Effects of Self-assessment Scripts on Self-regulation and Learning

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Summary

The objective of this study was to analyse the effect of scripts, as self-assessment tools, on self-regulation and learning, when used in the context of different kinds of instruction and feedback. Eighty third-year, secondary school students analysed landscapes as they usually do when studying Geography. Working in one of eight experimental conditions (process/performance instructions x script/no-script x mastery/performance feedback) and using three trials, the effects on self-regulation and learning were assessed. Results showed that while using the self-assessment scripts enhanced self-regulation and learning, the effects of instruction and feedback were not significant.

***Key words**: script, self-assessment, self-regulation, self-efficacy, learning environment, learning motivation, achievement goal theory.*

Resumen

Este estudio analiza el efecto de los guiones de autoevaluación sobre la autorregulación y el aprendizaje cuando se utilizan en el contexto de diferentes instrucciones y tipos de retroalimentación. Con este fin se pidió a 80 estudiantes de 3º de ESO que analizaran paisajes como lo hacen en Geografía. En el contexto de esta tarea se evaluaron los efectos sobre la autorregulación y el aprendizaje de trabajar en una de ocho condiciones experimentales ("instrucciones: proceso-ejecución" x "uso/no-uso de guiones" x "retroalimentación: dominio-ejecución") en tres ocasiones, cada una sobre un paisaje diferente. Los resultados mostraron que usar guiones mejora la autorregulación y el aprendizaje, pero muchas interacciones no fueron significativas.

Palabras clave: *guión, autoevaluación, autorregulación, autoeficacia, entorno de aprendizaje, motivación para el aprendizaje, teoría de metas de logro.*

Effects of Self-assessment Scripts on Self-regulation and Learning

Most researchers agree that the self-regulation process is comprised of three phases: planning, execution, and self-reflection (Greene & Azevedo, 2007; Zimmerman & Campillo, 2003). These phases interact in a cyclical process in which the student starts planning the task, executes it, and then once the activity is completed, he/she reflects on, and evaluates, the results. Self-assessment takes place throughout the self-regulation cycle. That is, the student assesses his or her time management, use of learning strategies, emotional regulation, progress toward task completion, and other aspects of his or her learning. Therefore, it is important to develop self-assessment skills in order to promote self-regulation.

Although several studies have investigated the effectiveness of self-regulation on the learning process (Dignath, Buettner & Langfeldt, 2008; Schunk & Zimmerman, 2007), few studies have examined how the process of self-assessment can enhance self-regulation. Therefore, this study set out to evaluate the effectiveness of using self-assessment scripts to promote self-regulation by comparing the self-regulation of a group who used the scripts, to that of a group that did not use the scripts.

Theoretical Framework

Teachers can help students develop their self-assessment skills by using several different strategies, which include the use of self-grading, rubrics, or prompts, cues, and scripts. What follows is a detailed description of these three strategies.

Promotion of self-assessment through self-grading. In studies investigating the use of self-grading, students are asked to grade their work once it is finished. These studies have sampled students from several different grade levels (7^{th} through 12^{th}) and subject

areas (math, language, idioms, biology, etc.), and have used mostly true experimental designs, although some have used quasi experiments. Studies on the effectiveness of self-grading have also varied in the quality of self-grading training, as well as in the general procedures of assessment and intervention. Despite such methodological diversity, a few studies have resulted in some positive findings. However, upon evaluating these studies on the use of self-grading one could easily conclude that self-grading does not seem to improve neither learning nor self-regulation.

An important study on the effectiveness of self-grading was a meta-analysis conducted by Falchikov and Boud (1989). These researchers found that self-grading does not ensure an improvement in learning, and whereas good students tend to grade themselves realistically, poor performance students tend to overestimate their work. A couple of recent studies (Lejk & Wyvill, 2001; Sadler & Good, 2006) have also found that, in order for self-grading to be done well, some kind of agreement needs to be made between the students and the teachers. Without this agreement, self-grades tend to vary quite significantly.

To summarize, current research on self-grading shows it not to be very effective. This may be because these studies did not provide any self-assessment criteria, such as the use of rubrics or scripts, which can afford the students an opportunity to reflect on the quality of their learning, or to identify the reasons for failure when it does occur. This self-reflection is a major component of self-assessment, and without it, there is no improvement in one's self-regulation.

Use of rubrics. A rubric is a self-assessment tool with two characteristics: a list of criteria for assessing the important goals of the task, and a continuum for different

levels of achievement. The continuum provides indicators and examples of each achievement level so that the students can compare their work with the desired level. Thus, when students use rubrics, they can compare their work against the criteria or "standards" in the rubric, and then self-grade their work accordingly. Rubrics are usually one of two types: analytical, where students self-grade their performance on each specific criteria, and then add these scores for a total score; or holistic, where the criteria are more general and the grading is more global.

The real question is whether rubrics are an adequate technique for facilitating students' self-assessment, self-regulation, and learning, and if they are, then under what conditions are they most effective? From a theoretical point of view, and depending on how well the rubric is written, it makes explicit the standards of quality that should be achieved by a student's performance, and the assessment criteria and examples presented, based on expert models. If constructed properly, the use of rubrics should improve self-assessment, self-regulation, and learning (Andrade & Valtcheva, 2009).

Only a handful of studies have investigated the effectiveness of using rubrics to enhance self-regulation or learning. Some of these have examined the effects of rubrics on self-grading, but for the purposes of this study, only those that have explored the effects of rubrics on the learning process or product are relevant. Jonsson and Svingby (2007) reviewed 75 studies, only a third of which reported an educational effect, and they found it difficult to draw any conclusions about student improvement in relation to the use of rubrics because results did not point in one direction. Only two studies report an overall improvement and others report positive effects in only limited areas, or only when rubrics were used in combination with other interventions; one study even

reported some negative effects.

Nevertheless, students and teachers perceive that rubrics a) clarify expectations (because they indicate what is important), b) encourage reflective practice, c) help teachers understand the reasons for the *effectiveness* of their instructional practices, and d) provide information for *feedback* and *self-assessment.* Other papers not included in the review by Jonsson and Svingby (2007) reached similar conclusions. Additionally, studies by Andrade and colleagues (Andrade & Du, 2005; Andrade, Du, & Wang, 2008; Andrade, Wang, Du, & Akawi, 2009) have shown that students perceive the use of rubrics as positive, reducing their anxiety levels, that most of the time rubrics contribute to an increase in self-efficacy perceptions, and most importantly, that rubrics appear to improve learning. As for teachers, rubrics seem to help them to clarify their assessment criteria (Schafer, Swanson, Bené, & Newberry, 2001).

Although rubrics have some utility, their use by students is not straightforward (Andrade et al., 2009). For example, students tend to believe rubrics contain what the teacher wants to be done, and not value them as tools for guiding their learning; other times they differ on what they think should count towards the grade (Andrade & Du, 2005). These problems can be solved if students participate in the construction of the rubric and develop an understanding of its meaning.

In conclusion, rubrics may have positive effects in self-assessment and learning, but supporting evidence is scarce, and the conditions for their effectiveness should be investigated further. Moreover, researchers studying rubrics have not considered the possibility that rubrics could orientate students' motivation toward performance goals instead of mastery goals, especially due to their emphasis on grades. Research has

established that performance orientation effects on motivation are mostly negative (Alonso-Tapia, 2005; Alonso-Tapia & Pardo, 2006; Elliot, 2005). Partially due to the ambiguous research on rubrics, researchers continue to look for teacher interventions that enhance student self-assessment. One such avenue of research has explored if teachers prompts, cues and scripts favour self-assessment, self-regulation and learning.

Prompts, cues and scripts. Prompts and cues are specific help aids in form of questions and statements delivered during task performance. These prompts and cues are usually given distributed throughout the learning process, but occur mostly at the beginning, such as when a teacher reminds the students of general learning steps, like paying attention while planning a task. Scripts are a more specific and structured set of statements, or steps, structured to follow the expert model of approaching a task from beginning to end. For example, teachers may give students a script that includes questions to ask themselves in order to follow the main steps for solving a problem. The script can also be used after completion of the activity to promote self-assessment but is better if it is used during the process. Thus, prompts, cues, and scripts point to aspects of the process that students should pay attention to in order to self-assess their understanding or completion of a task. In doing so, students can achieve more, increase their skills, and become more competent.

Researchers have investigated the effects of prompts, cues, and scripts mainly as scaffolding devices aimed at improving learning. However, the effect of these aids on self-assessment and self-regulation has not been systematically examined. Research has found that, depending on the characteristics and conditions of their application, these learning techniques have plenty of positive features. Cues and prompts can increase

learning, transfer, and achievement, as well as self-regulation, when they are used alone (Berthold, Nuckles, & Renkl, 2007), or in combination with feedback (van den Boom, Paas, van Merrienboer & van Gog, 2004). The use of scripts has been found to have positive effects on the self-regulation of math problem-solving, especially for students with math-specific learning disabilities (Montague, 2007), and scripts aid in learning to write (Bereiter & Scardamalia, 1987). However, these effects are not always found, and seem to depend on different variables such as degree and quality of script structure, and the length of intervention (Berthold, Nuckles & Renkl, 2007; Kitsantas, Reiser & Doster, 2004; Kollar, Fischer & Slotta, 2007).

Thus, scripts can have positive effects on both self-regulation and learning, as they focus students' attention on monitoring and assessing their learning processes, and orient students' motivation toward mastery, rather than performance goals. Nevertheless, evidence of script effectiveness, and the conditions for success, is scarce. Therefore, there is a need to further investigate the effects of scripts on self-regulation and learning under various conditions.

Students' motivation, self-regulation, and learning seem to be affected by the messages teachers give when they introduce a task, as well as by the frequency and type of feedback they provide (Alonso-Tapia & Fernández, 2008; Black & William, 1998; Pardo & Alonso-Tapia, 1992; Urdan & Turner, 2007; Zimmerman & Kitsantas, 2005).Consequently, we decided to study the effect of scripts on learning, self-regulation, and self-efficacy when they are used alone, or in combination with different types of instruction (process- vs. performance-oriented) and feedback (mastery- vs. performance-oriented).

It was decided to conduct the study in the context of social science instruction, because this is one of the areas in which our research group works. According to the Geography curriculum in Spain, learners need to be able to proficiently analyze pictures of natural and manmade landscapes. There are documents that provide useful information for identifying natural and human influences affecting, and affected by, the present configuration of the territory that a landscape represents. The effectiveness of such analysis depends on the degree to which expert criteria are applied while following a more-or-less fixed sequence of steps. Students must internalize these steps and criteria, and be able to use them for self-assessing and -regulating their analytic processes and outcomes. The landscape analysis task is a difficult one, but teachers can give different kinds of support to help the students achieve the objective.

Hypotheses

Using the three independent variables of scripts, instruction, and feedback, it was hypothesized that student self-regulation, learning, and perceived self-efficacy after landscape analysis training would be greater a) if students learned with script, b) if students received process-oriented instruction, and c) if students received mastery-oriented feedback. Additionally, it was expected that the convergence of these three conditions would further improve self-regulation, learning, and perceived self-efficacy, and that "practice" (the three trials) would also enhance the expected outcomes.

Method

Sample

Eighty (40 males, 40 females) third-year Secondary School students from two public high schools in Madrid comprised the sample for this study. They ranged in age from 15

to 16 years old (*SD* = 6 months). The participants did not receive any compensation for their participation, and the schools were chosen based on convenience.

Materials

A) Instruments for assessing dependent variables.

1) *Self-regulation measures.* Self-regulation is assessed mostly through questionnaires. However, the validity of existing measures is questionable. As Boekaerts and Corno (2005) have pointed out, most of them are too general and might not be sensitive enough to specific and small changes due to intervention. Thus, researchers have moved away from decontextualised measures of self-regulation learning to domain-specific measures, and then on to context-sensitive measures. They have also suggested that a combination of instruments is preferable over a single instrument for assessing self-regulation. Therefore, two self-regulation measures were developed for use in this study.

- *A General and Specific Self-Regulation Questionnaire (GSSRQ)*. The GSSRQ includes general self-regulation items related to planning, self- monitoring, and self-assessment, as well as some specific items related to landscape analysis. Its 36 items are grouped in two scales: a) *Positive Self-Regulation* (reliability: α=0.81), which includes task-oriented actions such as "*I am going to review…I think this is wrong…Oh, I see what to do now!*" (Item 14), and b) *Negative Self-Regulation* (reliability: α=0.89), which includes thoughts and actions that imply lack of positive self-regulation and a lack of coping behaviours when confronting difficulties and stress, such as "*I am getting nervous…I don't know how to do this…*" (Item 7). Items were answered in Likert-format on a scale from 1 (Never) to 5 (A Lot) indicating frequency of thoughts or

actions. The two scales were not significantly correlated.

- *On-Line Self-Regulation Index (OLSRI).* On the OLSRI, students were asked to express their thoughts and feelings aloud while doing the landscape analysis. Think-aloud protocols were recorded and later analysed using the content of each complete proposition (i.e., stand-alone idea) as the unit of analysis. Proposition content was classified into one of three: a) *Descriptive propositions*, or those in which the content refers to what the participant was observing while analysing the landscape; b) *Checked descriptive propositions*, which are similar to descriptive propositions, but before expressing the idea the participant looked at the script for information, a behaviour that implies self-regulation; and c) *Self-regulatory propositions*, or propositions whose content referred to questions asked while receiving instructions, messages for controlling disturbing emotions, planning, help-seeking, or revision, and questions of clarification during feedback. We classified all the propositions independently according to these categories. Inter-rater agreement was 96%. Finally, to normalize scores, the number of self-regulatory propositions of each student was divided by the sum of self-regulatory propositions, plus descriptive propositions, plus checked-descriptive propositions.

2) Learning measures. Participants wrote their conclusions once they finished the oral analysis of each of the three landscapes. The written texts were divided into propositions, and then were evaluated as correct or incorrect using a specific analysis model for each landscape provided by two expert Social Science teachers. From this model, we developed a code of categories under which students' propositions could be classified. The percentage of agreement between the two coders was 82%, 88% and

76% for each of the three trials. The code used for the landscape presented in Figure 1 is shown in Table 1 along with a coding example **[Insert]**

3) *Self-Efficacy measure*. An eight-item, self-efficacy scale was used referring to specific aspects of landscape analysis, and was created for assessing the effects of the independent variables had on self-efficacy. Items were situation-specific because we wanted to assess "self-efficacy for landscape analysis." Examples of these self-efficacy items were: *"How capable do you feel you are to analyse a landscape?", " How capable do you feel to explain the landscape to a peer?"* or, *"How do you feel explaining a seashore landscape?"*. Items had to be answered in Likert-type format on a scale from 1 (Not At All) to 7 (Extremely) indicating security of being able to complete the task. The scale possessed good internal consistency reliability ($\alpha = 0.85$), and was administered before and after the intervention.

B) Instruments for assessing moderating variables.

Besides the Self-Efficacy scale just described, we decided to measure whether a difference in goal orientations was a moderating variable for the training effects. For this purpose, we used the *Motivation, Expectancies, and Values questionnaire* (MEVA; Alonso-Tapia, 2005). The MEVA measures the three motivational orientations usually described in the goal-orientation literature: mastery, performance, and avoidance.

C) Task materials.

Three kinds of materials were used. First, we created *three PowerPoint presentations* (see Figure 1). **[Insert]** Each presentation had four pictures of the same landscape taken from different perspectives, which provided complementary information on the landscape characteristics. Each of the three presentations showed a different type of

landscape: a) a rural area with Oceanic climate, b) a mining area with Mediterranean climate, and C) an urban area with Continental climate. Participants had control over the progression of the presentation, and could navigate the way they wanted to. The second kind of material was the *script for landscape analysis* shown in Table 2 **[Insert]** that was developed based on criteria outlined by two Social Science experts, and then given to the students in the script conditions. The third type of material was a *sheet with the main instructions* for the task was handed out in case the students wanted to refer to it during the activity.

Design

This research used a 2 x 2 x 2 x 3 design: three between-group independent variables contained two conditions each as follows: 1) *instructions,* oriented to process or oriented to performance, 2) the presence or absence of a *script*, and 3) *feedback*, oriented to mastery or oriented to performance; and one within-group variable, which was the number of landscape tasks completed (three trials). Ten students were assigned to each of the eight conditions.

Procedure

Students completed the MEVA (goal orientation questionnaire) during their courses in the normal classroom settings. Afterward, they were taken one by one to the experimental setting, a room within their schools, where the landscape PowerPoints were presented on a computer equipped with a web-camera. Each student then received the instructions, which were the same for all of the groups, except for some sentences that aimed to create the conditions “process oriented” or “performance oriented”. The sentences for creating the process condition were: “*As you are going to make several*

times the task you will have room for improvement. If you find difficulties, don't worry and relax because you will have more opportunities to learn. The most important thing is that you don't focus in the results but in learning how to do the analysis". For the performance condition, the instructions directed the student to do the task as if it were an assessment, and they did not contain and specific comments directed toward learning.

After receiving the instructions, each student was shown an example of a landscape, one different from those about to be analysed, so that they could estimate their level of competence, and then the student completed the self-efficacy scale. The student would then start the first analysis using a think aloud protocol to express his/her self-regulation processes. The student's words were recorded by the web-camera and later serve as the basis for obtaining the o*n-line self-regulation index (OLSRI)*. Students in the "script" condition were given the script with information regarding its meaning: "*Here you have a script that can be of help if you want to self-assess your work. When a teacher evaluates a landscape analysis, he/she examines whether you have followed the steps outlined in this script. If you take these steps into account, you will become aware of your work quality*."

Once the students reached their conclusions, they entered them as text into the computer, and then received feedback regarding their performance based on the assigned conditions of "mastery feedback" or "performance feedback". For example, if one student in the performance-feedback condition did not mention the relief, she/he was told "*You did not mention relief,*" but if he was in the mastery-feedback condition, she/he was told "*One important feature is relief. In this landscape, it is abrupt. Talking*

about the relief is important because it is a main factor of the landscape." After being given one type of feedback or the other, the student moved to the second landscape, and the procedure was repeated, and then again for the third and final landscape. Once the student finished the analyses, she/he completed the self-regulation questionnaire and again the self-efficacy scale.

Analysis procedure

First, two One-Way ANOVAs were computed to test whether or not students differed on the moderating variables of goal orientation and/or self-efficacy, in case these variables had to be used in subsequent analyses. As no significant differences on these moderating variables were found, the data on each dependent variable –the self-regulation questionnaire (GSSQ) and on-line measures (OLSRI), learning, and self-efficacy– were analysed using Repeated Measures ANOVAs. Between-subject factors corresponded to each of the eight conditions of the study, and the within-subject factor to the three landscape analyses each student completed. We corrected the degrees of freedom by means of the *Greenhouse-Geisser* statistic if the *Mauchly's sphericity test* showed that sphericity could not be assumed.

Results

No significant differences in moderating variables were found between conditions. So, ANOVA instead of ANCOVA procedures were used for analysing intervention effects.

Intervention effects on Self-regulation

The first dependent variable -self-regulation- was assessed through three different measures:

a) The score in s*elf-regulation on-line,* obtained from the codification of the thinking-aloud protocols. Results showed that only one of the main factors, presence or absence of script, had a significant effect on this measure ($F_{(gl\ 1,\ 71)} = 58.96$; $p<.0001$). As expected, students using the script (Mean: 0.50) overcame students that did not use it (Mean: 0.10). Moreover, the interaction "script by practice" was also significant as expected, that is, as the number of landscapes analysed increased, so did the amount of self-regulation in the experimental group, but not in the control ($F_{(gl\ 1.448,\ 104.278)} = 6.24$; $p<.007$). These results are shown in Figure 2 [**Insert**].

b) The score in the *positive self-regulation scale* of the *self-regulation self-report (GSSQ).* No significant differences between scores in the positive self-regulation scale were found; so, we omit its presentation, though this unexpected result will be discussed later.

c) The score in the *negative self-regulation scale* of the *self-regulation self-report (GSSQ).* In the case of this scale, the effect of type of instructions felt slightly short of the standard limits of significance ($F_{(gl\ 1,\ 71)} = 3.65$; $p<.060$), but in the expected direction: the groups with learning instructions reported less negative self-regulation (mean: 18.95) than the group with performance instructions (mean: 22.17). However, the interaction between *scripts and feedback conditions* was significant in the expected direction ($F_{(gl\ 1,\ 71)} = 3.98$; $p<.050$), as it is shown in Figure 3 **[Insert].** The absence of the script maintained the negative self-regulation high no matter if the feedback was mastery or product. It also happened in presence of the script when the feedback was oriented to product. But if the student had the script and received mastery feedback there was a decrease in the negative self-regulation reported.

Intervention effects on learning

Only the factor "script/no-script" had a significant effect on learning ($F_{(gl\ 1,\ 71)} = 8{,}27$; $p<.005$). As expected, students without the script showed less knowledge (mean: 45.04) than the students with it (mean: 54.63). There was neither a significant effect of type of instructions, type of feedback nor practice.

Intervention effects on self-efficacy

We used a covariance analysis to see if the variables modified the self-efficacy beliefs. The initial measure of self-efficacy was used as covariable. The results showed that, contrary to our expectations, there was not any significant effect due to intervention conditions. So data will not be presented, though this unexpected result will be discussed.

Conclusion

The main hypothesis of this study was that self-regulation, learning, and perceived self-efficacy following training would be greater if students worked with a script than if they did not use this self-assessment device. Also, it was hypothesized that instructions oriented toward learning, and feedback oriented toward mastery, would have effects similar to those of using a script, that the convergence of these three conditions would magnify the effects, and that the effect of practice would move students in the same direction. We now review our results in relation to these hypotheses.

The main hypothesis was supported in most cases based on our data: when students used scripts, positive on-line self-regulation was higher, and negative self-regulation assessed through questionnaires was lower, than for students who did not use scripts. Moreover, positive self-regulation increased as a result of practice. In line with results

of other studies (e.g., Montague, 2007), the positive results here suggest that the use of scripts should be encouraged if self-regulation and learning must be improved, and also, that it is worthwhile to continue studying the conditions that moderate the effects of scripts. Similarly, the use of the script had a significant effect on learning: students using it showed higher knowledge than students working without a script. This fact is important, because the script informed students about the categories of the landscape analysis, but it did not give them the correct answers to the different categorical analyses. However, only some of the remaining hypotheses received positive support. Why might this lack of support have occurred? To answer this, we next consider the interactions among three different factors: measurement procedure, dependent variables, and independent variables.

In regards to the dependent variable of *self-regulation*, the fact that the use of scripts did not have significant effects in all cases may have to do with the measurement procedure used to assess self-regulation. Data coming from thinking-aloud protocols do not depend on a student's awareness of what he or she is doing, whereas self-reported self-regulation not only implies its use, but awareness of its use. This makes it more difficult for self-report measures, like the ones used here, to detect significant changes in self-regulation. This explanation is in line with Boekaerts' and Corno's (2005) recommendation that situational measures of self-regulation should be used, but they also recommend the use of multiple assessment procedures.

As for the use of instructions, those who received instructions oriented toward learning reported fewer negative self-regulatory thoughts and behaviours, which supports our hypothesis derived from previous research (e.g., Black & William, 1998).

However, contrary to our expectations, the *type* of instructions did not affect positive task-regulating behaviours in either the on-line self-regulation measure or in the self-report. Why did this occur? One possible explanation that deserves attention is that prior students' goals and expectations, usually centered on performance rather than learning, may have inhibited students' attention to the teacher's instructions related to the task of learning. This explanation does not imply that the messages are inefficient, as shown by Pardo and Alonso-Tapia (1992), but rather, it implies their effects are not automatic; maybe other conditions are necessary for this to occur.

If we now consider the feedback effects, we can see that the only significant result was their interaction with the use (or non-use) of scripts. Students using scripts and receiving feedback oriented toward mastery manifested fewer negative self-regulatory behaviours than students in the other conditions. This result was expected, as mastery feedback is consistent with one of scripts' intended effects: to increase the perception of competency, which reduces anxiety, a reduction observed by researchers working with rubrics (Andrade & Du, 2005) and different types of feedback (Alonso-Tapia, 2005). However, why did feedback by itself not significantly affect the degree of self-regulation, as was expected? We have no obvious explanation for this fact, except that it may be necessary to have congruence between students goals' and expectancies, and the nature of the feedback, for this to be effective.

In the case of *learning,* other than the main effect of the use of scripts, and contrary to our expectations, no other variable or combination of variables had significant effects. As in the case of effects on self-regulation, we can think of three different, nonexclusive explanations. First, the type of learning measure used may have had a

ceiling effect, so it may have not been sensitive enough to differentiate possible intervention effects. Second, it may be necessary for a greater degree of practice to occur before the effects of interactions among independent measures on learning can be found significant. And third, it could be that the effects of instructions and feedback depend on their interaction with the type of outcome expected.

Finally, we consider the lack of influence for intervention on *perceived self-efficacy*, which could be explained by the short duration of training, as specific self-efficacy depends on positive learning experience; the three trials used here may not have been enough to produce the desired effects. Nevertheless, our results here are consistent with those of other studies (e.g., Zimmerman, Bandura, & Martínez-Pons, 1992; Zimmerman & Kitsantas, 2005).

Given the positive effects of scripts on self-regulation and learning, the possible explanations of the unexpected results found here deserve to be further investigated, especially as they relate to conditions of script effectiveness. Because this study was not carried out in the context of natural classrooms, different disciplines, or different kinds of students, and because the effects of scripts were not compared with other self-assessment devices (e.g., rubrics or e-learning devices), this opens up many avenues for future research directions. However, we can conclude that our study supports that the use of scripts to promote self-assessment enhance self-regulation and learning.

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Figure 1: Example of a set of landscapes used in the study.

Table 1. Coding examples of the quality of landscape analysis for Figure 1

CATEGORIES	EXAMPLES OF ANSWERS
DESCRIPTION	
Mountainous area	"This is area is really uneven as it has mountains"
Lake or reservoirs	"There is a lake…ummm…wait, it seems to be manmade so it is probably a reservoir"
Dense vegetation	"It is a really dense forest. There are a lot of trees and it is really green"
Two types of vegetation: evergreen or deciduous trees	"I think those trees are evergreen ones because it seems to be autumn but they are still green"
Evergreen trees are pines	"I would say the trees are pines"
Autumn season	"By the colors I think it is autumn"
River valley	"Ummm, this valley was created by the river"
Settlement	"I can see houses, so there are people living here"
It is a rural landscape with dispersed houses	"This is a rural area and the houses are really far apart. There is also no downtown"
Communications: roads, electricity…	"There are some signs of communication, they have a small road, and you can see the telephone poles"
Economic activity: agriculture for self-consumption and cattle farming	"Generally, they will work on agriculture and cattle farming here"
FACTORS THAT CAUSE THE LANDSCAPE TO BE THE WAY IT IS	
Fertile Soil	"The soil is probably good for farming and cattle grazing"
River erosion and sediment	"This valley was created in the past through river erosion"
Rainy weather	"If this landscape is so green it is because of the weather. It rains a lot"

Civilization: farming, roads, reservoir	"Here, people are not as present as they are in the city but you can still see the farms, roads…and even a reservoir".
CLASIFICATION	
Rural landscape	"This is a rural environment".

Table 2. Script to learn how to analyze a landscape

1) GENERAL IMPRESSION

¿What I am seeing?

2) PERSPECTIVE

From where I am seeing it? There are different planes? What is in each of them?

3) FEATURES

a) Natural:
- Relief forms?
- Type of vegetation?
- Are there rivers? What about rain, it is more or less frequent?
- What information gives me the colors?

b) Human:
- About settlement:
  - Is there any?
    If yes, where is it placed? (Coast, mountain, flat, near a river, etc.)
  - If yes, what type is it?
    Rural? If so, is it concentrated or spread?
    Urban? If so, what is the form of the city? (Irregular, checkerboard, concentric, lineal, etc.)
    What type of functions does the city has? (Industrial, residential, commercial, touristic, etc.)
- Communication vials
  Is there any? What type?
- Economic activity
  Is there any? What type? (Agriculture, mining, fishery, industry, tourism, etc.)

4) INTERPRETATION

What natural, human or both features contributed to the landscape looks the way it does?

a) Natural
- The type of soil?
- Weather?
- Erosion and sedimentation?
- Earthquakes?
- Constructing agents? (Volcanoes, board elevation, chorale, etc.)

b) Human
- What activities modify the landscape?
- What effect did they bring?

5) CLASSIFICATION

- Is the landscape in its majority natural-nature in salvage state?
  Why do I think that way?
- Is the landscape in its majority agrarian-there are farms and growing?
  Why do I think that way?
- Is the landscape in its majority industrial-there are factories?
  Why do I think that way?
- Is the landscape in its majority urban-are there human settlement?
  Why do I think that way?
- In conclusion, what type of landscape I think it is? Why do I think that way?

Has this script help me out to do the landscape analysis?

Figure 2. Script-practice interaction effect on self-regulation on-line.

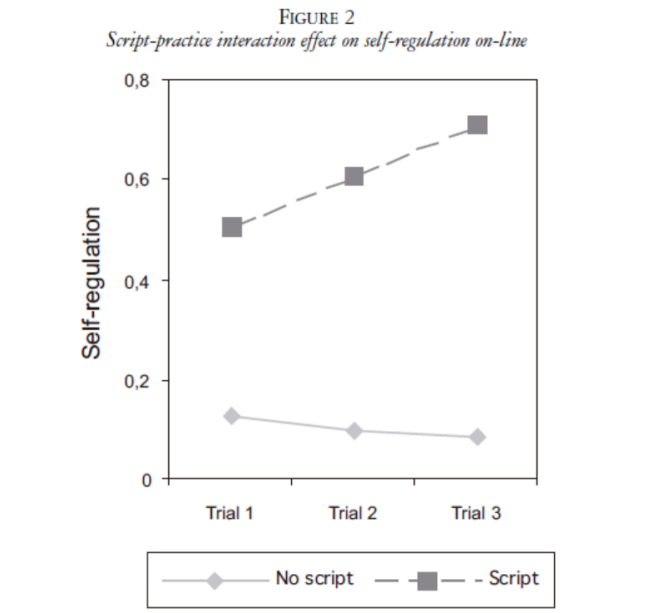

Figure 3: Script-type of feedback Interaction effect on negative self-regulation.