



Original

The effectiveness of four instructional approaches used in a MOOC promoting personal skills for success in life[☆]

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ABSTRACT

This study examines the efficacy of a MOOC-format instructional program, *Improvement of personal competencies for success*, which entailed the use of four clearly differentiated instructional approaches (three experimental approaches and one control approach): (1) *product*, with an emphasis on the final result and the overall quality; (2) *processes*, with an emphasis on recursion and constant self-assessment of the processes; (3) *mixed*, oriented on the result and overall quality as well as to recursion, self-reflection and self-assessment; and (4) *traditional (control)* focused on online instruction of the subjects and on the accomplishment of tasks. The MOOC was designed and implemented through the Universidad de León's external Moodle (Ariadne). It involved 745 people aged between 10 and 50, though only 336 completed it. The results demonstrate the efficacy of the MOOC—irrespective of the instructional approach followed—for instruction on different contents and competencies, such as resilience, achievement motivation and self-esteem; they reveal a statistically significant increase in different variables such as self-efficacy and they confirm the effectiveness of Moodle for the design and development of a MOOC. The implications of these findings are discussed and evaluated.

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Promoción de habilidades personales para la vida a través de la implementación de cuatro enfoques instruccionales en un MOOC

RESUMEN

En este estudio se analiza la eficacia de un programa instruccional, *Mejora de las Competencias Personales para el Éxito (APS-ÉXITO)*, en formato de MOOC, con cuatro enfoques instruccionales (tres experimentales y uno de control) claramente diferenciales: (1) *producto* con énfasis en el resultado final y en la calidad global; (2) *procesos* con hincapié en la recursividad, y en la autovaloración constante de los procesos; (3) *mixto* orientado tanto al resultado y calidad global, como a la recursividad, autorreflexión y autovaloración; y, (4) *tradicional (control)* centrado en la instrucción en línea de los temas y en la realización de tareas. Todo ello, diseñado y aplicado a través del Moodle Externo de la Universidad de León (Ariadna) en el que participan 745 personas con edades entre los 10 y 50 años, si bien solo lo culminan 336. Los resultados demuestran la eficacia del MOOC para la instrucción en contenidos y competencias diversas tales como resiliencia, motivación de logro y autoestima, con independencia del enfoque instruccional seguido, a lo que se añade un aumento estadísticamente significativo en diferentes variables como la autoeficacia. Las implicaciones de estos resultados son discutidas y valoradas.

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Palabras:

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Introduction

In recent years, Massive Open Online Courses (MOOCs) have become more popular in higher education (Alraimi, Zo, & Ciganek, 2015; Andone, Mihaescu, Ternauciu, & Vasii, 2015; Bayeck & Choi, 2018; Bonk, Lee, Kou, Xu, & Sheu, 2015; Chang, Hung, & Lin, 2015; Hew & Cheung, 2014; Loizzo & Ertmer, 2016; Lorenz, Wittke, Muschal, & Steinert, 2015; Lowenthal, Snelson, & Perkins, 2018; Muñoz-Merino, Ruipérez, Alario, Pérez, & Delgado, 2015; Zawacki, Bozkurt, Alturki, & Aldraiweesh, 2018). This is as a result of the proliferation of new information and communication technologies (Ng, 2012; Yu, Liao, & Su, 2013), of e-learning platforms (Liaw & Huang, 2013; Lin, 2012; Yu et al., 2013), of the development of active methodologies such as collaborative work, of instruction in skills and of the launch of Web 2.0 tools such as blogs, wikis and social networks in different areas of young people's everyday lives (Andone et al., 2015; Clará & Barberá, 2013).

These factors, coupled with the recent psychological interest in improving the quality of people's lives based on the analysis of the positive aspects of the human mind, which emerged as a result of the incorporation of a new psychological orientation (known as Positive Psychology) characterized by its positive hedonic tone and by its complementary nature, have resulted in a MOOC-format instructional program, *Improvement of personal competencies for success*, with four clearly differentiated instructional approaches (three experimental approaches and one control approach): (1) *product*, with an emphasis on the final result, performance, formal aspects, the execution of a series of indicators, the overall quality and constant self-evaluation of the final product (Frydrychova, 2014; Hashemnezhad & Hashemnezhad, 2012; Thulasi, Bin, & Bte, 2014); (2) *processes*, with an emphasis on the orchestration, dynamics and deployment of the participant's mental processes, and also on recursion, self-reflection and constant self-assessment of the processes (Frydrychova, 2014; Hashemnezhad & Hashemnezhad, 2012; Thulasi et al., 2014); (3) *mixed*, oriented on the final result, performance, overall quality and execution of indicators, as well as the orchestration, dynamics and deployment of mental processes, recursion and constant self-reflection on and self-assessment of the final product of the processes (Thulasi et al., 2014); and (4) *traditional (control)* focused on online instruction of the subjects and on the accomplishment of tasks.

Gaps of literature review about MOOCs

Firstly, the review of the literature suggests that MOOCs have had a significant impact on the development of online education, with many MOOCs having been produced through platforms such as Coursera, MiriadaX, FutureLearn (Alturkistani et al., 2019), Udacity, edX (Ruipelez, Halawa, & Reich, 2019) and Owc (Alraimi et al., 2015; Bonk et al., 2015; Chang et al., 2015), as a result of which previously used virtual learning environments such as Moodle seem to have been forgotten. Secondly, the characteristics of MOOCs are that they are free and available to any person (Andone et al., 2015), though it is also true that the majority of them are primarily focused on teaching specific content on artificial intelligence, programming systems, languages and psychological theories—areas that are useful for university-level adults and young people but not of great relevance to the rest of the population. Thirdly, there have been numerous exploratory or descriptive studies (Alraimi et al., 2015; Bonk et al., 2015; Chang et al., 2015), and meta-analysis or review studies (Alturkistani et al., 2019; Hew & Cheung, 2014; Margaryan, Bianco, & Littlejohn, 2015; Zawacki et al., 2018) that have focused on MOOCs, largely due to the change that they represent for the process of teaching and learning of any content, material, competency or ability. However, it can be seen that the number of MOOCs that meet all the criteria of empirical validation are greatly reduced,

because a large number of MOOC do not take into account some of the validation criteria of instructional interventions—for example, the analysis of the maintenance of the effects once the instructional intervention has been completed, and/or the existence of experimental and control groups, and/or the application of the same instruments before and after the intervention—in order for these criteria to be considered as evidence-based interventions (EBI). In addition, it must be kept in mind that among the majority of MOOCs has not been made a distinction between experimental and control groups, the instructional approach (product, process, mixed and traditional) followed neither the maintenance of the effects of instruction (follow-up). Along these lines, a recent study on MOOCs produced in Spain based on a sample of 186 people shows the influence of the satisfaction and motivation of participants on performance as a result of their participation in a cooperative MOOC, though it is unknown if these effects are maintained over time (Castaño, Maiz, & Garay, 2015).

As a result, with the objective of examining, understanding and describing the efficacy of a MOOCs for teaching on various psychological and educational variables and providing solid empirical evidence, a MOOC was designed according to criteria of evidence-based interventions (EBI), with four clearly differentiated instructional approaches (product, process, mixed and traditional), and delivered through Moodle. This MOOC was focused on the teaching of basic personal and psychological skills such as resilience, motivation (Cheung, Chiu, & Lee, 2011; Lin & Lu, 2011), self-efficacy, self-esteem, emotional intelligence (Deursen, Bolle, Hegner, & Kommers, 2015; Herodotou, Kambouri, & Winters, 2011) and, of course, written communication skills. This focus ensured that the MOOC would be relevant and significant to any individual, regardless of his or her age, gender or educational level.

Instructional approaches

The MOOC contained four clearly differentiated approaches (three experimental ones and a control one): (1) *product*, with an emphasis on the final result, performance, formal aspects, the execution of a series of indicators, the overall quality and constant self-evaluation of the final product; (2) *processes*, with an emphasis on the orchestration, dynamics and deployment of the participant's mental processes, and also on recursion, self-reflection and constant self-assessment of the processes; (3) *mixed*, oriented on the final result, performance, overall quality and execution of indicators, as well as on the orchestration, dynamics and deployment of mental processes, recursion and constant self-reflection on and self-assessment of the final product of the processes; and, (4) *traditional (control)* focused on the specific online instruction of the subjects and on the accomplishment of tasks.

All the approaches shared the following aspects: (a) they were virtual (Moodle); (b) they were designed with the same web tools (YouTube, SurveyMonkey and HotPotatoes); (c) they developed the same content; (d) they had the same number of levels; (e) they had identical linked activities, in the form of programmed learning, ensuring effective following of the course and gaining maximum benefit from the MOOC; (f) the same duration; (g) same level of demand and difficulty; (h) identical instructional sequence (introduction, guided practice, execution of the task and feedback); and (i) they bring together the characteristics of quality so as to be replicable and publishable in journals with a high impact factor. To this end, the guides and directives agreed at *European Research Network Learning to Write Effectively (ERN-LWE ISO703)* were followed. These included the specification of different aspects such as target learners, objective, duration, instructional sequence, teaching tasks and evaluation (García-Martín & García, 2017; Robledo & García, 2018). As a result of these factors, the only variable was the resulting interactive structure.

In addition, various validation criteria for the instructional interventions were incorporated so that the MOOC could be considered to be evidence based (EBI). These included: (1) the *existence of three experimental groups* (product, process and mixed approaches) and *one control group* (traditional approach); (2) the presence of subsequent *follow-up* after the intervention (pretest – post-test – follow-up); (3) the existence of measures related to the *maintenance* of the effects derived from the application of the four instructional approaches, with the same evaluation instruments being applied before and after the instruction, along with a follow-up measure three months after the completing of the MOOC; (4) the *generalizability* produced through the existence of a representative and balanced sample for each group; (5) the *durability*, understood as the analysis of the effects of the intervention made through the application and analysis of a specific instrument applied during the post-test and follow-up; (6) the *faithfulness* of the instruction (same content, level of difficulty, and so forth); (7) the *reliability* of the instruments (pretest – post-test – follow-up); and, (8) the *personal, psychological and social usefulness and relevance* of the MOOC (Graham & Harris, 2014).

Objective and hypotheses

The objective of this study is to examine the efficacy of four instructional approaches (processes, product, mixed and traditional) of a MOOC with regard to the teaching of various personal skills (resilience, motivation, self-efficacy, self-esteem, emotional intelligence and written composition). The study puts forward the following hypotheses: (1) it is predicted that all of the instructional approaches will favour the acquisition of personal skills such as self-efficacy that are conducive to success; (2) it is expected to observe some sort of trend towards an increase in the experimental instructional approaches (processes, product and mixed) relative to control one (traditional); (3) it is predicted to observe increases in learning; and (4) it is envisaged an increase in emotional competencies.

Method

Participants

Initially, 745 people made the informed and voluntary decision to participate in the MOOC. They were randomly distributed between the four instructional approaches -three experimental ones (processes, product and mixed) and a control one (traditional) -of the MOOC, which had a duration of 40 hours and had the objective of improving personal skills for success (see Table 1). The relative sample of those that completed the MOOC was $N = 336$.

Design

A 4×3 mixed factorial design analysis with repeated measures was carried out. The *intersubject factor* was considered as the instructional approach followed (processes vs product vs mixed vs traditional) and the *intrasubject factor* as the moment of evaluation (pretest vs post-test vs follow-up) to analyse the instructional efficacy of the four approaches that made up the MOOC.

Instruments and variables

With the goal of obtaining empirical evidence that corroborates the instructional efficacy of each one of the four approaches that the MOOC comprised, various online evaluation instruments and activities (for example, questionnaires, self-reporting and texts) were designed and implemented for pretest, post-test and follow-up, for the purpose of evaluating the participants' different competencies

and psychoeducational variables (see Table 2). In this regard, the texts written by the participants as part of the pretest and post-test were the basis for evaluating the textual product and the cognitive processes involved in the task of writing.

Accordingly, on the one hand, the written compositions were analysed on the basis of measures based on the text and on the reader, with text quality, productivity, structure and coherence being examined (García et al., 2014). On the other, an evaluation of the cognitive processes involved in the task of writing a text was conducted, through a variant of Kellogg's triple task technique. To this end, the technique of "online writing log" was used. This technique involves the student needing to identify the specific action that he or she is taking during the task of writing the text when a visual signal to record it appears online (Álvarez & García, 2014). Eight of the nine actions analysed fit within the processes of planning, editing and revising the text, with the other action relating to processes that are not related to written composition. All this was carried out without the presence of an instructor.

As can be seen in Table 2, the psychometric properties of these instruments are suitable and acceptable, as are the agreement indices between the codifiers for the writing tasks (Cohen's kappa above 0.85), as has been observed in previous studies on their design and implementation. With regard to the data of this study, these instruments present a high internal consistency (Cronbach's alphas between .70 and .96), adequate composite reliability or McDonald omegas (CR/ω between .70 and .96), acceptable average variance extracted (in general, AVE higher than .50).

The construct validity broadly confirms the groupings by scales. The content validity was assured by the numerous preview studies and the deep examination of each construct and variable. The discriminant validity was confirmed by the different pattern of factors inside and outside each instrument and in the sensitivity in the detection of changes in variables and factors after the intervention.

Instructional programme

The MOOC was made up of fifteen instructional units with an approximate duration of one hour, without including the complementary or optional tasks (see Chart 1). To these should be added the use of a code recorder and the assignment of virtual badges. Each time an instructional block was satisfactorily completed, a cup and an access code that needed to be included in the code recorder were issued. However, if the block comprised two instructional units, upon the conclusion of each unit a medal was awarded, and when the whole block was completed a cup was issued. Accordingly, satisfactory completion of the MOOC required all the access codes and the ten cups.

Procedure

At first, national and international scientific research articles were examined for identifying the psychological variables and personal competencies that influence personal success, and examining the effectiveness of MOOCs as an instructional and intervention tool on personal competencies and different psychological variables. This examination raised the need for the current study. Then, selection, adaptation and design of the evaluation instruments (pre, post and follow-up) was conducted, both for the psychological variables and personal competencies on the one hand and on the other for the written communication skills and the repeated psychological and educational measures such as the levels of difficulty, satisfaction and learning, which were to be examined through the fifteen levels that the MOOC comprised. Afterwards, the MOOC was designed in accordance with the aforementioned studies and previously developed instructional programmes that had an instructional psychology focus and were centered on the processes, product,

Table 1
Distribution of participants according to instructional approach, gender and age

	Experimental groups				Control group	Total gender
	Approach	Processes	Product	Mixed	Traditional	
Gender	Men	32	27	25	26	110
	Women	58	56	60	52	226
	Total approach	90	83	85	78	336
	Min.-max. age	10–58	10–47	10–52	10–44	

mixed and traditional approaches. Numerous versions of the four approaches were made; these were tried out by novice and expert instructors, and each of the levels, challenges and basic and complementary tasks was evaluated and graded in order to determine whether or not they focused on the selected construct.

Once this step was completed, the MOOC was designed on the Universidad de León's external Moodle (Ariadna) using SurveyMonkey, YouTube and Hot Potatoes. All these tools allowed the recording of access to the different levels, tasks and challenges, as well as the time spent on their completion, their execution itself and various other factors that would allow the teaching-learning process to be adjusted and any type of incidence to be detected. Moreover, with the goal of refining the approaches, various participants who were external to the design process and who had no knowledge of the subject area did the MOOC, providing important data on its difficulty, usability and accessibility.

Next, prior to the launch of the MOOC and with a view to complying at all times with the deontological norms pertinent to any scientific study, all of the participants in the study were contacted in writing to request a signed authorization. In the case of minors, this authorization had to include a signature from the mother, father or legal guardian.

After these steps had been taken, the MOOC was delivered as a Universidad de León 40-hours extension course. It was available 24 hours a day, 7 days a week for a period of six months. Although its preferred audience was secondary-level students in compulsory or noncompulsory education and university students, it was available to anyone, regardless of age, with an interest in furthering their personal competencies to achieve success.

In order to reduce as far as possible the dropout rate, all participants who completed all of the MOOC's activities received a university extension course completion certificate, which carries four LEC (Libre Elección Curricular; free curricular choice) and two ECTS (European Credit Transfer and Accumulation System) credits.

Once three months had passed following the conclusion of the MOOC, the 336 participants were asked (on a voluntary basis) to complete the evaluation instruments, with the goal of testing the continuation and maintenance of the MOOC's effects. This request was made in the form of an email sent to the 336 participants that made up the sample, in which they were told about the importance and usefulness of their opinions and comments in order to improve and optimize the MOOC.

Once the MOOC had been delivered and the follow-up had been completed, the Survey Monkey matrices were downloaded, relevant coding was completed and appropriate statistical analysis was conducted through version 22 of IBM SPSS Statistics.

Data analysis

Firstly, means and standard deviations were calculated to obtain descriptive data on participants. Next, the normality of the sampling distribution through kurtosis and asymmetry tests was verified, observing assumptions of normality in the majority of the measures. Then, the analysis strategy focused on two foci, with the nuclear one determining the effectiveness of the intervention. Previously, although the tasks and instruments were implemented or

validated in previous studies, a new validation and adaptation was made with the data of this study. For the analysis of the intervention effectiveness, following the design put, the differences in the psychological measures of the pretests of the four approaches using GLM multivariate contrasts were analysed, through which we verified an absence of statistically significant differences between them prior to the beginning of the course. All this was conducted through version 24 of IBM SPSS Statistics. And for the calculation of Macdonald's omega - composite reliability, average variance extracted indexes, Excell spreadsheet programs were carried out through from the pattern matrices of the factorial analysis of the instruments.

For the factorial analysis, the common factors approach was used with the maximum likelihood method. Although the distributions of the instruments were normal, when checking that the factors are related by the matrices of factor correlations, the oblique rotation was implemented by means of the Oblimin method. This strategy has been suggested, for example, in a review of 117 studies (Izquierdo, Olea, & Abad, 2014). Several indicators were obtained that confirm the suitability of the samplings, as well as the goodness of fit, among others (see Table 2). The identification of factors was based on the theoretical nature of the measured constructs; analysis of the sedimentation and factor graphs. Also, the determinants of the matrices of correlations, the suitability of the sampling and sphericity (KMO and Barlett), factorial matrices, communalities, tests of goodness of fit. And finally, the alphas of Cronbach, the CR and AVE. Factor scores were extracted by the Bartlett method. In order to guarantee the generalization of the factorial structure of each instrument, they were confirmed with the analysis of each of the three moments, with comparable results.

Results

In general, statistically significant gains were observed between the pre and post, and from the pre to the follow-up in the four approaches (this will be expanded upon later), but not the interaction between the four approaches by moment (hence they are not indicated). That is, the four instructional approaches (processes, product, mixed and traditional) improved, but none did so to a greater and statistically significant extent than any other. Nevertheless, in the analysis that follows, we briefly describe the trends observed with regard to the instructional approaches based on the factors or components obtained from the factorial analysis carried out.

Results for instruction on written composition

In the initial evaluation (pretest), there were no statistically significant differences in the analysed measures for the written composition between the instructional approaches (processes, product, mixed and traditional).

However, once the MOOC had finished—that is, once the results of the pretest and the post-test were compared—we found statistically significant increases in the variable *attitudes towards written composition* $F_{(1,332)} = .590, p = .001, \eta^2 = .410$ (with a large effect size) and in variable for analysis of the writing product, *number*

Table 2
Evaluation tasks and instruments

Instruments	Aspect evaluated	Cronbach (α)	Deter- minant (p)	Kaiser- Meyer- Olkin Suitability sampling	Bartlett's sphericity test (p)	CR/ ω	AVE	Cumulative explained variance	Goodness of fit test χ^2 (p)	Application			Example of previous studies on implementation of the instrument
										Pre-test	Post-test	Follow-up	
CIG	Informed consent	.93	.001	.923	.001			64.62	.001	X			García-Martín & García (2013; 2017; 2018)
EMSO	General information					.827	.621	19.688					
	Emotional expressiveness (EE)					.777	.56	32.304					
	Emotional sensitivity (ES)	.798	.05	.722	.001	.73	.475	43.574	.001	X	X	X	Oldmeadow et al., (2013)
	Emotional control (EC)					.73	.46	52.720					
SEN	Social expressiveness (SE)					.74	.48	59.890					
	Social sensitivity (SS)					.73	.48	65.736					
ACT	Social control (SC)	.894	.81	.748	.001	.87	.63	71.02	.001	X	X	X	García et al. (2001)
	Feelings about writing	.857	.05	.858	.001	.776	.576	49.356	.001	X	X	X	
DIF. SEM.	Attitudes towards writing					.888	.464	44.423					
	Effects (generalization)					.758	.458	52.634	.001	X	X	X	Díez et al. (2010)
	Effects (emotional components)	.665	.001	.937	.001								
EMI	Effects (effects on learning)					.714	.469	58.997					
	Effects (practical realization)					.773	.51	64.892					
	Methodologies deployed and preferred	.901	.001	.736	.001	.808	.516	49.467	.001	X	X		
AEF	ED: Expected and Desired DP: Deployed and Preferred												
	Self-efficacy (Self-control)					.775	.52	42.693					
	Self-efficacy (Self-esteem/Strengths)	.969	.001	.909	.001	.88	.649	50.175	.001	X	X	X	García-Martín & García (2017, 2018)
	Self-efficacy (Attributions/Goals)					.723	.517	56.936					
ELE_POST	Self-efficacy (Planning)					.758	.517	62.650					
	Self-efficacy (Empathy/Motivation)					.793	.448	67.959					
	Effects on learning	.916	.001	.951	.001	.956	.519	64.192	.001		X	X	Liaw & Huang (2013); Lin (2012)
	PROD									X	X		García et al., (2014); García-Martín & García, 2017, 2018)
	WL									X	X		Álvarez & García (2014)

Chart 1

Explicative design of the MOOC's different competencies and constructs, instructional units and tasks (basic and complementary)

Competencies/Constructs	Instructional units	Basic tasks	Complementary tasks
Prior evaluation	Self-reporting Written communicative competency processes	INTRODUCTION TO THE TASK (Introductions* and Videos**)	INTRODUCTION TO THE TASK (Brief explanations****)
Resilience	I. The resilient being	GUIDED PRACTICE (Quizzes***)	GUIDED PRACTICE (Quizzes****)
Achievement motivation	II. Task value, levels of demand and expectations		
Self-efficacy	III. Attributions	EXECUTION OF THE TASK (Quizzes***, challenges*** and texts***)	EXECUTION OF THE TASK (Quizzes****, challenges and texts****)
	IV. Proven mastery and vicarious experience		
Written communication	V. Psychological and affective states and verbal persuasion	FEEDBACK (Comments, suggestions, additional information***)	FEEDBACK (Comments, suggestions, additional information****)
Metacognition	VI. Written composition		
Self-esteem	VII. Self-knowledge		
Written communicative competence	VIII. Self-regulation	EXECUTION OF THE TASK (Quizzes***, challenges*** and texts***)	EXECUTION OF THE TASK (Quizzes****, challenges and texts****)
Emotional competencies	IX. Intrapersonal aspects		
Final evaluation	X. Interpersonal aspects	FEEDBACK (Comments, suggestions, additional information****)	FEEDBACK (Comments, suggestions, additional information****)
	XI. Written composition		
	XII. Emotional control		
	XIII. Socioemotional skills		
	Self-reporting Written communicative competency processes		

Note. Designed using: * PowerPoint; ** 5-10 minute YouTube videos. *** SurveyMonkey; **** Hot Potatoes.

of textual units $F_{(1,332)} = .998, p = .012, \eta^2 = .037$. Moreover, upon analysing the writing processes, we also found a statistically significant improvement in variables for the revision process such as percentage of time spent on correction of the text $F_{(1,332)} = .989, p = .055, \eta^2 = .011$ and on modification of the text $F_{(1,332)} = .987, p = .037, \eta^2 = .013$, with the latter displaying a trend towards increase in the experimental approaches (mixed and processes) relative to the control (traditional) $F_{(1,332)} = .968, p = .013, \eta^2 = .032$. Furthermore, in carrying out analysis based on the three moments (planning, editing and revision), we observed a statistically significant increase, during the third moment, in the percentage of time spent on various categories on revision in the processes and mixed (experimental) approaches relative to the traditional (control) approach $F_{(1,332)} = .985, p = .027, \eta^2 = .015$ and an increase in some of the categories on planning $F_{(1,332)} = .973, p = .003, \eta^2 = .027$ and editing $F_{(1,332)} = .988, p = .048, \eta^2 = .012$ for the traditional approach relative to the experimental approaches (processes, product and mixed).

Results for evaluation of the instruction

In the initial evaluation, there were no statistically significant differences in the analysed measures for the evaluation of the instruction between the instructional approaches (processes, product, mixed and traditional). However, once the instruction had been carried out, there was a statistically significant increase in learning $F_{(1,332)} = .844, p = .001, \eta^2 = .156$, emotional competencies $F_{(1,332)} = .878, p = .005, \eta^2 = .122$, practical realization $F_{(1,332)} = .849, p = .001, \eta^2 = .151$ and generalizability $F_{(1,332)} = .818, p \leq .001, \eta^2 = .182$, with large effect sizes (see Figure 1). This occurred regardless of the instructional approach followed as can be seen in Figure 1.

In the pretest, there were no statistically significant differences between the instructional approaches (processes, product, mixed and traditional) with regard to the variables of expressiveness and emotional control. In spite of this, once the instruction had been delivered and upon comparing the pretest and post-test results, we observed an improvement in variables such as emotional control $F_{(1,332)} = .355, p \leq .001, \eta^2 = .045$ and social expressiveness $F_{(1,332)} = .966, p = .001, \eta^2 = .034$ with small effect sizes, and social control $F_{(1,332)} = .922, p = .031, \eta^2 = .078$ with a medium effect size. Moreover, if we consider the results obtained in the pretest and

the follow-up of the instructional approaches, the improvements remain in the majority of the measures, as can be seen in Figure 2.

Results for the self-efficacy measures

The pretest does not reveal statistically significant differences between the four approaches (processes, product, mixed and traditional) in the analysed measures related to self-efficacy, as can be seen in the Figure 3 ($p = .001, \eta^2 = .150$), 4 ($p = .037, \eta^2 = .077$) and 5 ($p = .022, \eta^2 = .087$) (Figure 4, Figure 5).

However, once the MOOC had been completed—that is, comparing the results obtained in the pretest and those of the post-test—statistically significant increases in the majority of analysed variables were revealed, for example in the achievement motivation task value component $F_{(1,332)} = .844, p = .001, \eta^2 = .156$, achievement motivation $F_{(1,332)} = .850, p = .001, \eta^2 = .150$ (with large effect sizes), and in the sources of proven mastery and vicarious experience, metacognition, self-esteem and social skills (with medium effect sizes). There was a tendency towards increase in the experimental approaches (principally those of product and mixed) relative to the control (traditional), though this increase was not statistically significant.

Moreover, if we consider the results obtained from the pretest and follow-up of the experimental instructional approaches (process, product and mixed), we can see that in practically the majority of the measures this improvement was maintained. This trend was not observed in certain traditional focus variables such as self-efficacy on attributions and achievement motivation in general.

Discussion

The results validate the instructional efficacy of the four approaches (processes, product, mixed and traditional) in terms of both the acquisition of and improvement in different personal competencies such as resilience, self-efficacy, achievement motivation and written communication. These findings are supported by the results obtained in the majority of the analysed measures, which in turn are consistent with those observed in previous interventions on written communication competence (Frydrychova, 2014; Hashemnezhad & Hashemnezhad, 2012; Thulasi et al., 2014), thereby confirming the first hypothesis made.

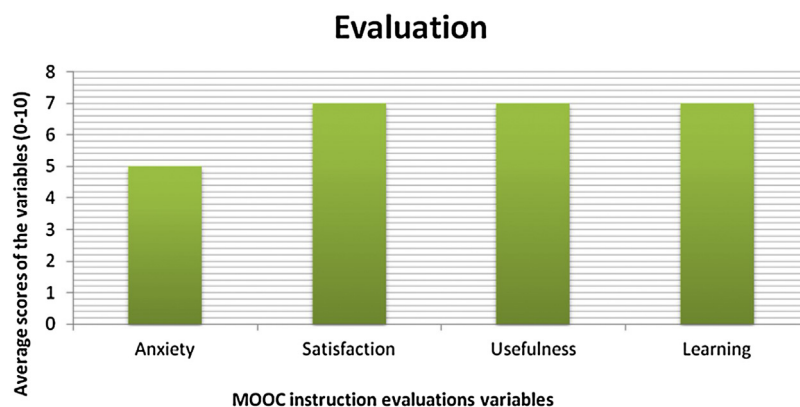


Figure 1. Results of the evaluation of the instruction of the MOOC: anxiety, satisfaction, usefulness and learning.

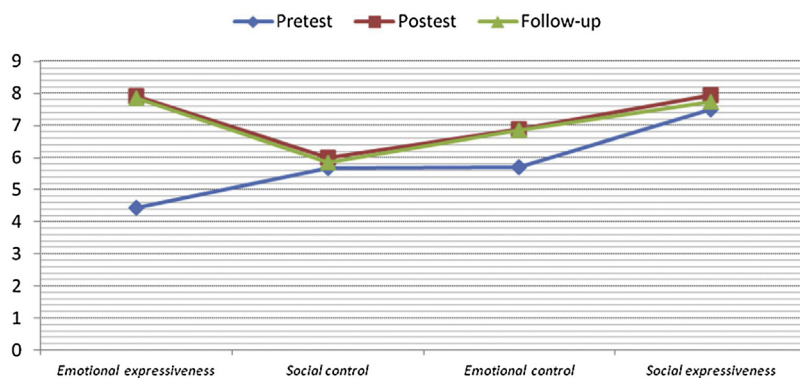


Figure 2. Expressiveness and emotional control*.

*Due to the absence of statistically significant differences when considering the interaction between the moment of evaluation (pre, post and follow-up) and the instructional approaches (processes, product, mixed and traditional), the scores obtained from the variables of expressiveness and both emotional and social control are presented, using as an example the mixed instructional approach.

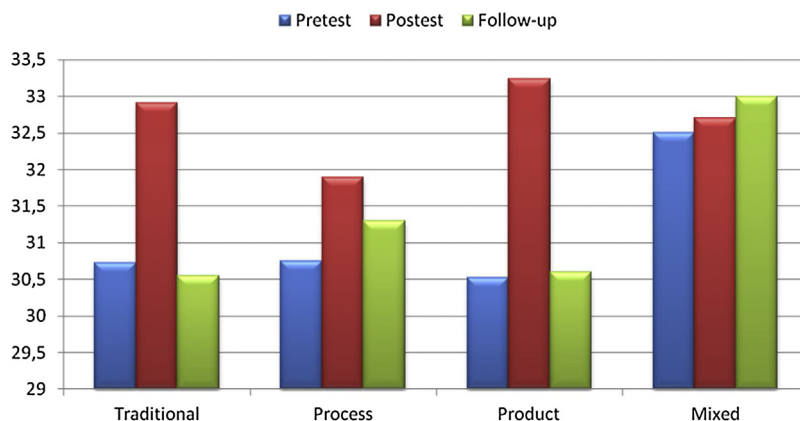


Figure 3. Results of the evaluation of self-efficacy on achievement motivation.

Moreover, the results obtained indicate an increase in perceived self-efficacy in practically all of the analysed variables. The slight tendency towards increase found in the experimental instructional approaches (processes, production and mixed) relative to the traditional (control) approach would seem to support the second hypothesis, even if it is not statistically significant. As a result, it would be worthwhile for future studies to be carried out on these approaches, increasing the number of instructional sessions and the time commitment, with the goal of confirming or refuting this trend on a statistical basis.

A significant increase in learning following the instruction delivered through the MOOC was also confirmed, regardless of the instructional approach followed. This improvement is supported by the data observed in the majority of the measures examined and in previous review (Hew & Cheung, 2014; Margaryan et al., 2015), exploration (Alraimi et al., 2015; Chang et al., 2015) and intervention (Castaño et al., 2015; Gillani & Eynon, 2014; Muñoz-Merino et al., 2015) studies on MOOCs, thereby confirming the third hypothesis.

Equally, with regards to emotional competencies, the results have confirmed that the approaches developed and applied

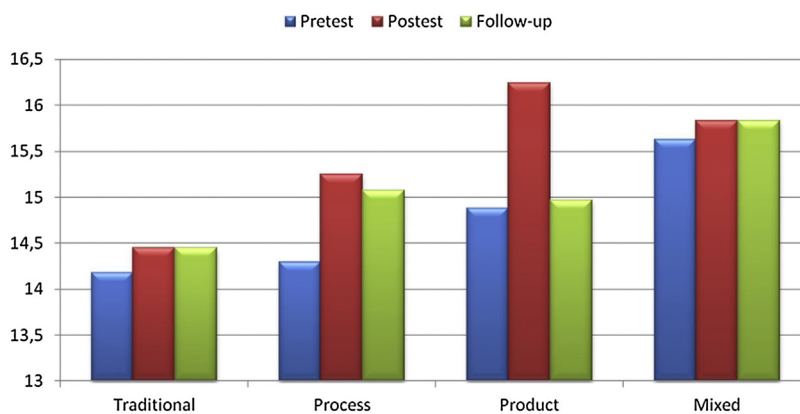


Figure 4. Results of the evaluation of self-efficacy on metacognition self-knowledge.

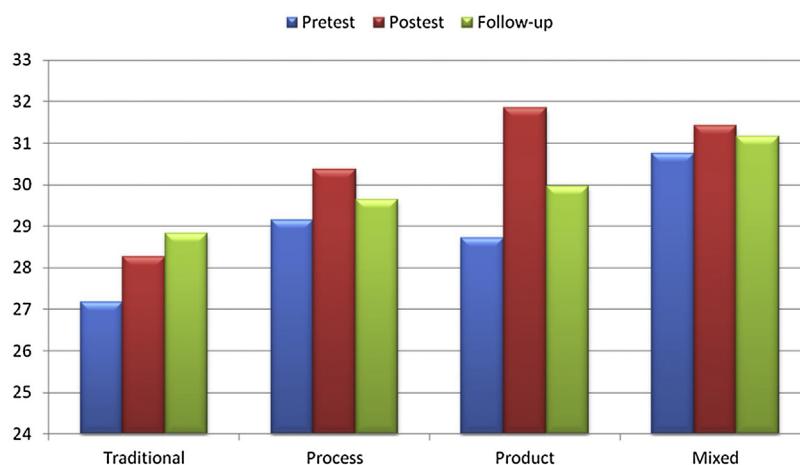


Figure 5. Results of the evaluation of self-efficacy on metacognition self-knowledge and self-regulation.

through the MOOC produced positive effects. This assertion is supported by results obtained through different measures and in previous exploratory (Alraimi et al., 2015; Chang et al., 2015; Lorenz et al., 2015) and intervention (Castaño et al., 2015; Gillani & Eynon, 2014) studies on MOOCs and interactive or e-learning environments (Liaw & Huang, 2013; Lin, 2012; Lorenz et al., 2015), which in turn confirm the fourth hypothesis.

It must also be kept in mind that this was the first MOOC to be delivered in Spanish that focused on personal competencies such as motivation (Lorenz et al., 2015; Van der Meij, Van der Meij, & Harmsen, 2015), self-efficacy, metacognition (Reid, Morrison, & Bol, 2017), self-esteem, written communication and emotional competencies, to be useful for the general population and to draw on a sample made up of children, adolescents, youths and adults.

As a result, we can conclude that the efficacy of this MOOC for the instruction of curricular content and personal and basic competencies can be corroborated, regardless of the instructional approach (García-Martín & García, 2018). This represents an important advance for formal and academic education and for competence-based learning (Hew & Cheung, 2014) and gives rise to significant debate on educational and training standards from traditional (in-person) teaching versus online learning, since the latter implies a break with spatial and temporal barriers. That is, any person with an interest in learning can do so where and when he or she wants, materials are made more widely available, and personalized and individualized learning is encouraged (Chang et al., 2015). There is therefore a need for future researchers to analysis the effects of instruction on and acquisition of personal psychological

competencies through MOOCs and traditional in-person teaching. We should also point out that although in this MOOC the criteria for methodological rigour that are part of any high-quality instructional intervention were followed (Graham & Harris, 2014), it would be advisable for future research studies to increase the sample size and the number of instructional sessions, as this would allow the instruction to be focused and the time spent on the content or competency to be increased, with the objective of obtaining relevant and more nuanced data on the characteristics and indicators of both in-person and online evidence-based instructional interventions.

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