

## **NEW DIGITAL LEARNING MODEL FOR SRL-ORIENTED INSTRUCTIONAL DESIGN AND FLEXIBILITY**

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**Abstract-** Allowing learners to learn freely, anytime, and anywhere is widely reported as an advantage. Challenges such as lack of engagement are also highlighted, and thus further developing self-regulated learning skills is essential. This need is even more pronounced in the initial training of teachers since they are expected to take charge of their classes autonomously, whereas they have been used to being guided throughout their school and university careers. Their appreciations of training's flexibility are therefore not so obvious. This study examines the self-regulated learning (SRL) skills developed among pre-service teachers in an online training context by building directives set for an SRL-oriented instructional design to redesign a traditional pre-service teachers' training so it would foster these skills and implement them. Next comes the investigation phase. Data on beneficiaries' assessment of flexibility and their perception of the impact of the training developed on some of their SLR skills were collected using a survey that was prepared for this purpose and conducted among a sample of 93 pre-service teachers. The results show that the developed SRL-oriented instructional design significantly exercises these skills, the proposed directives can thus be considered as contributing to their improvement. The study was conducted at the Regional Center for Education and Training Professions in Rabat, Morocco, it can also be inferred that flexibility is perceived differently by Moroccan pre-service teachers depending on whether it is a question of content and approach or time.

**Keywords:** Instructional Design, Online Training, Self-Regulated Learning (SRL), Pre-Service Teacher Education.

### **1. INTRODUCTION**

The UNESCO study [1] stated that Information and Communication Technologies (ICT) can be used to achieve the Education 2030 Agenda goals by merging the policymakers, academics, and private sector viewpoints. As studied by Fu [2], the benefits of using ICT in education are multiple, such as expanding access to education, helping students access digital information effectively and efficiently, facilitating access to course content, supporting student-centered and self-regulated learning, promoting

collaborative learning and creativity, and providing more opportunities to develop critical thinking skills. This author also gathered barriers and solutions from the perspective of students, teachers, as well as administration, and ICT infrastructure.

Society is changing at a fast rate, so the pace and complexity of change are outpacing curricular authority's ability to anticipate and adapt to it [3]. It's worth noting that, to satisfy the 21st century demands, teachers are required to learn how they can be adapted to change, and to ICT-assisted teaching and learning emerging trends. Indeed, the learners and teachers should adjust to meet new managing challenges modes of learning [4]. Such tools offer learners the ability to understand how they learn, and to exercise control over their learning. More than two decades later, this statement is still relevant.

The increased interest in Learner-Centered Teaching and the development of powerful educational tools accentuated the need for Self-regulated learning (SRL) skills. Indeed, Learner-Centered Instruction made SRL skills more important, since it is assumed that learners should be more involved in their learning processes and more responsible for regulation. Furthermore, ICT has offered up new educational learning forms that increased that need. The ability to manage learning becomes critical to achieve desired outcomes during online courses, which made SRL skills even more important [5]. Urbina and al. [6] conducted a large literature review in various scientific databases over 2015-2021, concerning the technological elements adopted as factors that would improve self-regulated learning. Also, the authors concluded in their review analysis that this topic, associated with many challenges, such as learner engagement, is gaining much interest among researchers. Due to physical distance, SRL skills were recognized as being particularly crucial in online education [7].

The necessary means and supports that can be used to regulate learning are not always permitted to every learner. It was always recognized that most learners required accompaniment in developing their self-regulation [3], which needs a rigorous balance of independence and direction. Individual learning environments provide a greater degree of freedom, but it might marginalize weak learners.

Other ones that offer more guidance tend to institutionalize learning too much, and as a result, this restricted the SRL skills development [8]. The importance of guidance and freedom concepts is highlighted because of the highly motivated and autonomous learners could control more their learning, and realize better-learning performance [8]. Besides, empirical findings educational research show that wide SRL implementation is not sustained when the context is more teacher-controlled [9].

The same balance concerns teachers' training. Indeed, Vrieling and al. [10] affirmed that trainers should improve SRL skills in teacher training programs, assist learners in developing SRL skills by getting them to take charge of their learning, and then exert enough assessment on the curriculum learning processes. It seems that an instructional design balances trainer-directed learning with learner-centered learning. To note that trainers are required to apply structured and rigorous approaches in their training and enhancing teachers' learning strategies [10].

In the continuation, the work is developed over six important parts: the conceptual framework part, reviewing important studies on building SRL skills; the problematic illustrating the skills that should be acquired by the training teachers in the Moroccan context; the materials and methods discussed in terms of redesign and development, implementation, and the redesign evaluation; the results and the discussion parts in which are summarized and discussed the obtained results.

## **2. CONCEPTUAL FRAMEWORK**

### **2.1. Digital Learning**

Several ICT models' integration is specified in the literature such as the TPCK framework (Technological, Pedagogical, Content Knowledge) to effectively help teachers integrate technology into their teaching practices [11-12]. The UNESCO framework aims to use online technologies to support teachers, while the SAMR model allowed moving to learning tasks redefinition, through improvement and modification [13]. The online course redesign models can be seen as a continuum from presential to fully online courses. Between the two models, the blended learning forms are by presential and online activities, too. They can be broadly categorized into: (a) supplemental model, (b) replacement model, and (c) a fully online model. The supplemental model retains the traditional structure of the presential interactions with students, class meetings time is maintained. It can be simply done by adding some technologies to in-class activities or providing out-of-class online activities. The replacement model decreases class-meeting time in favors of online interactive learning; it reduces the class-meeting time that might be reserved for example to provide theory and class activities, explain some online components, or review challenging subjects. The fully online model delivers distance learning environments to remote learners [14].

Roy, et al. [15] noted a variety of the fully online model, ranging from self-directed courses to completely synchronous distance learning. The former allows the

learner to follow the course autonomously, while the tutor, who is in the background during the learning process, provides, among other things, the role of supervision. The synchronous course implies a virtual physical presence, the "distance" is rather linked to the geographical location and thus, the teacher is present during the educational activity. Since this work focuses on SRL skills, the training relative of this study is fully self-directed.

### **2.2. Self-Regulated Learning**

Merrill [16] affirmed that learner's group may learn in a social context, and the learning environment supports the group members. Despite, knowledge and skills acquisition and then the change in cognitive structure is made individually, which is coupled to SRL skills. Pintrich [17] defined the SRL skills as a constructive process where learners realize their goals, develop their cognition and motivation, which are constrained by contextual and environmental features. However, Zimmerman and Schunk [18] have considered that self-regulators can set and asses learning goals progress by effective learning strategies, establish a productive learning environment, seek needed assistance, and set new goals when the precedent goals are completed.

Several models were proposed to describe self-regulated learning processes. Some models are relatively complex, but most of them have a simple structure [3]. They can be viewed broadly as a cyclic process including goal, processes, strategies, and self-evaluation. Dabbagh and Kitsantas [19] listed six means keys for SRL: (a) goal-setting process that defines the learning and strategies outcome to be reached, (b) self-monitoring, described as paying attention to some part of one's behavior that helps to focus on the task and evaluate efforts' outcomes, (c) self-assessment process through which learners evaluate their learning outcome goals, (d) task strategies as processes that might be applied by the learner to achieve goals, including the ability to relate, organize, summarize, and review content, (f) help-seeking by looking for outside resources, and (e) time management which refers to managing learning activities regarding time. The six described key processes are the components we have considered in this study.

### **2.3. Instructional Design and SRL**

The instructional design model involved known learning strategies into experiences, which make knowledge and skills acquisition efficient and more effective; it allowed students to appropriate learning activities and knowledge, to encode and process information, to provide feedback on learning activities and practice performance. This model leads to establish learning experiences and environments that promote the students' instructional activities [16].

Definitions are abundant in the literature, instructional design can be seen as a creative step where someone was guided to realize permanent change in acquisition knowledge process, as described by Wagner in [20]. This author [21] has described the Instructional Design in four ways as: (a) Process, (b) Research and theory disciplines

on instructional strategies, (c) Specifications Science on how to develop, implement, and evaluate situations, and (d) Reality, a perspective from which the author asserts that the entire process is done by the time.

Moreover, instructional design is also concerned by managing the learning resistance during the design phase. The learning resistance depends according to Ronsiville [22] on the consonance or dissonance relationship between the subject and the information, and on the general way in which the learner learns and organizes new information, represents and communicates his/her mental models, and relates to the different training delivery methods. The instructional design should thus provide activities that do not generate great dissonance to assure effective individual learning, particularly when it's performed in a distance mode.

The instructional design had to take balance trainer-directed learning with learner-centered learning as mentioned before. A notable finding is that adopting a self-regulated learning style can be a challenge for weak learners or those accustomed to having controlled learning [8]. The instructional design had to articulate learning goals (relatively prescribed) and tasks that allowed learners to exercise their autonomy without becoming lax. Dividing a long-term learning goal into a sum of sub-goals that are intermediate steps toward the final goal is assumed to promote SRL since distant goal makes the process of self-regulation even more complex, and as a result, it complicates self-assessments, decreases the feeling of self-efficacy, and fails to maintain motivation for a long time [19, 23].

For learning activities, Reigeluth, et al. [5] noted that effective SRL needs to accommodate various individual differences as well as learner understanding about learning goals and tasks. The authors stated that enhancing good SRL skills involves setting learning goals first based on institutional curriculum, career competencies, and some learner interests; then selecting a task and clarifying task criteria of success based on their learning goals, and defining methods and strategies for carrying it out. For assessment, the final assessment does not sustain self-monitoring and self-evaluation. The instruction should be designed so that assessment is integrated and occurring all during the training [5].

There are two ways to think about SRL skills enhancement. The first is redesigning current instruction by using instructional approaches, methods, and learning environments that might improve learners' SRL which can be seen as a method used by learners to realize their goals. The second one is implementing instructional design to teach SRL skills using various content domains which will be means instead of learning goals [23]. This study adopts the first approach to incorporate SRL in the new instructional design of the student teachers' training.

#### **2.4. Pre-Service Teachers Training and SRL**

Well-chosen courses that cover core teaching knowledge are not enough, it is also essential to design pre-service teachers' experiences so that they may integrate and use their knowledge in the classroom in effective ways [24]. Darling-Hammond analyzed exemplary teacher

education programs and identified seven elements that are commonly established : (1) Creating coherence based on a shared and well-articulated vision of successful education; (2) Setting well-defined criteria for practice and performance; (3) Using a well-grounded curriculum; (4) Providing in-depth experiences, carefully constructed to reinforce both theories and practices; (5) Providing explicit strategies to help pre-service teachers confront their representations and beliefs about learning; (6) Building strong relationships among all those training pre-service teachers, shared knowledge, and common ideas; and (7) Conducting an assessment that is based on professional standards [24]. The fourth and fifth elements involve metacognition, defined as knowledge and regulation of knowledge, according to Veenmann and al. [25]. Vrieling-Teunter, et al. [26] gathered some challenges such as the frequent difficulty to integrate SRL effectively into curricula and the unpreparedness of many teacher trainers to integrate SRL into their classrooms; they also stated that teachers' professional development allowed to successful implementation of SRL model in educational programs.

Lunenberg and Korthagen [27] have studied individual interest-oriented learning among pre-service teachers, and their competences in using various reflections methods in discussing pedagogical choices; the authors concluded on the importance of teachers' trainers' professional development, which facilitate self-regulated learning in teacher education.

#### **2.5. Training Evaluation**

Effective training was described by J.D. Kirkpatrick and W.K Kirkpatrick [28] as well-received training that provides necessary knowledge and skills to be applied on the job. However, these authors highlighted that organizations expect what is learned to be implemented in their professions too, which makes difference in the organizational results. This Model is well-known in analyzes and evaluations of the training programs results as the most used framework in academic research [29]. It uses four levels of criteria described as: 1) Reaction criteria to measure how participants feel about the training (satisfaction), 2) Learning criteria to analyze if they comprehended the training; 3) Behavior criteria to evaluate whether they are using what they learned at work; and 4) Results criteria to assess whether the information had a positive influence on the organization. According to this model, the evaluation should begin with level one and go in sequence through levels two, three, and four as time and resources permit [28-29].

The strategy adopted is loosely based on the evaluation of an online teacher training in the Covid-19 crisis context at the "Center for University Teaching" in Montreal [30]. This study focuses mainly on the first two levels (reaction and learning). For the other two levels, it seems still early to establish a summary of the behavioral level and the impact on teaching practices. The first evaluation level (reaction) was completed with a questionnaire of perceived quality, and the second one (learning) was documented by a questionnaire on feelings of self-efficacy and perceptions of the impact of the training on SRL skills.

### 3. PROBLEMATIC

It has been found that many benefits can be obtained by giving learners freedom of learning anytime and anywhere, and at the same time, several challenges are highlighted in research such as procrastination. In pre-service teachers' training, autonomy and self-regulated learning skills should be more improved during the training year since they have to take over classes. However, their habit of being guided through their schooling and studies in universities suggests that their appreciation of flexibility is not so obvious.

This study tries to redesign the existing face-to-face training with SRL skills perspective, to elaborate a set of guidelines and indications to be respected when building an instructional design that exercises these skills, to implement the proposed intervention, and to evaluate the perceptions of pre-service teachers about the flexibility and the impact on their SRL skills. Improving the quality of learning is not the principal goal, even it might result as consequence. Indeed, Paul, et al. [9] compared the effectiveness of online versus traditional teaching of the same course over 8 years to see if students' performance was affected by the medium and stated that no significant differences in performance for the 548 learners were revealed overall, neither by gender nor by class rank. So, the redesign project aimed to elaborate an online SRL-oriented design for the training and to investigate how well it contributes to exercising Self-monitoring these skills, which yield to these research questions:

1. After the implementation of the redesign, how do pre-service teachers perceive technology-supported flexible learning given that they have been used to being relatively guided during their schooling and studies at the university?
2. How do pre-service teachers perceive the impact of the elaborated SRL-oriented training approach on some of their SRL skills?
3. What indications to adopt when building an instructional design that might enhance SRL skills of pre-service teachers?

### 4. MATERIALS AND METHODS

Regardless of integrated learning technologies used, the instructional designer oversees ensuring that the conditions, inputs, and learning outcomes actively encourage and support improved learning. The research questions of this work are studied following the ADDIE model of instructional design, we conducted in Table 1. After the analysis stage, the definition of some main lines was made to elaborate a training that contributes to training the SRL skills and then its development. Afterward, the implementation of the intervention and its trial lasted two years before evaluation. The elaborated survey containing 14 questions, allowed to investigate the pre-service teachers' perceptions concerning the exercise of their SRL skills during this training.

To focus on the SRL skills, the diversity of tools has been minimized to the just needed (technical perspective), and the proposed activities had been thought to minimize

dissonance that might generate a learning resistance, to provide an effective individual learning (pedagogical perspective).

Table 1. SRL-oriented instructional design stages

| Analysis       | Traditional program                                                                |
|----------------|------------------------------------------------------------------------------------|
| Design         | - Identify SRL-skills to promote                                                   |
|                | - Determine guidelines and indications that help promote those skills              |
|                | - Determine the type of activities considering these propositions                  |
|                | - Identify goals and outcomes                                                      |
| Development    | - Build globally the instructional design (technical and pedagogical perspectives) |
| Implementation | Develop learning activities and digital resources                                  |
| Evaluation     | Conduct the digital learning                                                       |
|                | Investigate how well it contributes to exercising these skills                     |

#### 4.1. Redesign and Development

This step includes particularly the analysis of the traditional existing design to determine how well it contributes to developing SRL skills, which oriented the design and development of the online SRL-oriented version. The starting point of the designing step was the list of the six SRL skills mentioned above, even before thinking about the content of the activities or their development. Based on the theoretical background presented, some guidelines and indications were established so that the instructional design could contribute to improving SRL skills. In the Table 2, are listed those being directly attached to SRL skills. Each indication may contribute to enhance one or more skills. The Table 3 indicates relationships that each one could have with the SRL skills. By column, the most concerned SRL skills are specified.

Table 2. Guidelines and indications that contribute to exercise SRL-skills

| Guidelines                                                                                                            | Indications                                                                                                                    |
|-----------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
| - Various autonomous opportunities, such as producing resources or doing individual resources synthesis               | - Providing learner time control (no course schedule, no deadlines for intermediate activities, and no synchronous activities) |
| - Less and less guidance as they progress through the training to let learners develop progressively their SRL skills | - Giving learners the freedom to choose the subject and the process of realization                                             |
| - Series of tasks having proximal goals                                                                               | - Letting learners discover the platform on their own.                                                                         |
| - High-level activities to improve reflection                                                                         | - Proposing ongoing assessment and prompt feedback                                                                             |

The training was thought to be entirely online and asynchronous to give much freedom. Based on all the above-mentioned, the intervention was designed to provide specific knowledge through a series of activities having proximal goals. First activities are perspective and trainer-led, then autonomous opportunities, such as creating a flayer, an educational video, and an online assessment are integrated progressively as well as high-level activities like elaborating a synthesis of four models of ICT integration.

Table 3. Contribution of the indications to developing SRL skills

|                                                                   | Self-monitoring | Help-seeking | Goal setting | Time-management | Self-evaluation | Task-strategies |
|-------------------------------------------------------------------|-----------------|--------------|--------------|-----------------|-----------------|-----------------|
| Providing learner time control                                    | x               |              |              | x               |                 | x               |
| Giving learners the freedom to choose the subject and realization | x               |              | x            | x               | x               | x               |
| Letting learners discover the platform on their own               |                 | x            |              | x               |                 | x               |
| Proposing ongoing assessment                                      |                 |              |              |                 | x               |                 |

Table 4. Summary of the proposed SRL-oriented instructional design versus traditional training

|                         | Traditional training                                            | Redesigned training                                                                                                                                                                                                                                                                                                                                        |
|-------------------------|-----------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Guidance                | Prescribed activities                                           | Pedagogical aspects:<br>- The first activities are perspective and trainer-led, then autonomous activities with less and less guidance as they progress through the training<br>- Think activities in a way that minimizes dissonance that could generate resistance to learning in the absence of the trainer<br>- Technical aspect: No explicit tutorial |
| Activities' goals       | Activities aimed at general goals                               | - Activities having proximal goals                                                                                                                                                                                                                                                                                                                         |
| Production activities   | Prescribed production (as an application of what was learned)   | - Creative production (autonomous choice of subject and approach)<br>- Synthesis activity                                                                                                                                                                                                                                                                  |
| Assessment and feedback | Mid-semester test and a final exam. Feedback: module validation | - Ongoing assessment activities<br>- Prompt feedback as they progress through the training                                                                                                                                                                                                                                                                 |
| Mode                    | Face-to-face                                                    | - Fully online - Fully asynchronous                                                                                                                                                                                                                                                                                                                        |
| Progression             | Scheduled program                                               | - No schedule - No deadlines                                                                                                                                                                                                                                                                                                                               |

Afterward, the learning objectives and contents were selected. Then comes the development of learning activities considering the guidelines mentioned. The redesign was not just a rearrangement of the traditional training activities that used to take place face-to-face before, but rather a whole redesign process from the start. Several activities have been removed, and new ones have been created and integrated into the training in its online SRL-oriented version. The Table 4 gives the summary of the proposed SRL-oriented instructional design versus traditional training.

## 4.2. Implementation

To focus on the subjects being learned, materials and activities were structured so that it avoids technical hurdles that might interfere with the learning process. The training is delivered via the platform Didacte ([www.didacte.com](http://www.didacte.com)). The platform, easily used as a Learning Management System, allowed content delivery, monitoring, parameterizing learners' progress on a centralized platform, and keeping track of learners' progress. Data such as the date and time each course was finished, the grades earned in each quiz, and the date and time of completion can be monitored.

The pre-service teachers who completed this training were enrolled at the Regional Center for Education and Training Professions in Rabat (Morocco) where they completed their training for one year. The implementation of this intervention lasted two years, involving two promotions, 3 groups in 2019/2020, and 3 others in 2020/2021. All groups had almost the same online training.

## 4.3. Evaluation of the Redesign

Based on an exploratory qualitative study, the survey items were elaborated and administered via Google forms. This survey is divided into three sections. The first serves to measure the degree of satisfaction of pre-service teachers with the platform; it concerns some technical

aspects (like the adopted parameterization of learners' progress) and the autonomous work on this platform. The second one investigates, among other things, the opinions on the mode of progression in the training course and their degree of appreciation of the different aspects of freedom and guidance. The third section, directly related to the SRL skills, gives learners the opportunity to give their opinion on the perceived implications of some indications used to build the instructional design on certain SRL skills.

Table 5. Some questions involved in the questionnaire, as translated from French to English

|                                                                                    |                                                                                                                                                                                                                                                                                                                      |
|------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Preferences<br>(Answers to choose from)                                            | Q3: The advancement in this training path is free:<br>• I have enjoyed advancing freely in my course<br>• I would have liked the activities to be timed, uniform progress for all trainees (one part per week for example)<br>• I don't have a preference; both are fine                                             |
|                                                                                    | Q8: There were 8 evaluation activities during the training. Regarding their integration in the training course,<br>• I appreciated that the evaluations were done throughout the training<br>• I would have preferred the evaluations to be at the end of the training<br>• I don't have a preference, both are fine |
| Perceptions of SRL skills use.<br>(Answers by: Rarely, Sometimes, Quiet, or Often) | Q11: The freedom in producing resources has allowed me to exercise:<br>• My ability to set work goals<br>• My autonomous work strategies<br>• My self-monitoring during the work<br>• My self-evaluation of my work                                                                                                  |
|                                                                                    | Q13: The freedom of deadlines for activities has allowed me to exercise:<br>• My ability to manage my time independently<br>• My strategies for individual work<br>• My self-monitoring during the work                                                                                                              |

An open-ended question was added at the end to allow learners to express themselves freely and give suggestions for improving the training for upcoming pre-service teachers. The survey was deployed in French; examples of translated questions are illustrated in Table 5. The survey aims to identify preferences, perceived satisfaction, and perceived impact on SRL skills. The perception of the

training quality (level 1 of Kirkpatrick Model) was investigated via four factors: 1) The learning process (i.e. advancement), 2) Evaluation, 3) the available resources (i.e. contents), and 4) the used technologies (platform). Besides, the self-efficacy feeling (level 2 of Kirkpatrick Model) contains items about learning goals and the six SRL skills listed in the conceptual framework (self-monitoring, help-seeking, goal-setting, time-management, self-assessment, task-strategies).

## 5. RESULTS

The target population is consisted of pre-service teachers taken from the "Education and Training professions regional center" at Rabat, Morocco, where they performed their training for one year. The survey concerns two promotions, 2019/2020 and 2020/2021. The percentage of completion that tends to be 100 % has no special significance since the module is mandatory. Data were obtained from 93 beneficiaries. In Table 6, are presented the obtained results for some selected questions (Qi), particularly those concerning individual activities, advancing, assessments, production activities, and deadlines.

Table 6. The obtained results for preferences

|                             |                                                                                   |                                                                               |                                    |
|-----------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------|------------------------------------|
| Individual activities (Q2)  | 16.1% affirmed that not communicating between users did not affect their learning | 63.4% would learn better if there were collaborative activities between users | 20.4% find both options convenient |
| Advancing (Q3)              | 31.2% enjoyed advancing freely                                                    | 55.9% would like the activities to be timed                                   | 12.9% find both options convenient |
| Assessments (Q8)            | 59.1% appreciated the ongoing evaluations                                         | 28% preferred they were at the end of training                                | 12.9% find both options convenient |
| Production activities (Q10) | 28% preferred the trainer to specify the exact topic                              | 72% liked to be free in the choice and in the production process              | -                                  |
| Deadlines (Q12)             | 48.4% preferred the trainer to specify deadlines for activities                   | 45.2% liked to be free in the management of time                              | 6.5% find both options convenient  |

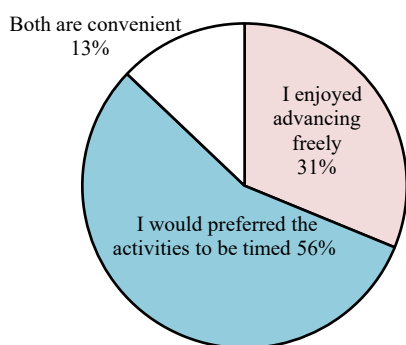


Figure 1. Percentages of pre-service teachers' responses about activities timing

The obtained results indicate that only 7.6 % of pre-service teachers found the use of the adopted platform somehow difficult (Q1), 63.4% would have been learned better if there were collaborative activities between users (Q2) and 3.2% of the respondents found contents useless

(Q5). These are supported by Merrill [16], which affirmed that the environment favored the group members learning in a social context. For time management, about half of the sample would prefer to be guided (Figures 1 and 2):

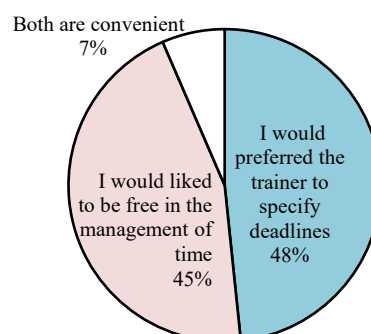


Figure 2. Percentages of pre-service teachers' responses about assessment deadlines

For perceptions about the implications on SRL skills, answers to the questions Q4, Q9, Q11, Q13 are as shown in Table 7.

Table 7. Percentage of pre-service teachers who perceive that their SRL skills were exercised

| Q4: My independent work on the platform has pushed me to:                |        |           |             |       |
|--------------------------------------------------------------------------|--------|-----------|-------------|-------|
|                                                                          | Rarely | Sometimes | Quite often | Often |
| 4a/ manage my work strategies                                            | 8.6%   | 24.7%     | 33.3%       | 33.3% |
| 4b/ manage my work time                                                  | 8.6%   | 25.8%     | 33.3%       | 32.3% |
| 4c/ seek help                                                            | 11.8%  | 43.0%     | 28.0%       | 17.2% |
| 4d/ waste time                                                           | 62.4%  | 23.7%     | 10.8%       | 3.2%  |
| Q9: Evaluations along the way                                            |        |           |             |       |
| allowed me to train my ability to self-assess, to adjust my learning.    | 1.1%   | 23.7%     | 39.8%       | 35.5% |
| Q11: The freedom in producing resources has allowed me to exercise:      |        |           |             |       |
| 11a/ my ability to set work goals                                        | 3.2%   | 21.5%     | 37.6%       | 37.6% |
| 11b/ my autonomous work strategies                                       | 4.3%   | 17.2%     | 44.1%       | 34.4% |
| 11c/ my strategies for individual work                                   | 4.3%   | 24.7%     | 36.6%       | 34.4% |
| 11d/ my self-evaluation of my work                                       | 3.2%   | 24.7%     | 38.7%       | 33.3% |
| Q13: The freedom of deadlines for activities has allowed me to exercise: |        |           |             |       |
| 13a/ my ability to manage my time independently                          | 4.3%   | 25.8%     | 35.5%       | 34.4% |
| 13b/ my autonomous work strategies                                       | 5.4%   | 24.7%     | 38.7%       | 31.2% |
| 13c/ my self-monitoring during the work                                  | 6.5%   | 22.6%     | 41.9%       | 29.0% |

Almost all the pre-service teachers (only 1.1% answered rarely) affirmed that the evaluation throughout the training allowed them to exercise their self-assessment skills and adjust their learning (Q9). As indicated by Reigeluth, et al. [5], the final assessment does not sustain self-monitoring and evaluation, which is generally confirmed by the results obtained in Table 7. The instruction model would be better if it was designed so that assessment is integrated and occurs during the training [5].

In terms of the overall perception on SRL skills improvement (Q14d), the figure 3 showed the percentage of the student teachers who stated that this training has improved their self-regulated learning skills was satisfying for almost 80% of the sample (greatly: 45.2%; quite often: 34.4%; a bit: 14%; and 6.4%: not at all).

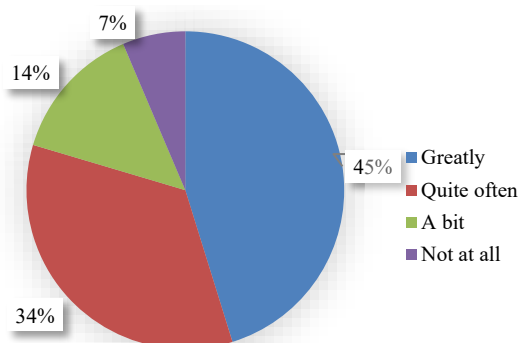


Figure 3. Overall pre-service teacher's perceptions about SRL skills improvement

## 6. DISCUSSION

The first research question concerns how pre-service teachers perceive flexible technology-supported learning. As 55.9% would have liked activities to be timed and 48.9% would have preferred the trainer to specify deadlines for the activities, it seems that pre-service teachers are still slightly attached to the guidance to which they were accustomed during their schooling and studies at the university. Broadly, about half of the participants preferred to be time-controlled, which can be interpreted as a belief in a relative inability to manage time by themselves. According to Dabbagh and Kitsantas [19] and Nussbaumer, et al. [8], the benefits of learner-centered online learning environments that have been extensively demonstrated in the literature may not always entail effects on learners, particularly those who are less self-regulated.

Since the training period occurred during the second semester and pre-service teachers are asked to take over classes a few months later, this makes it primordial to rethink training design so that it "frees" them more from this habituation to guidance and improves their autonomy, which could enhance the percentage of pre-service teachers who enjoy working freely. Lunenberg and Korthagen [27] also brought up the need to reconsider

training when they compared ten case studies to see if teacher trainers take the initiative to support student-led learning and found that this was not the case. These authors concluded that autonomizing practices should be introduced into teacher training to break the "didactic circle of traditionally trained teachers who adopt the traditional approach to teaching".

A similar assertion about rethinking training was made by Vrieling Teunter, et al. [26] when they stated that teacher professional development enables the successful implementation of self-regulated learning in educational programs. Hence, a major advantage to be highlighted is the fact that teachers will be better able to implement empowering teaching practices if they themselves are trained in this way.

It also shown that flexibility is seen differently when it is not a matter of time. First, nearly three-quarters of initial teacher training students (72%) enjoyed having freedom in the choice and process of production. On the other hand, 59.1% appreciated continuous assessments compared to only 28% who preferred assessments to take place at the end of training. This type of freedom seems to be better received compared to the freedom of progress over time.

The second research question investigates the pre-service teachers' perception of the elaborated SRL-oriented training approach impact on their SRL skills. To have a global vision, Table 8 illustrates the percentages of participants that answered by 'quite often' and 'often'. As concluded, about two-thirds of pre-service teachers stated that skills concerning self-monitoring, goal-setting, time-management, self-evaluation, and task strategies were exercised during the elaborated SRL-oriented training. The singular case of the help-seeking skill which has a lower percentage (45.2%) is probably related to the "seeking help" perception. Nevertheless, the pre-service teachers generally opted for their autonomy and their initiative to adopt the proposed indications that allowed them to train their SRL skills in self-monitoring, goal setting, time management, self-evaluation, and task strategies. This seems logical since the platform was deemed easy to use and therefore, does not often require help-seeking. The findings are more compatible with Roy, et al. [15] model, where the trainer allowed learners to follow the courses autonomously.

Table 8. Percentage of student teachers who affirmed that adopted indications allowed them to train their SRL skills (Responses by quite often and often)

|                 | Letting learners discover the platform on their own | Proposing ongoing assessment | Giving freedom to choose the subject and the process of realization | Providing time control |
|-----------------|-----------------------------------------------------|------------------------------|---------------------------------------------------------------------|------------------------|
| Self-monitoring |                                                     |                              | 71.0% (Q11c)                                                        | 71.0% (Q13c)           |
| Seeking help    | 45.2% (Q4c)                                         |                              |                                                                     |                        |
| Goal setting    |                                                     |                              | 75.3% (Q11a)                                                        |                        |
| Time management | 65.6% (Q4b)                                         |                              |                                                                     | 69.9% (Q13a)           |
| Self-evaluation |                                                     | 75.27% (Q9)                  | 72.0% (Q11d)                                                        |                        |
| Task strategies | 66.7% (Q4a)                                         |                              | 78.5% (Q11b)                                                        | 69.9% (Q13b)           |

The results shown in Table 7 validate the contribution of the four indications to the development of SRL presented in Table 8. For example, if the answers to (Q11) by quite often and often are added up, one can state that

giving learners the freedom to choose the subject and realization improves SRL skills as follows: goal setting (75.2%), time-management (78.5%), self-evaluation (72.0%), and task-strategies (71.0%), which are coherent

with the second line of Table 8. The percentages of answers by quite often/often to other questions are summarized below to show how indications are perceived to contribute to develop the SRL skills. The Figure 4 shows the SRL skills perceived as exercised by the four indications as obtained by the percentage of answers by quite often and often.

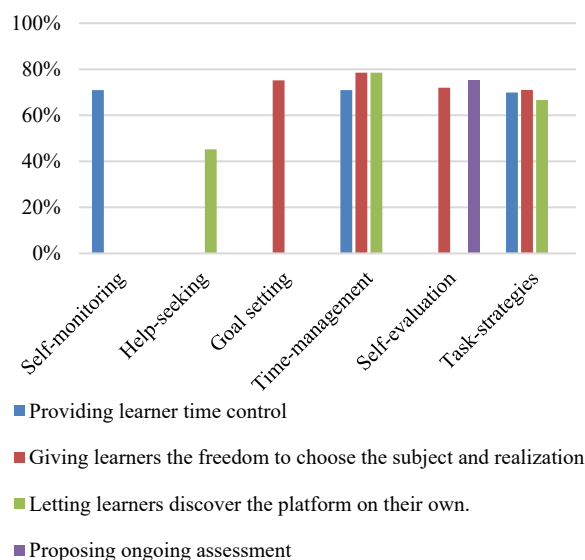


Figure 4. SRL skills perceived as exercised by the four indications (percentage of answers by quite often and often)

From this section's findings, the intervention can be considered to contribute significantly to the improvement of SRL skills. Since the main lines and indications established in the section method guided the instructional design, it confirms that they contribute to improve pre-service teachers' SRL skills, which answers the third research question.

## 7. CONCLUSION

The self-regulate ability of learners is not so obvious. Self-regulated learning scaffolding is therefore essential, and it is even more in teachers' training. Pre-service Teachers' education should focus on renewing the way they used to learn, they are no longer students, and they must be independent a few months later. The need to improve their self-regulated learning skills is therefore crucial not only for their lifelong learning, but also for the development of their professional practices. The study defines a set of guidelines and indications that guided the development of an SRL-oriented instructional design. This investigation allowed us to deduce that the developed design exercises significantly the self-regulated learning skills of the beneficiaries, so it can be concluded that the proposal contributes to the development of these skills.

This work, conducted among pre-service teachers of the Regional Center for Education and Training Professions in Rabat, Morocco, revealed that about three-quarters of the sample approved of the flexibility of content and production approaches, while only about half

approved of the flexibility of time. The prospective contribution of this study is that it would be interesting to implement this design in the institutional training of Moroccan teachers but with less flexibility in time for better engagement in asynchronous online training.

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