



## Analysis of the Moodle Learning Management System and user comfort levels

*Análisis del Sistema de Gestión del Aprendizaje, Moodle y niveles de confort en usuarios*

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### Abstract

This study analyzes the workflow experiences in the teaching-learning process of teachers and students enrolled in mixed (face to face /distance education) and distance education systems. The main objective is to evaluate Moodle, Learning Management System with the systematized Brief Inventory of Experiences. In this study we measure and compare the flow and comfort experiences of a population of 8140 participants, divided into two groups: 320 teachers and 7820 students. We can conclude that there is a significant difference in the  $p < 0.05$  level, in the following two variables: 1) When performing the activity, I forget about the problems and concerns and 2) I do things spontaneously and automatically. Tasks they must face in order to provide the students the appropriate tools in order to learn. In addition to this challenge, the teacher does not achieve an optimal level of comfort throughout the teaching process due the lack of positive feedback. Encouraging the teachers to guide the students to takeoff the learning and the teacher to get positive feedback. While the students receive and assimilate, the teacher gives and experiments. Because the transmission of knowledge is a function of who assimilates the legacy.

**Keywords:** virtual environment, meaningful learning, virtual education, learning experiences

### Resumen

*El estudio analiza las experiencias de flujo en el proceso de enseñanza-aprendizaje de docentes y estudiantes matriculados en sistemas mixtos (educación presencial / a distancia) y educación a distancia. El objetivo principal es evaluar el Sistema de Gestión del Aprendizaje, Moodle con el Inventario Breve de Experiencias sistematizado. Se compara las experiencias de flujo y comodidad en una población de 8140 participantes, divididos en dos grupos: 320 docentes y 7820 estudiantes. Resultados, existencia de diferencia significativa en el nivel  $p < 0.05$ , en las siguientes dos variables: 1) Al realizar la actividad, me olvido de los problemas y preocupaciones y 2) Hago las cosas de forma espontánea y automática. La diferencia radica en las dificultades que enfrentan los maestros al editar, seleccionar y actualizar los recursos de enseñanza. Tareas que deben enfrentar para proporcionar a los estudiantes las herramientas apropiadas para aprender. Además de estos desafíos, el maestro no logra un nivel óptimo de comodidad durante todo el proceso de enseñanza debido a la falta de retroalimentación. Mientras los estudiantes reciben y asimilan, el maestro da y experimenta. Porque la transmisión del conocimiento es una función de quién asimila el legado.*

**Palabras claves:** ambiente virtual, aprendizaje significativo, educación virtual, experiencias de aprendizaje



## 1. INTRODUCTION

Technology has penetrated all areas of life and social coexistence. Among them is education that has acquired teaching-learning models with the use of electronic tools that improve and accelerate educational processes (Vallejo, 2017).

The study focuses on the experiences that the actors (teacher and student) have in the teaching-learning process. To know their experiences of fluency and comfort in the face of the use of virtual tools in mixed and distance education at a higher level. Because until now the studies have focused on the experiences of fluidity and comfort generated by virtual tools in student learning, leaving aside the entire process. (dos Santos, *et al.*, 2018).

The study is centered in the comparison of the levels of fluidity or comfort in the teaching-learning process between both actors to be able to define the emotions of permanence before the use of virtual tools.

The theory used was the Theory of Flow or Comfort, because it explains the emotions that are experienced when using virtual tools. This theory is the pioneer to explain permanence experiences due to motivation and self-learning (Csikszentmihalyi, 2014). From it arise the theory of self-determination, the theory of the S curve, intrinsic motivation, among others, which attempt to explain the main elements associated with learning flow and comfort. But until now it has not been possible to recognize a generic permanence theory because it is a multifactorial phenomenon (dos Santos, *et al.*, 2018). There is an integrative model that captures the formation of flow in personalized e-learning environments, including various factors, but it is only focused on student learning (Meseguer-Artola & Rodríguez-Ardura, 2019).

The theories and models, mentioned in the previous paragraph, try to explain the learning flow in virtual environments through the conceptualization of the learning elements, such as: attention span, memory and problem-solving, since the improvement of such skills leads to proactive and autonomous behaviors. Behaviors that are intrinsically necessary to the optimum use of the new learning technologies (Asakawa, 2010).

The digital tool used for such measurements was the Learning Management System, Moodle since it is a tool designed to create online training courses and programs and it is the most used system in virtual learning at a higher education level.

The study carried out by Puello, Fernández & Cabarcas in 2014 detects the learning styles obtained with Moodle, where it analyzes the different points: 1) the curricular content (defined topic and pre-established objectives), 2) the virtual classrooms and the existing materials (infrastructure) and 3) the level and learning style of the students. He also comments on the importance of "it is taught" (curriculum), "how" it is taught (virtual teaching environment) and "it is learned" (assimilation of the curriculum by the student) and "how" it is learned (learning strategies) . Although it is a very complete study, it does not contemplate the emotions generated using Moodle.



There are other studies that tell us about the benefits of virtual learning, such as personalized learning which implements specific learning by promoting the forms and channels required by the learning process (Robles, Galicia & Sánchez, 2017). The flow experience identified in educational systems (Oliveira, *et al.*, 2019). Connected learning and online learning that allows the empowerment and creation of new knowledge (Reig, 2016). Global telecommunication allows the user to receive, transform and emit new knowledge, as well as collaborating with the knowledge culture in a comfortable way (Peleta, Ettisb & Cowart, 2017).

The focus is on the learning benefits of the student but the teaching-learning process has two actors 1) A teacher or tutor, who has didactic qualities (teaching strategies) and human inputs (cordial, flexible, tolerant, respectful, authentic, honest and empathetic), (Hernández, 2017) 2) The student or apprentice must be committed to achieving their objectives accompanied by individual reflection and learning strategies appropriate for their learning area (Roux & Ansurez, 2015).

Due the complexity of the virtual teaching-learning process, the contribution made by this study is to analyze the emotions of fluidity or comfort of teachers and students in the scenario of the Learning Management System, Moodle, because emotions generate the permanence factor for the generation and acquisition of knowledge.

### 1.1. Moodle, Learning Management Systems

The Learning Management System (LMS), by far the most widely used system in education, currently contains 174 million users located in 232 countries ([https:// stats.moodle.org/](https://stats.moodle.org/))

Moodle is derived from the English term Modular Object-Oriented Dynamic Learning Environment. It was created by Martin Dougiamas in 2002, based on the "social constructionist pedagogical theory" corresponding to the philosophy of cooperative learning. (<https://moodle.org/>).

Moodle is software that is installed on a web server to create educational virtual campuses. It is commonly used in universities and educational training centers. Moodle is an open source or public domain platform that generally does not require payment for its use. But sometimes, the specialization of the content requires maintenance and specialized personnel for its proper performance. (<https://moodle.org/>).

Moodle has a simple interface, divided into modules that optimize use for teachers or tutors. It is involved in: a) administrative and academic management, b) communication management, c) management of the teaching and learning process and d) management of evaluation and monitoring processes. (<https://moodle.org/>).

The advantages of learning in Moodle increase retention by 60% and online participation is five times higher than face-to-face (<https:// stats.moodle.org/>).



Moodle promises to create positive and comfortable environments for users. Therefore, this study aims to measure and compare the flow or comfort experiences of users of this educational platform.

## 1.2. Theory of fluidity or comfort

The theory of fluidity or comfort was used to understand the great acceptance of Moodle in users of educational platforms because through its constructs (nine dimensions) was explained the behaviors of motivation and self-sufficiency, generating significant learning (Arteaga & Duarte. 2010).

The Flow Theory was initiated in 1975 by Csikszentmihalyi, who explains the association between learning and rewards (Csikszentmihalyi, 2014). The author links sports, artistic activities or board games with immediate reward, with the increase of motivation and self-sufficiency in learning.

The rise of the Internet led to the appearance of several studies that associate the Flow Theory, the use of ICTs and the Internet tools resulting in the study of the implications of psychological flow in motivation levels and feelings.

In 2018, dos Santos *et al.*, carried out a documentary research with 57 studies, analyzed through StArt (State of the Art through Systematic Reviews). To find out if Flow Theory was the conceptual framework that could explain the use of Digital Information and Communication Technologies (DICT) in Education. The documentary research was based on the categories previously elaborated by Bittencourt, in 2016, in order to have a frame of reference, which are educational software platform, educational system, learning environment, web-based learning, semantic web-based education, collaborative learning, adaptive hypermedia, intelligent tutoring system and distance education and educative game.

Within the analysis, several research questions associated with motivational descriptors are considered. Question 2: "How have computer-based learning activities been designed to bring students into the flow state? (dos Santos *et al.*, 2018, p. 35).

"The response identifies the teaching strategies that are used to create learning activities to guide students to the flow state" (dos Santos *et al.*, 2018, p. 35).

Question 2 is appropriate for the analysis in this study because it highlights teaching activities that are a topic little studied in computer-based education. It focuses on learning and its sensation of flow and comfort. Leaving aside the designer (teacher, tutor or who), and focusing on the learning management system, Moodle.

Here we are measuring the whole teaching and learning process. The teaching is directly proportional to the skills that the designer has. Learning will depend on the design of activities that lead to the flow state in students (González, *et al.*, 2019).



Moodle has didactic and communication tools within the website which enables the acquisition of knowledge. Every program has its rules of proper use, which are specified in the Moodle manuals (depending on version and user). [https://docs.moodle.org/all/es/Manuales\\_de\\_Moodle](https://docs.moodle.org/all/es/Manuales_de_Moodle)

This allows the development of appropriate personal skills, concentration on the object, participation, enjoyment, control of the situation (Csikszentmihalyi, 2014). Flow is known as a state that is "characterized by pleasant experiences, concentration, immersion and intensive participation" (Chen, 2006: p 222).

The intrinsic interest is also related to personal development and future goals to be achieved. Therefore, learning must have a defined meaning, motivating the learner to know more about the subject (Csikszentmihalyi, 2014).

Flow theory presents nine dimensions, when the user experiences all nine he is in the macro-flow state; and when he experiences some of the nine, he is in the micro-flow state (Jackson & Csikszentmihalyi, 2002).

## 2. METHOD

Non-experimental design, exploratory by electronic survey, cross-sectional cut, quantitative analysis with descriptive and inferential statistics for comparison of two groups.

Sample of 8140 participants, divided in two groups of (320 teachers and 7820 students) who were surveyed through an electronic link located <https://s.surveypal.com/EYiJNllq>

### Hypothesis

H1 There are significant differences at the  $p < 0.05$  level in the nine Flow dimensions between the teacher group and the student group in the use of the Learning Management System, Moodle.

H0 There are no significant differences at the  $p < 0.05$  level in the nine Flow dimensions between the teacher group and the student group in the use of the Learning Management System, Moodle.

### 2.1. Material

#### Brief Inventory of Optimal Experiences (Flow)

The objective of this study was to evaluate the teaching learning process within Moodle, Learning Management System with the Systematized Short Inventory of Optimal Experiences test, which measured and compared the flow or comfort experiences of the population of 8140 participants.



The development of the inventory was based on nine original Flow dimensions proposed by Csikszentmihalyi in the 1990s.

It measures the existence of positive experiences before an event.

Standardized in Spanish-speaking population by García-Calvó *et al.* in 2008 and standardized in Latino population by Calero & Injoque in 2013. That developed and tested the brief inventory with nine items, associated to each of the Flow dimensions.

Validity, positive correlation is significant (Spearman's Rho 0.694;  $p < 0.001$ ) and negative correlation is significant (Spearman's Rho -0.459;  $p < 0.001$ ). Cronbach's Alpha reliability, positive by 0.86 and negative by 0.72 (Calero & Injoque, 2013).

Items and dimension:

"1) While performing the activity I forget about problems and worries (Loss of self-awareness); 2) I have a good idea, when I am performing the activity, about how well I am doing (Clear and direct feedback); 3) I do things spontaneously and automatically without having to think about them (Union between action and consciousness); 4) I have total concentration (Concentration on the present task); 5) The way time passes seems to be different from normal (Deformation in time perception); 6) I feel that I am competent enough to meet the demands of the situation (Balance between perceived ability and the challenge posed by the activity); 7) The experience is extremely rewarding (Autotelic experience); 8) I have a feeling of total control (Feeling or perception of control); 9) I have a broad sense of what I want to do (Clear goals)" (Calero & Injoque, 2013:11).

Evaluation: On a Likert scale of 5 answers ranging from "Strongly agree" (with 5 points) to "Strongly disagree" (with 1 point).

Interpretation:

Ranges: between 45 to 34, optimal experience; between 33 to 22, defined as average experience and between 21 to 9, defined as low experience.

## 2.2. Procedure

Phase 0. Systematization of the Brief Inventory of Optimal Experiences (Flow) on the website <https://s.surveypal.com/EYiJNllq>

Phase 1. Promotion of the website within the state university through the local administrators of the Learning Management System, Moodle. The participation was compulsory due the need to determine the continuity of the use of Moodle within the educational institution.

Phase 2. Survey application to teachers and students, via online. It is important to clarify that such online survey encloses a box for informed consent and use of confidential data.



Face 3. Database extraction from the online survey. A total sample of 8140 participants was obtained, divided into 320 teachers and 7820 students.

Phase 4. Analysis of the data:

Quantitative analysis: a) Descriptive statistics, we used frequency and percentage measures for the characteristics of the sample in age, gender, undergraduate and postgraduate entities. b) Normal distribution of the sample is evaluated with the K-S test, obtaining  $D = 0.1108$ ,  $p\text{-value} = 0.9950$ , alternative hypothesis: two-sided. c) Inferential statistics, in order to know the normality of the populations, the homoscedasticity test of the variances was used in both groups through the Levene test,  $F = 0.309$  (Wohlin, *et al.*, 2012). Experimentation in software engineering. Springer Science & Business Media. Meeting the normal distribution requirement in the two populations, it was decided to use the T Test for independent samples, comparing the means between the two independent groups (teachers and students).

### 3. RESULTS

- > Descriptive statistics were carried out to obtain the main socio-demographic characteristics of the sample: male teachers between the ages of 36-40 years and male students between the ages 21-22 years. (see table 1).

Table 1. Sample characteristics by age and gender

Teachers 320						
Age	n	%	Male	%	Female	%
20-25 years	19	6%	9	3%	11	3%
26-30 years	81	25%	49	15%	31	10%
31-35 years	37	12%	21	7%	19	6%
36-40 years	103	32%	60	19%	40	13%
41-45 years	30	9%	21	7%	9	3%
46-50 years	10	3%	8	3%	2	1%
51 - more years	40	13%	30	9%	10	3%
total	320	100%	200	63%	120	38%
Students 7820						
Edad	n	%	Male	%	Female	%
18-20 years	1681	21%	959	12%	720	9%
21-22 years	2130	27%	1570	20%	560	7%
23-24 years	1839	24%	1131	14%	710	9%
25 -26 years	970	12%	580	7%	390	5%
27 more years	1200	15%	780	10%	420	5%
total	7820	100%	5020	64%	2800	36%

Source: Own research, 2020



- > Descriptive statistics were carried out to obtain the main academic characteristics of the sample, namely Teachers and Students of blended learning, Computer Engineering (CE) university degrees and intermediate academic level (see table 2)

Table 2. Characteristics of the sample by type of education, degree and semester

Teachers in blended learning 213 and distance learning 107								
n=320								
University degrees	Semesters		novices		intermediate		experienced	
	n	%		%		%		%
ADD	20	6%	2	1%	10	3%	8	3%
ACD	60	19%	21	7%	29	9%	10	3%
LD	20	6%	3	1%	10	3%	7	2%
PSD	20	6%	1	0%	10	3%	9	3%
SD	10	3%	0	0%	10	3%	0	0%
PD	30	9%	8	3%	10	3%	12	4%
TD	20	6%	2	1%	15	5%	3	1%
ND	10	3%	1	0%	8	3%	1	0%
ARD	20	6%	9	3%	10	3%	1	0%
ID	10	3%	10	3%	0	0%	0	0%
CE	100	31%	30	9%	40	13%	30	9%
<b>Total</b>	<b>320</b>	<b>100%</b>	<b>80</b>	<b>25%</b>	<b>160</b>	<b>50%</b>	<b>81</b>	<b>25%</b>

  

Teachers in blended learning 5324 and distance learning 2498								
n=7820								
University degrees	Semesters		novices		intermediate		experienced	
	n	%		%		%		%
ADD	870	11%	12	0%	414	5%	454	6%
ACD	1080	14%	310	4%	520	7%	250	3%
LD	410	5%	50	1%	151	2%	211	3%
PSD	380	5%	81	1%	200	3%	99	1%
SD	760	10%	0	0%	335	4%	425	5%
PD	1090	14%	320	4%	715	9%	55	1%
TD	750	10%	21	0%	439	6%	330	4%
ND	230	3%	80	1%	150	2%	0	0%
ARD	610	8%	240	3%	299	4%	71	1%
ID	350	4%	266	3%	70	1%	14	0%
CE	1290	16%	670	9%	420	5%	200	3%
<b>Total</b>	<b>7820</b>	<b>100%</b>	<b>1900</b>	<b>24%</b>	<b>3880</b>	<b>50%</b>	<b>2040</b>	<b>26%</b>

ADD=Administration Degree, ACD=Accountancy Degree, LD=Law Degree, PSD=Political Science Degree, SD=Sociology Degree, PD=Psychology Degree, TD=Tourism Degree, ND=Nursing Degree, ARD=Architecture Degree, IE=Industrial Engineering and CE=Computer Engineering

Source: Own research, 2020



- > Inferential statistics, the T-test was used for independent samples, comparing the means between two independent groups, one of teachers and another of students.
  - Significant difference  $p < 0.05$  was observed in dimension 1) While performing the activity I forget about problems and worries (Loss of self-awareness). In this dimension the teachers consider having a teaching problem to solve, which has three spheres: a) mastering the subject, b) implementing didactic strategies and c) editing and selecting the appropriate activities or resources to teach the subject with the educational platform. While the students do not consider having a problem because they need to follow the indications and concentrate to obtain the learning (see table 3).
  - There is also a significant difference  $p < 0.05$  in dimension 3) I do things spontaneously and automatically without having to think about them (Union between action and awareness), because the teacher must think and structure the learning within the educational platform. While the student simply executes it and many times integrates it to other virtual activities (see table 3).

Table 3: T-test for independent samples in the Short Inventory of Optimal Experiences (Flow)

Teachers 320 and students 7820 n=8140						
Optimal Experience Dimensions (Flow)	Participants	Level	Frequency	$\bar{x}$	$\bar{x}_1 - \bar{x}_2$	p
1) I forget about the problems and worries while I am doing the activity	Teachers	M	1MT	30.25	8.54	0.04368
	Students	O	1OS	38.79		
2) I have a good idea, when I am doing the activity, about how well I am doing	Teachers	M	2MT	28.1	8.15	0.06253
	Students	O	2OS	36.25		
3) I do things spontaneously and automatically without having to think	Teachers	M	4MT	28.67	11.12	0.02844
	Students	O	4OS	39.79		
4) I have total concentration	Teachers	O	1OT	37.27	6.73	0.08606
	Students	M	1MS	30.54		
5) The way time passes seems to be different from normal	Teachers	M	3MT	31.24	3.77	0.08678
	Students	O	3OS	35.01		
6) I feel I am competent enough to meet the demands of the situation	Teachers	M	5MT	27.43	5.36	0.08225
	Students	O	5OS	32.79		
7) The experience is extremely rewarding	Teachers	M	6MT	31.25	8.50	0.05128
	Students	O	6OS	35.79		
8) I have a feeling of total control	Teachers	M	7MT	26.32	7.47	0.07642
	Students	O	7OS	33.79		
9) I have a broad sense of what I want to do	Teachers	O	2OT	34.28	4.11	0.08409
	Students	O	8OS	38.39		

O=Optima Experience, M=Medium Experience, S=Students, P=Professors

Source: Own research, 2020



#### 4. DISCUSSION AND CONCLUSION

The study focused on analysing the existence of significant differences between the group of teachers and the group of students in terms of the experiences of fluidity and comfort lived in the process of virtual teaching-learning, carried out through the Learning Management System, Moodle.

The most frequent characteristics of the population were: mixed learning, university degree in computer engineering and intermediate semester level. It is important to note that the entire population behaved as a block (presenting a normal distribution), without showing a significant difference between the blended learning and distance learning groups (Hong, *et al.*, 2019)

Moodle is designed under the social constructivist pedagogical theory, basis of cooperative learning and the Brief Inventory of Optimal Experiences (Flow), is designed under the positivist theory of reinforcement and feedback (Jackson & Csikszentmihalyi, 2002; Vázquez & Hervás, 2017). Both theories refer to high levels of learning, empowerment and participation in knowledge.

The study allowed us to know the teachers' teaching experiences and students' learning experiences in the Moodle environment. But above all, it allowed us to spot the optimal experiences in the teaching-learning process and Subjective Well-Being (Collins, Sarkisian & Winner, 2009; Fernández, Pérez, & González, 2013).

There are studies that show that virtual learning in blended and distance education has many advantages because students show significant knowledge acquisition by improving attention, memory, and problem-solving skills, leading to proactive and autonomous behavior, as long as virtual tools are being used properly (Vallejo, 2017; Oliveira, *et al.*, 2019). While there are other studies that mention that non face-to-face teaching affects education because it affects personal relationships and teaching. The use of technological tools for face-to-face learning can improve learning (Arteaga & Duarte, 2010). Therefore, it can be observed that both support the use of electronic tools in education and improvements in learning.

The results obtained showed that students have a greater number of optimal experiences than teachers, as students refer to the educational platform as an interactive environment that helps them learn, interweaving it with their educational infrastructure to train them (Reig, 2019; Meseguer-Artola & Rodríguez-Ardura, 2019).

While teachers present a greater number of average experiences, because teachers focus on turning their curriculum into an educational platform with all its didactic and updating features, which allows them to be at the forefront of technological and educational advances (Arranz, Aguado & Lucia, 2008; González *et al.*, 2019).

According to flow theory we can say, the amount of positive experiences obtained by students are in the macro flow state, while teachers are in the micro flow state (Jackson & Csikszentmihalyi, 2002). Therefore, the hypothesis, the true hypothesis is accepted because if there is a significant difference in the levels of  $p < 0.05$ , it is observed in two flow dimensions:



1) while performing the activity, I forget about the problems and concerns. 2) I do things spontaneously and automatically without having to think, about them 95% difference between the teacher group and the student group in the use of Moodle. There is another similar 3) The experience is extremely rewarding with 94% difference, which closes the experience. Showing a responsibility that needs to be recognized.

So, we can say that the teachers or tutors do not flow because they do not reach the level of comfort when they are teaching. Positivist theories tell us that happiness is found when positive feedback is achieved (Ozkan & Koseler, 2009). Argument that explains why teachers or tutors are energetic about the teaching process. Teachers want to see that their students have learned, because that is their feedback on the teaching. The teachers do not finish their process until their feedback arrives and that is why in the period, they are teaching they are in micro-flow (Seligman, 2003;).

Observing the characteristics of the population studied, we can say that 40% of the teachers subject to this study are in the exact sciences field, where no errors can the students and this makes them more energetic and rigid (Vázquez & Hervás, 2017). Flow and comfort meet with mastery; teachers do not master the learning process, because it corresponds to another actor, the student (dos Santos, *et al.*, 2018).

The Learning Management System, Moodle, is a challenge that can be achieved, with knowledge, effort and dedication, because Moodle is well designed to help organize, complement, evaluate and monitor (Ros, 2008).

Reaffirming the position of the student, who is empowered by digital systems to be part of a post-millennium generation, where concentration and manipulation of learning in digital environments are part of daily life (Rodríguez-Ardura & Meseguer-Artola, 2019; Oliveira, *et al.*, 2019). While teachers have to think to solve the problems and concerns that their role of tutor and guide demands, in: 1) domination of knowledge, 2) domination of pedagogy and 3) domination of technology to use the most appropriate tool, for the acquisition of meaningful knowledge. Here we can talk about Technology, Pedagogy and Content Knowledge (TPACK) in teachers (Guay, Ratelle & Chanal, 2008; Cabero & Barroso, 2016).

The difference between both groups in terms of fluency will go hand to hand with the positive feedback that characterizes the comfort and continuity of the experience (Seligman, 2003).

Analyze how experiences flow within the teaching-learning process in the users (teachers and students). It allowed to know the similar behavior in seven dimensions and a significant difference in two dimensions before the use of Moodle.

The results reflect that students and teachers do not have the same feeling of fluidity or comfort with the teaching-learning process. While the student is in Macro flow because he receives and dominates the technology, the teacher is in Micro flow due the following two factors: 1) Teaching in digital systems represents greater dedication because teachers must master the pedagogy, the subject and the digital platform. 2) Teachers do not get positive feedback through the digital channel because the results are correlated with the learning,



which corresponds to the student. The demanding attitude and strictness shown by teachers are according to the need to control the learning process. This being the positive feedback that the teacher wishes to obtain. Therefore, the optimal experience will emerge after the teaching process.

As far as we can see, the Moodle Learning Management System is fulfilling its goal of supporting the teacher, but the challenge is great. The flow experienced by the teacher will depend on subject knowledge, e-learning techniques and the appropriate use of Moodle, although comfort will depend on positive feedback on teaching outcomes.

## 5. REFERENCES

- Arranz, V., Aguado, D. & Lucía, B. (2008). La influencia del tutor en el seguimiento de programas elearning. Estudio de acciones en un caso práctico. *Revista de Psicología del Trabajo y de las Organizaciones*, 24(1), 5–23. <https://doi.org/10.4321/S1576-59622008000100001>
- Arteaga, S. & Duarte, H. (2010). Motivational factors that influence the acceptance of Moodle using TAM. *Computers in Human Behavior*. 26(6), 1632-1640. <https://doi.org/10.1016/j.chb.2010.06.011>
- Asakawa, K. (2010). Flow Experience, Culture, and Well-being: How do Autotelic Japanese College Students Feel, Behave, and Think in Their Daily Lives? *Journal of Happiness Studies*, 11(2), 205-223. <https://doi.org/10.1007/s10902-008-9132-3>
- Bittencourt, I. I., Baranauskas, M., Pereira, R., Dermeval, D., Isotani, S., & Jaques, P. (2016). A systematic review on multi-device inclusive environments. *Universal Access in the Information Society*, 15(4), 737-772. <https://doi.org/10.1007/s10209-015-0422-3>
- Cabero, J. & Barroso, J. (2016). ICT teacher training: a view of the TPACK model / Formación del profesorado en TIC: una visión del modelo TPACK, *Cultura y Educación*, 28(3), 633-663. <https://doi.org/10.1080/11356405.2016.1203526>
- Calero, A. & Injoque-R, I. (2013). Propiedades psicométricas del Inventario Breve de Experiencias Óptimas (Flow). *Evaluar*, 13, 40 – 56. <https://doi.org/10.35670/1667-4545.v13.n1.6796>
- Chen, H. (2006). Flow on the net-detecting Web users' positive effects and their flow states. *Computers in Human Behavior*, 22, 221-233. <https://doi.org/10.1016/j.chb.2004.07.001>
- Collins, A. L., Sarkisian, N. & Winner, E. (2009). Flow and Happiness in Later Life: An Investigation into the Role of Daily and Weekly Flow Experiences. *Journal of Happiness Studies: An Interdisciplinary Forum on Subjective Well-Being*, 10(6), 703–719. <https://doi.org/10.1007/s10902-008-9116-3>
- Csikszentmihalyi, M. (2014). *Flow and the Foundations of Positive Psychology Mihaly Csikszentmihalyi The Collected Works of Mihaly Csikszentmihalyi*. New York London, Springer Dordrecht Heidelberg. <https://doi.org/10.1007/978-94-017-9088-8>
- dos Santos W., Bittencourt, I. I., Dermeval, D., Isotani, S., Marques, L., & Silveira, I. (2018). Flow Theory to Promote Learning in Educational Systems: Is it Really Relevant? *Brazilian Journal of Computers in Education*, 26(2), 29-59. DOI: <http://dx.doi.org/10.5753/rbie.2018.26.02.29>



- Reig, D. (2016). TIC, TAC, TEP: internet como escuela de vida. *Cuadernos de pedagogía*, 473, 24-27. <https://dialnet.unirioja.es/servlet/autor?codigo=701093>
- Reig, D. (2019). Educando la empatía global con ayuda de las tecnologías. *Cuadernos de pedagogía*, 495, 108-109. <https://dialnet.unirioja.es/servlet/autor?codigo=701093>
- Fernández, M. P., Pérez, N. M. & González O. H. (2013). Efecto del flujo y el afecto positivo en el bienestar psicológico. *Boletín de Psicología*, 107, 71-90. <https://www.uv.es/seoane/boletin/previos/N107-4.pdf>
- García-Calvó, T., Jiménez, C. R., Santos-Rosa, F., Reina, R. & Cervelló, E. (2008). Psychometric Properties of the Spanish Version of the Flow State Scale. *The Spanish Journal of Psychology*, 11(2), 660-669. <https://revistas.ucm.es/index.php/SJOP/article/view/SJOP0808220660A/28755>
- González J., López C., Trujillo M. & Bautista L. (2019). Instrumento certificador de tecnologías de la información y comunicación y tecnologías del aprendizaje y el conocimiento para docentes universitarios. *Revista Interamericana para la Investigación y el Desarrollo Educativo*, 10(19). <https://doi.org/10.23913/ride.v10i19.516>
- Guay, F., Ratelle, C. F. & Chanal, J. (2008). Optimal learning in optimal contexts: The role of self-determination in education. *Canadian Psychology*, 49, 233-240. <https://doi.org/10.1037/a0012758>
- Hernández, R. M. (2017). Impacto de las TIC en la educación: Retos y Perspectivas. *Propósitos y Representaciones*, 5(1), 325 – 347. <http://dx.doi.org/10.20511/pyr2017.v5n1.149>
- Hong, J., Tsai, C., Hsiao, H., Chen, P., Chu, K., Gu, J. & Sitthiworachart, J. (2019). The effect of the “Prediction-observation-quiz-explanation” inquiry-based e-learning model on flow experience in green energy learning. *Computers & Education*, 133(1), 127-138. <https://www.learntechlib.org/p/208165/>.
- Jackson, S. & Csikszentmihalyi, M. (2002). *Fluir en el Deporte. Claves para las experiencias y actuaciones óptimas*. Barcelona: Editorial Paidotribo.
- Meseguer-Artola, A. & Rodríguez-Ardura, I. (2019). Flow experiences in personalised e-learning environments and the role of gender and academic performance. *Interactive Learning Environments*, 1, 1-24. <https://doi.org/10.1080/10494820.2019.1572628>
- Oliveira, W., Toda, A., Palomino, P., Rodrigues, L., Isotani, S., & Shi, L. (2019). Towards Automatic Flow Experience Identification in Educational Systems: A Theory-driven Approach. *Extended Abstracts of the Annual Symposium on Computer-Human Interaction in Play Companion Extended Abstracts*. 581-588. <https://dl.acm.org/doi/abs/10.1145/3341215.335631>
- Ozkan, S. & Koseler, R. (2009). Multi-dimensional students’ evaluation of e-learning systems in the higher education context: An empirical investigation. *Computers & Education*, 53(4), 1285–1296. <https://doi.org/10.1016/j.compedu.2009.06.011>
- Peleta, J.É., Ettisb, S., & Cowart, K. (2017). Optimal experience of flow enhanced by telepresence: Evidence from social media use. *Information & Management*, 54, 115-128. <https://dl.acm.org/doi/abs/10.1016/j.im.2016.05.001>



- Puello, P., Fernández, D. & Amaury, C. (2014). Herramienta para la detección de estilos de aprendizaje en estudiantes utilizando la plataforma MOODLE, *Formación Universitaria*, 7(4), 15-24. <http://dx.doi.org/10.4067/S0718-50062014000400003>
- Robles, F., Galicia, I. & Sánchez, A. (2017). Orientación temporal, autorregulación y aproximación al aprendizaje en el rendimiento académico en estudiantes universitarios. *Revista Electrónica de Psicología Iztacala*, 20(2), 502-518. <https://www.iztacala.unam.mx/carreras/psicologia/psiclin/vol20num2/Vol20No2Art6.pdf>
- Rodríguez-Ardura, I., & Meseguer-Artola, A. (2019). Flow experiences in personalised e-learning environments and the role of gender and academic performance. *Interactive Learning Environments*, 1-24. <http://hdl.handle.net/10609/112546>
- Ros, I. (2008). Moodle, la plataforma para la enseñanza y organización escolar. Ikastorratza, e- *Revista de Didáctica* 2, 1-12, Didáctica de la Expresión Corporal. Escuela de Magisterio Vitoria. UPV / EHU. <http://hdl.handle.net/10810/6876>
- Roux R. & Anzures, E. (2015). Estrategias de aprendizaje y su relación con el rendimiento académicos en estudiantes de una escuela privada de educación media superior. *Revista Actualidades Investigativas en Educación*, 15(1), 1-16. <http://dx.doi.org/10.15517/aie.v15i1.17731>
- Seligman, M.E.P. (2003). *La auténtica felicidad*. Barcelona, España: Vergara.
- Vallejo, Flores K. M. (2017): Aplicación de plataformas educativas para maximizar el rendimiento académico en los jóvenes estudiantes, *Revista Atlante: Cuadernos de Educación y Desarrollo. Segunda época*. 1-10. <http://www.eumed.net/rev/atlante/2017/07/plataformas-educativas.html>
- Vázquez, C. & Hervás G. (2017). *Fundamentos de la Psicología Positiva*, Capítulo II, La complejidad de las emociones positivas, 47-74, Madrid, Alianza.
- Wohlin, C., Runeson, P., Höst, M., Ohlsson, M. C., Regnell, B., & Wesslén, A. (2012). *Experimentation in software engineering*. New York. Springer Science & Business Media.

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