .3*** | .05 | .33*** | .23*** | .24*** | .3*** | .25*** | _ | |
| 4 (Part) | .36*** | .29*** | −.07 | −.14* | .18** | .24*** | .27*** | .29*** | .07 | .24*** | .4*** | .25*** | .14* | _ |

*Legenda.* SRL-O: SE = Factor 1 online self-efficacy; IM = Factor 2 online intrinsic motivation; EM = Factor 3 online extrinsic motivation; NE = Factor 4 online negative achievement emotion; P&TM = Factor 5 online planning and time management; Met = Factor 6 online metacognition; SET = Factor 7 online study environment; ER = Factor 8 online effort regulation; SS = Factor 9 online social support; TS = Factor 10 online task strategies.

LO-COMPASS: SR = Factor 1 Learning as a self-regulated and strategic experience; MOT = Factor 2 Learning as a process of affective, motivational and co-constructive activation of self; GP = Factor 3 Learning as a guided practice; Part = Factor 4 Learning as participation in school practice.

*$p$<.05, **$p$<.01, ***$p$<.001; values rounded up.

conceptions of learning. Before testing the convergent validity, a confirmatory factor analysis was run for LO-COMPASS. The results confirmed the four-factors model with an acceptable goodness-of-fit, $\chi^2_{(145)} = 228$, $p<.001$, CFI = .92, TLI = .91; RMSEA = .04 [90% CI = .03; .05].

Regarding the results of the convergent validity, there was a significant association between the factors of the two questionnaires (see Table 2).

The SRL-O online-academic self-efficacy scale (Factor 1) had a significantly strong positive correlation with all the LO-COMPASS (Factors 1, 2 and 4) scales except Factor 3 - Learning as a guided practice.

The SRL-O intrinsic motivation scale (Factor 2) had a significantly strong positive correlation with all four of the LO-COMPASS scales (Factors 1, 2, 3 and 4).

The SRL-O extrinsic motivation scale (Factor 3) had a significantly unique positive correlation with the LO-COMPASS Factor 3 - Learning as guided practice.

The SRL-O negative achievement emotions scale (Factor 4) had two significantly negative correlations with the LO-COMPASS Factor 1 - Learning as a self-regulated and strategic experience and LO-COMPASS Factor 4 - Learning as participation in school practice.

The SRL-O planning and time management scale (Factor 5) had significantly positive correlations with all the LO-COMPASS scales (Factors 1, 3 and 4) except Factor 2 - Learning as a process of affective, motivational, and co-constructive activation of Self.

The SRL-O metacognition scale (Factor 6) had significantly strong positive correlations with all the LO-COMPASS scales (Factors 1, 2, 3 and 4).

The SRL-O study environment scale (Factor 7) had significantly strong positive correlations with the LO-COMPASS scales Factor 1 - Learning as a self-regulated and strategic experience and Factor 4-Learning as participation in school practice.

The SRL-O online effort regulation scale (Factor 8) had significantly strong positive correlations with all the LO-COMPASS scales (Factors 1, 2, 3 and 4).

The SRL-O online social support scale (Factor 9) had significantly positive correlations with all the LO-COMPASS scales (Factors 1, 2 and 3) except Factor 4 - Learning as participation in school practice.

The SRL-O online task strategies scale (Factor 10) had significantly strong positive correlation with all the LO-COMPASS scales (Factors 1, 2, 3 and 4).

## DISCUSSION

This study addressed the need to validate reliable and practical tools to assess university students' self-regulation of learning in blended and online contexts. To this end, we identified the SRL-O questionnaire (Broadbent et al., 2023) as it included both motivational and strategic components, and it was specifically designed for online or blended learning environments. The specific objective of the study was to validate and provide the psychometric properties of the Italian translation of the SRL-O. To the best of our knowledge, this is the first study to evaluate its cross-cultural validity. This is a relevant step towards the validation of equivalent instruments across countries and it facilitates cross-cultural comparisons. In an increasingly globalized higher educational system, it is important to assess how students coming from culturally different backgrounds are prepared for online or blended learning environments.

The results provide support for the ten-factor structure of the forty-four-item original version indicating the equivalence in measurement of online self-regulation in Australian and Italian university populations. Importantly, self-regulated learning is a complex set of processes encompassing cognitive, metacognitive as well as motivational aspects of learning. A recent review of instruments assessing self-regulated learning in higher education (Roth et al., 2016) found that only few studies used instruments providing situational specificity. Thus, it is important to validate instruments that are specific to the contextual (online, blended or face-to-face) or cultural characteristics of a learning environment.

Similarly to Broadbent and colleagues (2023), all factors in the SRL-O are related to other factors, supporting the notion of the existence of a latent overarching factor defining the student's approach to the learning task. Indeed, self-regulated learning processes are hypothesized to be intricately linked to an individual's goal structure, that is their own higher-order (such as being successful) and personal goals (such as passing an exam with an excellent grade) (Boekaerts, 2002). In an adaptive perspective, individuals engage most of their efforts to pursue and protect the goals that they value.

Online extrinsic motivation is the only factor that seems unrelated with other SRL factors, except for an association with negative achievement emotions (and a negligible association with the metacognition factor). Extrinsic motivation is controversial: one the one hand it is not ideal to learn because of external sources of motivation (e.g., to

satisfy parents or to be better than anyone else) rather than for internal reasons (e.g., to feel more competent), but on the other hand in complex learning environments sometimes it is important to sustain learning effort through some external reward associated with the completion of an activity. Extrinsic motivation works well with well-defined tasks (e.g., reading 100 pages in a day) but not with ill-defined tasks (e.g., studying well and deeply). For this sort of task, intrinsic motivation is optimal. Lin, McKeachie and Kim (2003) showed that extrinsic motivation is not necessarily incompatible with intrinsic motivation. Specifically, they found that the highest grades were associated with high intrinsic motivation coupled with moderate extrinsic motivation.

Of notice, the analysis suggests the existence of a cluster represented by correlations of medium effect size. Online effort regulation seems well associated with planning and time management. Space and time are two dimensions particularly affected when we move learning from physical to online platforms. Learners have to make more choices (especially if asynchronous video lessons are available) and lack the co-regulation from other peers (Tarchi et al., 2022). Moreover, online effort regulation is associated with the metacognitive factor, suggesting that students are able to sustain effort if metacognitively aware and if efficient in their task strategies (as suggested by the association between metacognition and task strategies).

Finally, SRL-O allows also to investigate the role of emotions in learning within the self-regulated learning framework. Specifically, negative emotions were strongly and negatively associated with several SRL factors covering motivational regulation and learning strategies' dimensions, in line with the predictions of the control-value theory of achievement emotions (see Pekrun, 2006).

The Italian version of the SRL-O was found to have a good convergent validity with the Italian instrument LO-COMPASS measuring learning orientations. The results showed that all dimensions of the SRL-O were associated with regulative and motivational aspects of the LO-COMPASS learning orientations. A recent cross-cultural study confirmed that conceptions of online learning vary between contexts, but are also generally underdeveloped if compared with existing theoretical frameworks (Tarchi et al., 2022). This finding is worrisome especially in light of the results of the present study, which confirm an association between conceptions of learning and self-regulated learning. Specifically, among SRL factors, intrinsic motivation, metacognition, effort regulation, and task strategies are associated with all the dimensions of concepts of learning, that is, considering learning as a self-regulated, strategic, affective, motivational, co-constructive, guided and participative experience.

## Limitations

Some limitations should be considered when considering our results. Firstly, the study was conducted with a population of higher education students from the Social Sciences and Humanities disciplines. It is still unclear the extent to which SRL is discipline-general or -specific (see Bembenutty, Cleary & Kitsantas, 2013; Rotgans & Schmidt, 2009; Vanderstoep, Pintrich & Fagerlin, 1996), thus future studies should replicate the validation with students from the physical, engineering, and life sciences. Secondly, SRL competences may improve as students' progress in their higher education studies, thus it would be interesting to investigate differences across different cohorts of students (e.g., freshmen vs graduate students). Thirdly, there may be a gap between what students consider important to do and what students actually do when studying online. Thus, self-report measures, such as the SRL-O, should be validated with instruments tapping on genuine learning processes, such as learning diaries (e.g., Schmitz & Perels, 2011).

# CONCLUSIONS

The present study introduced a new instrument in the Italian context to assess university students' self-regulation in blended and online learning. The instrument might be adopted for research purposes, especially to investigate the relations between online self-regulation and academic outcomes in online and blended environments. Self-regulated learning may provide the theoretical framework to identify learning analytics and support students through an adaptive system (Lodge et al., 2018). The instrument could also be useful for prevention interventions or tutoring sessions to improve students' awareness of their own strengths and weaknesses when learning online. Higher education all over the world are building increasingly inclusive systems and this instrument may be useful for academic support services.

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# APPENDIX

*Italian translation of the SRL-O questionnaire*

| **Nome scala** | **Autoefficacia accademica online (scala di risposta 1-7)** |
|---|---|
| **Items** | 1. Sono sicuro di essere in grado di padroneggiare i contenuti e i compiti di questo corso online.<br>2. Sono fiducioso nella mia capacità di persistere con successo in questo corso online, anche se dovessi trovare il contenuto difficile.<br>3. Sono sicuro di poter mettere in atto l'impegno necessario per ottenere un voto alto in questo corso online.<br>4. Sono sicuro di essere in grado di capire con precisione cosa mi viene richiesto di fare. |

| **Nome scala** | **Motivazione intrinseca (scala di risposta 1-7)** |
|---|---|
| **Items** | 1. Trovo sempre aspetti del programma di studio che suscitano la mia curiosità.<br>2. Mi piace imparare cose nuove in questo corso online.<br>3. Trovo piacevole studiare per questo corso online.<br>4. Trovo molto stimolante apprendere i contenuti di questo corso online.<br>5. Provo un senso di realizzazione quando acquisisco competenze o informazioni. |

| **Nome scala** | **Motivazione estrinseca online (scala di risposta 1-7)** |
|---|---|
| Items | 1. Voglio fare bene questo corso online per poterlo esibire ai miei amici e alla mia famiglia.<br>2. Voglio fare bene per le aspettative reali o percepite degli altri nei miei confronti.<br>3. Voglio ottenere un voto migliore degli altri nel mio corso online. |

| **Nome scala** | **Emozione negativa per il raggiungimento dei risultati online (scala di risposta 1-7)** |
|---|---|
| **Items** | 1. Mi sento così impotente da non poter dedicare tutto il mio impegno agli studi online.<br>2. Sto pensando di abbandonare gli studi perché mi sento sopraffatto dagli studi online.<br>3. Mentre studio cerco di distrarmi per abbassare il livello di ansia.<br>4. Sono così ansioso che non voglio nemmeno iniziare a studiare online.<br>5. Quando devo studiare online inizio a sentirmi a disagio. |

| **Nome scala** | **Pianificazione e gestione del tempo (scala di risposta 1-7)** |
|---|---|
| **Items** | 1. Stabilisco obiettivi a breve termine (giornalieri o settimanali).<br>2. Stabilisco tempistiche realistiche per l'apprendimento.<br>3. Suddivido gli obiettivi più grandi in obiettivi più piccoli e perseguibili.<br>4. Faccio un elenco di azioni dettagliate che devo completare.<br>5. Ogni settimana pianifico i miei impegni, in modo da avere a disposizione il tempo necessario per lo studio online. |

| **Nome scala** | **Metacognizione (scala di risposta 1-7)** |
|---|---|
| **Items** | 1. Penso a quali strategie di apprendimento hanno funzionato per me in passato quando ho svolto compiti simili o tipi di studio.<br>2. Trascorro del tempo cercando di comprendere il compito per assicurarmi di capire con precisione ciò che devo fare.<br>3. Di solito autovaluto la mia prestazione una volta terminata.<br>4. Esamino i feedback ricevuti in passato e verifico se ho apportato miglioramenti al mio percorso di apprendimento attuale.<br>5. Penso a come migliorare il mio lavoro, valutandolo in base ai criteri di valutazione forniti dall'insegnante. |

| **Nome scala** | **Ambiente di studio (scala di risposta 1-7)** |
|---|---|
| **Items** | 1. Sono in grado di studiare per il mio corso online senza distrazioni.<br>2. Ho a disposizione un luogo tranquillo e privo di distrazioni per studiare.<br>3. So dove posso studiare in modo più efficiente per questo corso online. |

| **Nome scala** | **Regolazione dello sforzo online (scala di risposta 1-7)** |
|---|---|
| **Items** | 1. Mi impegno molto nello studio online, anche quando ci sono cose più interessanti da fare.<br>2. Quando lo studio online diventa difficile, mi impegno a raggiungere i miei obiettivi di studio.<br>3. Quando la mia mente inizia a vagare durante una lezione di questo corso online, faccio uno sforzo supplementare per continuare a concentrarmi.<br>4. A prescindere da come mi sento, persevero nello studio online. |

| **Nome scala** | **Supporto sociale online (scala di risposta 1-7)** |
|---|---|
| **Items** | 1. Cerco di aiutare gli altri studenti quando fanno una domanda online a cui posso rispondere.<br>2. Chiedo aiuto ad altri esperti attraverso i canali online quando non sono sicuro di cosa fare nel mio corso online.<br>3. Chiedo all'insegnante e/o ai miei compagni di fare chiarimenti nel mio corso online.<br>4. Quando ho difficoltà con il mio corso online, cerco supporto dagli altri attraverso mezzi online (forum di discussione, social media, e-mail, messaggistica istantanea, ecc.).<br>5. Uso la posta elettronica, i forum di discussione, i social media, ecc. per mettermi in contatto con l'insegnante e gli altri studenti quando ho bisogno di aiuto. |

| **Nome scala** | **Strategie di lavoro online (scala di risposta 1-7)** |
|---|---|
| **Items** | 1. Quando studio online, creo i miei schemi per rendere i contenuti più significativi.<br>2. Quando studio online, organizzo i miei ragionamenti facendo dei riassunti di ciò che sto imparando.<br>3. Quando studio online, cerco di collegare i contenuti a ciò che già conosco.<br>4. Quando studio online, cerco di sviluppare le mie idee in merito ai contenuti che apprendo.<br>5. Cerco di ampliare le mie conoscenze svolgendo attività supplementare al di là del programma principale (ad esempio, svolgendo attività extra di problem solving o letture extra). |