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Distinguishing Self-Directed and Self-Regulated Learning and Measuring them in the E-learning Context

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Abstract

Self-directed (SDL) and self-regulated learning (SRL) skills are important, increasingly in e-learning, but the terms are not clearly distinguished in literature having led to tangled understandings and complications measuring SDL and SRL. The aim of the study is to further explore the similarities and differences between the terms and their usage. Consequently, two research questions were posed: whether and how are SDL and SRL distinguished in empirical studies? What kind of research methods and instruments are used for studying SDL and SRL in e-learning context? To answer the questions the literature review of 30 empirical studies was conducted to compare them on SDL and SRL in the context of e-learning to find overlappings and differences between the concepts and research methods. The studies were compared on the basis of the use of terms, approaches, methods, instruments and analysis.

Keywords: self-directed learning; self-regulated learning; e-learning; literature review

1. Introduction

Learning as process has changed tremendously over the last decades. Information burst is indeterminable, surviving and adapting in it takes special skills. Self-directedness and self-directed learning once started as a term of adult education (Tough, Knowles) have become more important in light of digital revolution. Better access to information technology and digital resources as well as new communication channels and virtual learning communities have expanded the meaning of lifelong learning (Kim, 2010; Thorpe, 2005).

The high relevance of self-directed learning in today's educational discourse would suggest that the term is precisely defined and used in literature. However, several authors point out that the concept of self-directed learning is

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intangible and ambiguous (Brockett *et al*, 1991; Benson, 2011; Ng, 2008). Many similar terms like self-regulated learning, autonomous learning, self-planned learning, self teaching and independent study are used in the same meaning and context, and the differences between them are often subtle and inconsistent which has caused them being used interchangeably by many researchers. This has launched the study to explore the similarities and differences between two most frequently used of the terms – self-directed learning (SDL) and self-regulated learning (SRL). More specifically, in this paper we focus on exploring the usage of these terms in digital learning environments context, where the use of these terms has become more frequent over the past years (Thorpe, 2005). The following subsections aim to introduce the genesis and developments of the terms SDL and SRL. At the end of the section, research questions will be presented.

1.1. Self-directed learning and self-regulated learning

The most foundational definition of self-directed learning comes from Knowles who described it as a process in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies, and evaluating learning outcomes (Knowles, 1975). The concept of self-directed learning has undergone a thorough consideration over the last years. What has emerged is an important distinction between the process of self-directed learning and the notion of self-direction as a personality construct (Brockett *et al*, 1991). To overcome the confusion with the two perspectives of the term self-directed learning, and to move away from overemphasis on it, Brockett and Hiemstra came out with their „Personal Responsibility Orientation“ (PRO) model where the two related dimensions are connected into one umbrella concept „self-direction in learning“. The new term refers to both the *external* characteristics of an instructional process and the *internal* characteristics of the learner, where the individual assumes primary responsibility for a learning experience (Brockett *et al*, 1991).

Similarly to the constructs connected with self-directed learning, the terminology of self-regulated learning also has to be clarified. Within cognitive psychology, self-regulated learning has been considered students' independence in learning. Self-regulated learning is an active, constructive process whereby learners set goals for their learning and attempt to monitor, regulate and control their cognition, motivation, and behaviour, guided and constrained by their goals and contextual features on the environment (Pintrich, 2000). A variety of perspectives on self-regulated learning exist and researchers with different foci attempt to model how cognitive, meta-cognitive, motivational, and contextual factors influence the learning process (e.g Boekaerts, Pintrich, Zimmerman). According to Zimmerman, „students can be described as self-regulated to the degree that they are meta-cognitively, motivationally, and behaviourally active participants in their own learning process“ (Jossberger *et al,* 2010).

Trying to be explicit with the terms it is necessary to distinguish self-regulation and self-regulated learning similarly to self-directedness and self-directed learning. Self-regulation initially emphasized behavioural and emotional regulation. With Bandura's later writings on self-efficacy, motivation emerged as an additional regulatory area. Self-regulation emphasizes the reciprocal determinism of the environment on the person, mediated through behaviour (Dinsmore, 2008). Zimmerman and Schunk use self-regulation as an umbrella term for self-regulated learning and self-regulated performance. Whereas self-regulated learning is understood as learning and motivational processes that underlie students' assumption of personal responsibility to learn, which may or may not involve an instructor. And self-regulated performance as efforts of skilled learners to function at an optimal level often under difficult performance conditions (Zimmerman, B., personal communication, February 9, 2013).

Reading the definitions of self-directed learning and self-regulated learning *per se*, one may inevitably get the impression of reading the same phenomenon. This is the way many researchers have approached them and used the terms synonymously describing one of them (Garrison, 1997; Siadaty *et al*, 2012; Robertson, 2011). An evidence of

confusion with terms is also self-regulated learning being used in the context of lifelong learning (Sha *et al*, 2011) which is usually associated with self-directed adult education. Another example of tangled use is an example from an article where self-regulated learning has been defined through the classical definition of self-directed learning by Knowles, „According to Knowles (1975), self-regulated learning (SRL) refers to a process, "… in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies, and evaluating learning outcomes"." (Siadaty *et al*, 2012). Knowles (1975) and Winne & Hadwin (1998) identified 4 key phases of self-directed learning in academic learning situations: (1) defining tasks; (2) setting goals and planning; (3) enacting study tactics and strategies; (4) metacognitively adapting studying. Pintrich (2010) did the same in the context of self-regulated learning listing (1) planning and goal-setting, activation of perceptions and knowledge of the task and context and the self in relation to the task; (2) monitoring processes that represent metacognitive awareness of different aspects of the self and task or context; (3) efforts to control and regulate different aspect of the self or task and context; (4) reactions and reflections on the self and the task or context. When trying to list the similarities of the concepts, active participation and goal-directed behaviour should be stated first. They are accompanied by setting goals and analysis of the task, accomplishment of the plan and self-assessment of the learning process. Furthermore, the two concepts activate metacognitive skills, and intrinsic motivation as a key component is emphasized on both cases (Loyens *et al*, 2008). Similarly to self-directed learning, self-regulated learning is also featured as a combination of internal and external factors. The first of them being represented by affect or motivation, metacognition and cognition factors. The last comprises traditional learning tasks but also human interaction (Cho *et al*, 2009). Another reason why the terms are used as synonyms is the personality perspective being the overlapping part of both constructs. Considering all these similarities and overlappings it is rather detectable why the terms are used synonymously.

When contrasting SDL and SRL the first thing to be stated is the origin of the concepts. Self-directed learning is a concept of adult education from the 1970s-1980s whereas self-regulated learning which is somewhat younger originates from educational psychology and cognitive psychology. SDL due to its adult education roots is mostly used for describing the learning activities outside traditional school environment and involves the aspect of designing learning environments. Self-regulated learning, on the other hand, is mostly studied in the school environment (Loyens *et al*, 2008) but it should not exclude the possibility of designing a personal learning environment. Self-directed learning has been considered a broader construct encompassing self-regulated learning as narrower and more specific one. SDL has also been treated as a broader concept in the sense of learner's freedom to manage his learning activities and the degree of control the learner has. In SDL this is the learner who defines the learning task, in SRL it may also be a teacher (Loyens *et al*, 2008). According to Jossberger, Brand-Gruwel, Boshuizen and Wiel (2010) the constructs of self-directed learning skills and self-regulated learning skills are ascribed to different levels. While self-directed learning is suggested to be situated at the macro level, self-regulated learning is stated to be the micro-level concept. The macro-level self-directed learning refers to the planning of the learning trajectory – a self-directed learner is able to decide what needs to be learned next and how his learning is best accomplished. A skillful self-directed learner diagnoses his learning needs, formulates learning goals, finds suitable resources for learning and monitors his learning activities. A self-directed learner is able, ready and willing to prepare, execute, and complete learning independently (Jossberger *et al,* 2010). The first step in learning to self-direct one's learning is the skill to self-regulate learning activities and task performances (Jossberger *et al,* 2010). Self-regulated learning is the micro-level concept that concerns processes within task execution. Self-directed learning may include self-regulated learning but not the opposite (Jossberger *et al,* 2010). In other words, a self-directed learner is supposed to self-regulate, but a self-regulated learner may not self-direct. From this point of view, self-directed learning deals more with subsequent steps in the learning process. Providing students with opportunities for self-directed practice can help to improve their self-regulation (Jossberger *et al,* 2010). In a self-directed learning environment, students have more freedom to generate and pursue their own goals, and undertake critical evaluation of the materials they select. The self-directed

learner initiates the learning task, whereas in self-regulated learning, the task can be set by the teacher (Robertson, 2011).

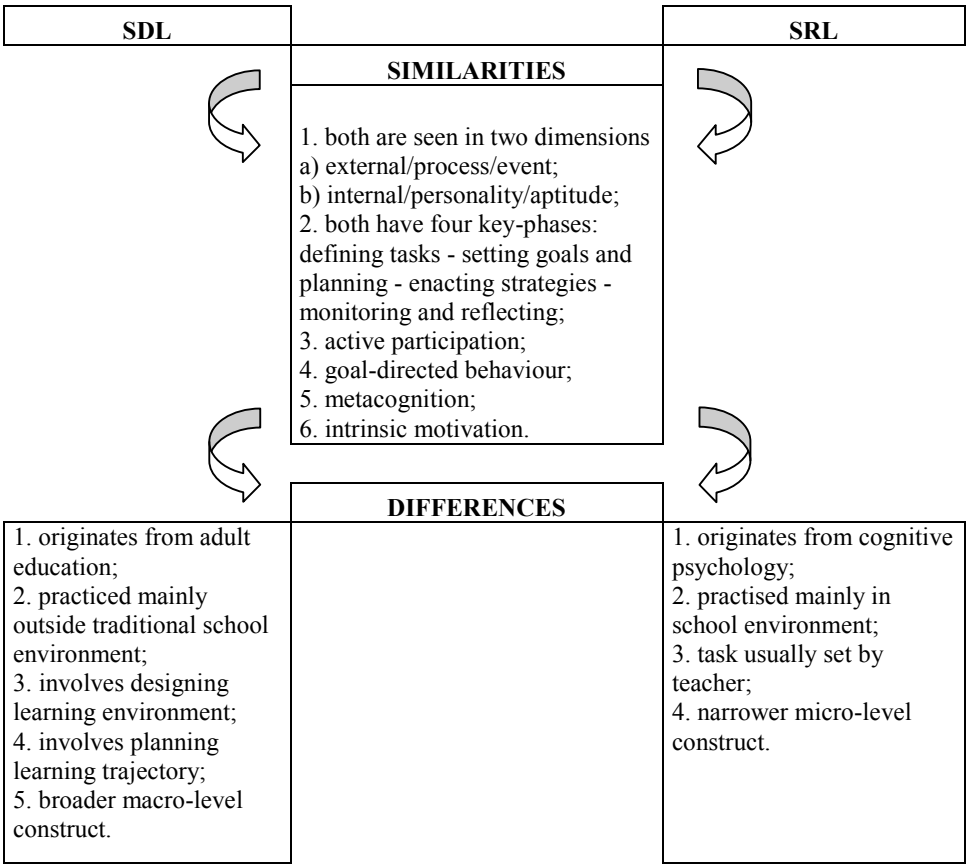

Figure 1. Similarities and differences of SDL and SRL.

Despite the seeming similarity of the concepts of SDL and SRL, the theoretical backgrounds and dimensions, however, differ respectively and that is why the terms should not be used synonymously. The prior presented theoretical framework shows that it would be rational to distinguish several perspectives in the case of both terms. At the same time it is difficult to estimate how widespread and practical this kind of operationalizing is in empirical studies conducted in digital learning environments. There are no comparative summary reports on the research methods of these terms, either. The importance of the present research lies in comparison of different approaches to the terms of self-directed learning and self-regulated learning in the e-learning context. This article aims at comparing different theoretical models of self-directed and self-regulated learning, and methods and measurements of the empirical researches of these concepts in the e-learning context. Consequently, we formulated the following research questions: (1) whether and how are SDL and SRL distinguished in the studies conducted in e-learning context? (2)

how are SDL and SRL studied in e-learning context? To answer the posed questions a review of 30 empirical studies was conducted where the two aspects were analysed.

2. Selection of studies

Having one of the aims of the review to investigate how self-directed learning and self-regulated learning are studied in different forms of e-learning, we used only the empirical researches that studied learning activities in different digital learning environments. All review articles and theoretical articles were excluded. While e-learning has been triumphing over the last years, we confined ourselves to empirical work of the last five years, the period of 2008-2012. When searching the articles we proceeded from two key words: *self-directed learning* and *self-regulated learning*. No key words connected with e-learning were used because the possible list of these would be imperceptibly long and all possible versions cannot be foreseen. The suitable studies using different forms of e-learning were assorted during the latter reading. Information retrieval was conducted between December 2012 and January 2013.

The articles were searched in EBSCO databases *Academic Search Complete, ERIC* and *PsycINFO*. The journals that consisted the picked articles were: *The Internet and Higher Education, Journal of Computer Assisted Learning, Education, Interactive Learning Environments, Teaching in Higher Education, Educational Technology & Society, Educational Psychology, Psicothema, Computers & Education, The American Journal of Distance Education, Learning and Instruction, Educational Psychologist, Computer Assisted Language Learning, European Journal of Education, Journal of Educational Psychology, Educational Psychologist, Information Systems Research, Information Technology & Libraries, European Journal of Scientific Research, Research in Learning Technology, Teaching Science: The Journal of the Australian Science Teachers Association, AIP Conference Proceedings, Decision Sciences Journal of Innovative Education, Human Resource Development International, International Journal of Self-Directed Learning* and *Computers in Human Behavior*.

When selecting the articles the primary search was made with the key word *self-directed learning* and the secondary search with *self-regulated learning*. The most important selection was made on the basis of abstracts where the studies conducted in e-learning environments or using digital tools were picked out. On the basis of the selected articles the following key words connected with e-learning can be pointed out: *online learning, mobile learning, webquests, electronic performance support systems, e-/m-learning, online inventory, blended learning, Moodle, hypermedia environment, online courses, web-based environment, internet-based learning environment, virtual classroom, learning technologies, technology use, web-based learning sites, CALL, online community etc*. For our literature review 30 articles were selected, 12 of them are on self-directed learning and 18 on self-regulated learning.

3. Results and discussion

Although the studies researched for the review seem to focus on one or the other concept, there are still cases when the terms SDL and SRL have been used in a tangled way, mostly by the authors treating SDL (Chu *et al*, 2009; Robertson, 2011). The other terms being used as synonyms in the same context are self-management, learner autonomy, learner control, independent learning (equated with e-learning) and autonomous learning (Quinney *et al*, 2010; Deepwell *et al*, 2008; Malik *et al*, 2008; Ng, 2008). In one case e-learning has been treated as self-directed learning (Simmering *et al*, 2009). In the field of self-regulated learning the use of terminology seems to be more precise, only one notable misuse was detected (Siadaty *et al*, 2012). When considering the term self-directed learning covering the two perspectives of process and personality characteristics, it must be admitted that no clear difference has been made. Only a few studies articulate the perspective considered in the research, in other cases the authors of

the present review tried to detect which perspective had been proceeded from. Comparing the results, 7 studies out of 12 on SDL can be classified as process-based studies (Ambikairajah *et al*, 2008; Deepwell *et al*, 2008; Hung *et al*, 2010; Robertson, 2011; Simmering *et al*, 2009; Teo *et al*, 2010), 2 as personality-based studies (Lai *et al*, 2011; Ng, 2008) and in 3 cases (Chu *et al*, 2009; Malik *et al*, 2008; Quinney *at al*, 2010) it was not possible to identify the perspective. In one study (Holt *et al*, 2012) both perspectives of process and personality had been considered.

One conclusion that can be drawn on the use of terminology is that the studies where SDL and SRL have not been clearly distinguished, the perspectives of self-directed learning have not been distinguished, either. One of the reasons why the terms SDL and SRL are used as synonyms may be the personality perspective being the overlapping part of them. It can also be concluded that e-learning and hypermedia context have not caused remarkable changes in the way self-directed learning and self-regulated learning are understood and described.

To answer the second research question we studied the research methods, the methods of measurement and the methods of data analysis when studying SDL and SRL in the e-learning context. In this comparison certain variations can be reported. In the studies on SDL the recurrent method was survey with 4 cases out of 12 (Ambikairajah *et al*, 2008; Chu *et al*, 2009; Holt *et al*, 2012; Lai *et al*, 2011), followed by 3 case studies (Deepwell *et al*, 2008; Malik *et al*, 2008; Ng, 2008), 2 experiments (Quinney *et al*, 2010; Simmering *et al*, 2009) and 1 content analysis (Robertson, 2011). The other variables that self-directed learning was studied with were motivation, computer- and internet-efficacy, students' and teachers' perceptions and experiences with the use of technology and network literacy. Two studies focused on developing and validating a new instrument – OLRS (Online Learning Readiness Scale) (Hung *et al*, 2010) and SDLTS (Self-Directed Learning with Technology Scale) (Teo *et al*, 2010). Comparing these methods with the ones used for self-regulated learning, predominant use of experiment emerged with 10 cases out of 18 (Greene *et al*, 2010b; Kert *et al*, 2012; Kramarski *et al*, 2009, 2010; Lee *et al*, 2010; Lewis *et al*, 2011; Moos *et al*, 2008; Nunez *et al*, 2011; Shih *et al*, 2010; Vighnarajah *et al*, 2009) followed by 5 surveys (Artino *et al*, 2012; Cho *et al*, 2009; Greene *et al*, 2010a; Lai *et al*, 2011; Puzziferro, 2008), 2 model developments (Sha *et al*, 2011; Siadaty *et al*, 2012) and one case study (Shen *et al*, 2011). The latter was providing a conceptual framework for understanding mobile learning. The other variables studied with SRL were computing skills and attention to learn, human interaction, students' perception on online community discussion, preservice teachers' professional growth, technologies self-efficacy, satisfaction with studies and learning involvement. One study focused on modelling a new instrument – OSRLI (Online Self-Regulated Learning Inventory) (Cho *et al*, 2009).

A common feature when comparing studies on SDL and SRL is the way of data collection using self-report tests mostly. In SDL self-reports were used in 10 studies out of 12 (Ambikairajah *et al*, 2008; Chu *et al*, 2009; Holt *et al*, 2012; Hung *et al*, 2010; Lai *et al*, 2011; Malik *et al*, 2008; Ng, 2008; Quinney *et al*, 2010; Simmering *et al*, 2009; Teo *et al*, 2010), followed by 3 interviews (Deepwell *et al*, 2008; Malik *et al*, 2008; Ng 2008) and one observation (Ng, 2008). In SRL studies self-reports were used in 15 studies out of 18 (Artino *et al*, 2012; Greene *et al*, 2010a; Kert *et al*, 2012; Kramarski *et al*, 2009, 2010; Lai *et al*, 2011; Lee *et al*, 2010; Lewis *et al*, 2011; Nunez *et al*, 2011; Puzziferro, 2008; Sha *et al*, 2011; Shen *et al*, 2011; Shih *et al*, 2010; Siadaty *et al*, 2012; Vighnarajah *et al*, 2009), followed by 3 interviews (Lai *et al*, 2011; Shen *et al*, 2011; Vighnarajah *et al*, 2009) and 3 think-aloud protocols (Greene *et al*, 2010a, 2010b; Moos *et al*, 2008), 2 server file log tracking (Sha *et al*, 2011; Shen *et al*, 2011) and one observation (Shih *et al*, 2010). In several cases more than one method of measurement was applied (Malik *et al*, 2008; Ng, 2008; Greene *et al*, 2010a; Lai *et al*, 2011; Sha *et al*, 2011; Shen *et al*, 2011; Shih *et al*, 2010; Vighnarajah *et al*, 2009).

Although there are many ways to capture data on learner's self-directedness or self-regulation, self-report measures have still stayed dominant so far. In the studies of self-directed learning, SDLRS (Self-Directed Learning Readiness Scale) and OCLI (Oddi Continuing Learning Inventory) have been widely used over the last decades. The former

developed by Lucy M. Guglielmino, translated into more than 20 languages and validated by many researchers is undoubtedly one of the most widely exploited instruments in the field. SDLRS is a tool for assessing self-directedness, observable personality characteristics claimed by respondents (Confessore, G., personal communication, October 9, 2012). However, in the recent times there have been hesitations about using SDLRS because of the component structure of the instrument (Straka, 1995). Guglielmino's questionnaire or its adaptations were used in several studies for measuring self-directedness in the present sample as well. In one case the personality perspective was clearly identifiable. In other cases the perspective cannot be so clearly identified. There were also cases when no validated instrument was used for questioning students but the questionnaires compiled by the researchers themselves, and the conclusions on participants' self-directedness were drawn on the basis of these. However, Guglielmino's scale is not the only valid instrument. In one study PRO-SDLS, developed by Brockett and Hiemstra and based on their PRO model, was used. On the basis of forementioned, it can be concluded that it is not easy to find a suitable and acceptable instrument for assessing learner's self-directedness or self-directed learning. One of its reasons may be reducible to the confusion with the different perspectives that are not always taken into consideration.

When considering the use of instruments in SRL studies, the prevailing assessment tool is another self-report test Motivated Strategies for Learning Questionnaire (MSLQ) by Pintrich or its adaptations that were used in 7 cases out of 12 studies that applied self-reports. However, in the research of SRL there seems to be growing interest in different methods of measurement, especially think-aloud protocols.

The instrument for measuring SRL depends on whether this is aptitude or event that is needed to measure. Measurements of SRL as aptitude can be used to predict whether a learner is able to act on an SRL-related cognition such as belief about performing a study tactic. In this sense, a measurement of SRL as aptitude is unary being independent of other measurements (Winne *et al*, 2005). In case of SRL as an aptitude, self-report questionnaires are the most widely used measurements with LASSI (Learning and Strategies Study Inventory by Weinstein, Schulte and Palmer in 1987) and MSLQ (Motivated Strategies for Learning Questionnaire by Pintrich, Smith, Garcia and McKearchie in 1991) controlling the list. The other methods also used widely are structured interviews and teacher ratings. When SRL is tried to study as an event considering the context and progress of the activities, different measurements are used – think-aloud protocols, error detection, observations and trace methodologies (Winne *et al*, 2005).

A lot of research made to find more suitable measurements of cognitive and metacognitive processes has focused on self-regulated learning in computer-based learning environments (Greene *et al*, 2010; Winne, 2010; Schraw, 2010). Despite the seeming popularity of self-report measures, also disclosed in this review, the critique has made many researchers doubt them. Greene with colleagues have questioned the validity of using self-report measures pointing out several concerns with them. One of them refers to SRL being treated as trait-like, unregarded the context or student's progress in terms of completing the learning task. The other reason is that the data from self-reports are based on students' often-inaccurate aggregate perceptions of their self-regulatory processes. It has also been stated that SRL should not be considered static and measured outside of the actual learning context (Greene *et al*, 2010). The advantages why think-aloud protocols have been started to apply more are the possibility to capture the processes more precisely and follow their dynamic nature.

4. Summary

In this article, we reviewed empirical studies on self-directed and self-regulated learning in e-learning context with the aim to get an overview of the use of terms *self-directed learning* and *self-regulated learning*, and find out the most widely used methods of studying SDL and SRL.

To answer the research questions 12 empirical studies on SDL and 18 on SRL were analysed. The sample of articles showed the tangled use of terms, especially in the articles on SDL. A long list of similar terms – self-management, learner autonomy, independent learning, e-learning - are used synonymously with self-directed learning. Similar confusion seems to be prevailing in the question of distinguishing personality and process perspective of SDL. The term self-regulated learning seems to be defined and understood more precisely, no serious misuse or synonymous use with SDL was detected in the articles on SRL. It may also be claimed that e-learning context has not caused remarkable changes in the use of terms SDL and SRL. When comparing the research methods employed in DL and SRL studies, it can be stated that self-directed learning is mostly studied with surveys and case studies, but self-regulated learning with experiments and surveys. In data collection the prevailing method is self-report measurement for both, SDL and SRL despite the fact that self-reports are considered less trustworthy compared to other methods. However, in the studies of SRL think-aloud protocols may become more applicable in the future as this enables to assess self-regulated learning as an event.

In brief, the importance of distinguishing SDL and SRL was stressed in this paper. These are different terms with their own specific background, content and perspectives despite seeming similarity. Keeping the concepts apart would allow to be more precise and develop instruments with considerable construct and content validity. We also propose that additional measurements should be developed and tested for assessing different perspectives of SDL as well as SRL. Further studies could explore further the possibilities of trace methodologies that opened new perspectives for understanding and assessing self-directed and self-regulated learning.

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