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Transforming a class from the Psychology degree into a flipped classroom

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Resumen
La *flipped classroom* es una metodología docente que trata de modificar la dinámica de la clase tradicional, en la que el alumnado estudia la materia antes de asistir a clase (fundamentalmente mediante Tecnologías de la Información y Comunicación), y el tiempo en el aula se emplea para clarificar contenidos y realizar actividades significativas, con el apoyo continuado del profesorado. Estudios recientes muestran que se han obtenido resultados positivos respecto a la utilización de esta metodología. Sin embargo, la implantación de esta metodología en el grado en Psicología es escasa. Por ello, el objetivo de este trabajo fue aplicar la metodología *flipped classroom* en un tema de la asignatura Psicopatología, y comparar su efectividad con una clase tradicional. Participaron 87 alumnos/as (*M* = 23.02; *DT* = 7.88 años, 73.1% mujeres) del grado en Psicología de la Universitat de València. En la condición *flipped classroom* (*n* = 47), la exposición de la materia se realizaba a través de un vídeo que el alumnado visualizaba en casa, y en el aula se evaluaban y clarificaban contenidos (mediante la plataforma *Kahoot!*), y se realizaban actividades significativas en pequeños grupos. En la condición *tradicional* (*n* = 40), se impartió una clase magistral, se evaluaron y clarificaron los contenidos a través de la plataforma *Kahoot!*, y se propuso la realización de las actividades significativas en casa. El alumnado de cada condición evaluó el interés, utilidad y dificultad de cada uno de los componentes de las metodologías en una encuesta tipo Likert, que además contenía dos preguntas abiertas. Asimismo, se evaluó el nivel de conocimientos adquiridos, tanto a través de la plataforma *Kahoot!* como del examen final de la asignatura. No se observaron diferencias significativas entre ambas condiciones respecto a los contenidos adquiridos evaluados a través del examen de la asignatura. Sin embargo, la realización de las actividades en grupo y en el aula, junto con la presencia del profesorado durante la realización de las mismas, disminuyeron la dificultad percibida, y se observaron comentarios positivos por parte del alumnado respecto a la metodología *flipped classroom*.

Palabras clave: Flipped Classroom; Metodología docente; Tecnologías de la Información y la Comunicación; Psicopatología.

Resum
La *flipped classroom* és una metodologia docent que tracta de modificar la dinàmica de la classe tradicional, en la que l'alumnat estudia la matèria abans d'assistir a classe (fonamentalment per mitjà de les Tecnologies de la Informació i Comunicació), i el temps en l'aula s'empra per a aclarir continguts i realitzar activitats significatives, amb el suport continuat del professorat. Estudis recents mostren que s'han obtingut resultats positius respecte a la utilització d'aquesta metodologia. No obstant això, la implantació d'aquesta metodologia en el grau en Psicologia és escassa. Per això, l'objectiu d'aquest treball va ser aplicar la metodologia *flipped classroom* a un tema de l'assignatura Psicopatologia, i comparar la seua efectivitat amb una classe tradicional. La mostra va estar composta per 87 alumnes (*M* = 23.02; *DT* = 7.88 anys, 73.1% dones) del grau de Psicologia de la Universitat de València. En la condició *flipped classroom* (*n* = 47) l'exposició de la matèria es realitzava a través d'un vídeo que l'alumnat visualitzava a casa, i en l'aula s'avaluaven i aclarien continguts (per mitjà de la plataforma *Kahoot!*) i es realitzaven activitats significatives en xicotets grups. En la condició tradicional (*n* = 40), es va impartir una classe magistral, es van avaluar i aclarir els continguts a través de la plataforma *Kahoot!*, i es va proposar la realització de les activitats significatives per a casa. L'alumnat de cada condició va avaluar l'interès, utilitat i dificultat de cada un dels components de les metodologies en una enquesta tipus Likert, que a més contenia dos preguntes obertes. Així mateix, es va avaluar el nivell de coneixements adquirits tant a través de la plataforma *Kahoot!* com a l'examen final de l'assignatura. No es van

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observar diferències significatives entre ambdós condicions respecte als continguts adquirits a través de l'examen de l'assignatura. No obstant això, la realització de les activitats a l'aula en grups, junt al professorat, va disminuir la dificultat percebuda de les mateixes, i es van observar comentaris molt positius per part de l'alumnat respecte a la metodologia *flipped classroom*.

Paraules clau: Flipped Classroom; Metodologia docent; Tecnologies de la informació i comunicació; Psicopatologia.

Abstract

The flipped classroom is a teaching methodology that changes the dynamics of the traditional class. Students study course material prior to attending class (mainly through Information and Communication Technology), and class time is used to clarify content and do meaningful activities with the teacher's support. Recent studies show that positive results have been obtained using this methodology; however, its implementation in the Psychology degree is scarce. The aim of this study was to use the flipped classroom methodology in a lesson of a Psychopathology course and compare its effectiveness with that of a traditional class. The sample was composed of 87 undergraduate Psychology students (M = 23.02, SD = 7.88 years, 73.1% women) at the University of Valencia. In the flipped classroom condition (n = 47), the lesson was explained through a video lecture that students viewed at home. Class time was used to assess acquired knowledge and clarify content (using the Kahoot! platform) and do meaningful activities in small groups. The traditional condition (n = 40) consisted of an in-class lecture, followed by an assessment of acquired knowledge and clarification of content through the Kahoot! platform. Activities were then done at home. Students rated interest, usefulness, and difficulty of the components of each methodology by means of a Likert scale with two open-ended questions. Likewise, the level of acquired knowledge was assessed through the final exam. No significant differences between conditions were found in acquired knowledge (assessed through the Kahoot! platform or the final exam). However, working on meaningful activities in small groups with the teacher's support decreased the perceived difficulty of these activities, and students made positive comments about the flipped classroom methodology.

Keywords: Flipped Classroom, Teaching methodology; Information and Communication Technology; Psychopathology.

1 Introduction

The flipped classroom (also known as the inverted classroom) is a teaching methodology that changes the dynamics of the traditional classroom because students study course material prior to attending class. First, the teacher provides materials (e.g. reading articles, short videos, etc.), mainly through Information and Communication Technology (ICT). Subsequently, class time is used to clarify content and do activities that promote meaningful learning (e.g. case studies, debates, online tests that provide immediate feedback to students and the teacher), i.e. activities that facilitate integration of content through active, cooperative learning, with ongoing teacher support.

Thus, theoretical content, traditionally taught in the classroom, is done out of class with this methodology; activities traditionally done at home are now carried out in the classroom (Bergmann & Sams, 2012). Bishop and Verleger (2013) describe it as a pedagogical technique consisting of two elements: interactive group activities within the classroom and direct individual instruction supported through technology outside of class. Revision of the literature carried out by O'Flaherty and Philips (2015) shows that while there is no single model of the flipped classroom, it is characterised by the following elements: course material is studied beforehand (usually via a video lecture recorded by the teacher); the teacher is aware if students have adequately understood the lesson; and higher-order cognitive learning takes place. Furthermore, proper implementation of this method encourages students to think critically while they engage in active learning both in and out of the classroom.

Different studies indicate that the flipped classroom methodology provides several benefits due to its flexible format enabling students to follow their own pace (Johnson, 2013), and it allows for more individualised teaching (McDonald & Smith, 2013). It also boosts teacher-student interaction when students need to apply what they have learnt (Bergmann & Sams, 2012; Johnson, 2013), given that class time is dedicated to student-centred learning activities (e.g. problem solving). Teachers do not spend class time transmitting information. Instead, they help students overcome difficulties during the application of theoretical knowledge. More engaged learning takes place (Bergmann & Sams, 2012) because each student decides his/her own pace and the amount of course material to study prior to class. Students are responsible for attending classes, having studied the basic concepts in advance in order to be able to follow class activities or discussions.

The flipped classroom methodology became popular by chemistry teachers Jonathan Bergmann and Aaron Sams (2009), among others. Since then, several studies in the field of health sciences have obtained positive results regarding the use of this methodology in the classroom (e.g. Domínguez et al., 2015; Gilboy et al., 2015; McLaughlin et al., 2014; Missildine et al., 2013; Morton & Colbert-Getz, 2016; Street et al., 2015). In the field of psychology, in particular, a study was conducted with first year undergraduate students in a Social Psychology course (based on traditional methodology) and in a Clinical Psychology course (based on the flipped classroom) consecutively. During the flipped classroom methodology, students were required to view a video lecture and do activities prior to class in order to prepare for a class discussion. At the end of the semester, students reported that this methodology was more enjoyable and had helped them to develop their comprehension to a greater extent (Limniou et al., 2015). Along the same lines, Jordán et al. (2014) studied the impact of using the flipped classroom in a mathematics course at a Spanish university, concluding that this methodology was, in general, attractive for students. These results are consistent with previous literature (e.g. Bishop & Verleger, 2013), which reveals positive student opinions. Students show preference for in-class lectures, but at the same time they show preference for incorporating interactive activities in the classroom (versus traditional classes) (Bishop & Verleger, 2013). However, a recent revision of the studies (O'Flaherty & Philips, 2015) that compare the flipped classroom method and the traditional method indicated that there

are few studies that strongly demonstrate the flipped method to be more effective than the traditional method. It is necessary to carry out more longitudinal studies that assess learning outcomes and use other indicators of student engagement in the learning process.

2. Objectives

The aim of this paper was to implement and assess the flipped classroom teaching methodology (flipped classroom condition) in a lesson of a Psychopathology course from the Psychology degree and compare it to the same lesson that followed the traditional method (traditional condition). Specific objectives consisted of analysing: 1) differences in usefulness, interest and difficulty assigned to the components of each teaching methodology used; 2) relationships between usefulness, interest and difficulty assigned to the components of each methodology, and the variables of age and level of acquired knowledge; 3) if usefulness, interest and difficulty assigned to the explanation of content moderated the relationship between the condition (flipped classroom versus traditional methodology) and the level of acquired knowledge; 4) the difference in the level of acquired knowledge according to the type of methodology used; and 5) the qualitative assessment by students regarding each methodology.

3. Methodology

3.1. Participants

The sample was made up of a total of 87 undergraduate Psychology students at the University of Valencia between the ages of 20 and 65 (M = 23.02; SD = 7.88). 73.1% of the sample was made up of women.

Participants were divided into two experimental conditions. Forty-seven students participated in the flipped classroom condition, while forty students participated in the traditional condition.

3.2. Procedure

Two different methodologies were applied to two groups of Psychopathology students in a lesson entitled *Eating Disorders*. Both conditions were carried out over two sessions. One was performed individually by students outside of class and the other in class (2 hours). Each condition consisted of three parts: explanation of content, assessment of acquired knowledge/clarification of content and two practical activities.

In the first condition (flipped classroom), the flipped classroom methodology was applied. First, students viewed the video lecture on their own starting with a 30-minute PowerPoint presentation made available through a multimedia services platform at the University of Valencia (http://mmedia.uv.es). Second, students attended class for 1 hour and 50 minutes. At the beginning of class, they were asked to complete a multiple choice quiz based on the video lecture, with the double aim of assessing acquired knowledge and clarifying any doubts. In order to do this, the online platform Kahoot! was used (http://getkahoot.com), which enables the teacher to present multiple choice questions that appear on the classroom screen. Students choose the correct answer using smartphones or laptops. After each question, the number of students who have chosen each alternative appears, making it possible for the teacher to identify concepts and adapt to students' needs and difficulties. In turn, each student receives immediate feedback, identifying content that needs to be reinforced. Third, students did two practical activities in groups in order to apply theoretical concepts to practical cases. For these activities to be carried out and to boost active participation by all students, the jigsaw classroom was used (Aronson & Patnoe, 1997).

In the second condition (traditional), the teacher lectured in the first class for 30-40 minutes, using the same PowerPoint presentation (this time without audio). On completion, the online platform Kahoot! was used to assess acquired knowledge and clarify content. Students were also asked to do the same practical activities as in the flipped classroom condition, but outside of class and individually. The activities were corrected in the next class.

In both conditional experiments, students were requested to rate each component by completing three questionnaires (on the explanation of content, assessment of acquired knowledge/clarification of content via Kahoot! and the practical activities).

3.3. Assessment instruments

Assessment questionnaires on the methodologies. Different questionnaires were created to assess the components of each methodology: (1) *explanation of content* (viewing the video lecture before class in the flipped classroom condition versus the in-class lecture in the traditional condition); (2) *assessment of acquired knowledge and clarification of content* via Kahoot! and (3) *two practical activities* to reinforce content (in the classroom, in the flipped classroom condition at home versus the traditional condition). In each questionnaire the extent to which students agreed with each statement was rated on a scale of 1 (not at all/strongly disagree) to 10 (strongly agree) *'The activity has been useful for me to better understand the lesson'; 'The activity has been interesting'; and 'It has been difficult for me to do the activity correctly*'. Each questionnaire contained two open-ended questions for students to indicate possible improvements and state drawbacks associated with the components.

Assessment of acquired knowledge. This was done at two different times. First, the online platform Kahoot! was used to provide 13 multiple choice questions with a set of 4 alternatives to assess the knowledge acquired at the end of the lesson. This platform provided each student with a total score, according to the number of questions answered correctly and the time taken to respond. Second, the final exam included 3 multiple choice questions with a set of 3 alternatives related to the lesson.

3.4. Materials

PowerPoint presentation in video format and traditional format. In the video format, the PowerPoint presentation was narrated by the teacher. The presentation contained roughly 30 slides, created to be dynamic and with as many graphics as possible.

Meaningful learning activities. These activities were designed to enhance the application of theoretical contents to practical cases representing future professional activity. The first activity consisted of describing the differences and similarities in different diagnoses, whereas the second activity consisted of diagnosing brief clinical cases.

3.5. Statistical analysis

Statistical analyses were performed using the SPSS computer software package for Windows, version 20. First, it was evaluated if the dependent variables to be analysed showed a normal distribution in the Shapiro-

Wilk test. To analyse if there were differences between conditions in different quantitative variables, the Student's t-test was used for independent samples when the normality assumption was met, whereas the Mann-Whitney U test was used when this assumption was not met. The descriptive statistics presented are the mean average (*M*), standard deviation (*SD*), and the median (*Mdn*) in non-parametric tests. Second, a Mann-Whitney U test was performed to analyse if age differences exist between conditions and a chi-square test was conducted to explore differences in gender. Third, nine Mann-Whitney U tests were performed to analyse if there were differences in usefulness, interest and difficulty in the components of each methodology used. Fourth, Spearman correlations were calculated (due to non-compliance with the normality assumption) between such variables, and the age and acquisition of knowledge (Kahoot! total score). Fifth, moderation analyses were performed to explore if usefulness, interest and difficulty in the explanation of content moderated the relationship between the condition and the level of acquired knowledge (Kahoot! total score). To do this, the procedure described by Hayes (2013) using the PROCESS macro for SPSS, version 2.15 (model 1) was followed. In this procedure, moderation occurs when interaction between the independent variable and the moderating variable is significant ($p < .05$) or the confidence interval does not include zero. The traditional condition was coded as 1 and the flipped classroom as 2. A negative relationship between the condition and the Kahoot! total score was greater in the traditional condition. The effect of the condition in the total score according to the value of the moderating variable was estimated with the pick-a-point approach. Finally, a Student's t-test was conducted for independent samples to analyse if any differences exist between conditions in the Kahoot! total score, and a chi-square test was performed to observe if there were any differences in correct answers in the exam.

4. Results

4.1. Previous analysis: Age and gender

The average age of the flipped classroom condition was 23.39 (*SD* = 9.41) (*Mdn* = 21.00), and 22.61 (*SD* = 5.71) (*Mdn* = 21.00) for the traditional condition, with no significant differences between both conditions, $U = 786.50$, $z = -0.48$, $p = .631$.

There were marginally significant differences in gender between both groups, X^2 (1, $N = 78$) = 3.58, $p = .059$, given that in the flipped classroom condition 64.7% were women, while in the traditional condition women made up 83.3% of the sample.

4.2. Differences in usefulness, interest and difficulty assigned to the components of each methodology

Explanation of content (Online video lecture vs. in-class lecture). The comparison of usefulness, interest and difficulty assigned to viewing the video lecture prior to class (flipped classroom condition) with the explanation of content through an in-class lecture (traditional condition) showed no significant differences in any of the variables assessed (see Figure 1).

Assessment of acquired knowledge and clarification of content via Kahoot!. It compared usefulness, interest and difficulty assigned to the acquisition of knowledge and clarification of content via Kahoot! at the beginning of class and after viewing the video at home (flipped classroom condition), and at the end of the in-class lecture (traditional condition). There were no significant differences observed in any of the assessed variables (see Figure 1).

Carrying out practical activities. Usefulness, interest and difficulty assigned to practical group activities carried out in class that encouraged active participation (flipped classroom condition) were compared with doing the activities individually at home (traditional condition). Significant differences were found in the perceived difficulty of these activities. Participants in the flipped classroom condition found fewer difficulties doing these activities (see Figure 1).

	Flipped classroom condition		Traditional condition		*U* [1]	*z*	*p*
	M (SD)	*Mdn*	*M (SD)*	*Mdn*			
Explanation of content (Viewing video lecture vs. in-class lecture) [2]							
Usefulness	8.00 (1.54)	8.00	8.42 (1.20)	9.00	714.00	-1.17	.245
Interest	8.00 (1.35)	8.00	8.21 (1.44)	8.00	748.00	-0.84	.405
Difficulty	2.63 (2.14)	2.00	3.26 (2.67)	2.00	721.00	-0.95	.346
Assessment of acquired knowledge/clarification of content (Kahoot!)	8.16 (1.89)	9.00	8.84 (1.05)	9.00	695.50	-1.35	.179
Usefulness	9.05 (1.52)	10.00	9.13 (1.02)	9.00	776.00	-0.61	.547
Interest	3.64 (2.74)	3.00	3.47 (3.05)	2.00	797.50	-0.37	.717
Difficulty							
Practical activities							
Usefulness	8.39 (1.86)	9.00	8.63 (1.01)	8.50	510.00	-0.24	.815
Interest	7.84 (2.10)	8.00	8.25 (1.36)	8.50	500.50	-0.36	.723
Difficulty	3.11 (2.51)	2.00	4.46 (2.98)	3.50	378.50	-1.96	.050

Figure 1. Descriptive statistics and evidence of differences in usefulness, interest and difficulty assigned to the components of each methodology.

Note. [1] The *U*, *z* and *p* values are the result of comparing the flipped classroom condition and the traditional condition with the Mann-Whitney U test. [2] Due to the missing values, analyses were carried out with $n = 44$ in the flipped classroom condition (with the exception of the item 'difficulty in the video lecture', $n = 43$); whereas in the traditional condition, analyses were carried out with $n = 38$ in the in-class lecture and Kahoot! and $n = 24$ in the practical activities.

4.3. Analysis of the relationships between usefulness, interest, difficulty assigned to each component of the methodology, and age and level of acquired knowledge (Kahoot! total score)

Flipped classroom condition. Spearman correlations (see Figure 2) showed that older students had more interest in the video lecture but less acquisition of knowledge (lower Kahoot! score).

In this regard, it was observed that the students who obtained lower Kahoot! scores and therefore, less acquired knowledge, were those who had found greater difficulty in the video lecture and the Kahoot!.

When associations were analysed between the assessed variables (usefulness, interest, and difficulty) regarding the components of each methodology, it was observed that usefulness and interest were significantly correlated in one of the components. Furthermore, there was a significant negative correlation between the assessment of usefulness and difficulty encountered in the video lecture.

With regard to associations between the assessed variables (usefulness, interest, and difficulty) in different components, it is worth mentioning the significant positive relationship found between interest in the video lecture and interest in the Kahoot!, between the usefulness of these components, between the usefulness of Kahoot! and the usefulness of the practical activities, as well as the usefulness of the video and the interest in Kahoot!. It is also worth highlighting the significant positive relationship found between difficulty

in the video lecture, and difficulty in doing the Kahoot! and practical activities. Finally, there was a significant negative relationship found between difficulty in the video lecture, and usefulness and interest in doing the Kahoot!, and the usefulness of the practical activities.

	1	2	3	4	5	6	7	8	9	10	11
1. Age	1										
2. Kahoot! score	-.36*	1									
Explanation of content (viewing the video lecture)											
3. Usefulness	.05	.21	1								
4. Interest	.44**	-.06	.38*	1							
5. Difficulty	.13	-.41*	-.31*	-.22	1						
Assessment of acquired knowledge/clarification of content (Kahoot!)											
6. Usefulness	-.04	.16	.49**	.30	-.35*	1					
7. Interest	-.06	.29	.44**	.33*	-.42**	.73**	1				
8. Difficulty	.17	-.61**	-.18	-.05	.64**	-.15	-.23	1			
Practical activities											
9. Usefulness	.19	-.07	.22	.17	-.33**	.44**	.27	-.07	1		
10. Interest	-.22	-.05	.08	.15	-.23	.23	.21	-.01	.73**	1	
11. Difficulty	.20	-.17	-.09	.15	.55**	-.16	.19	.28	-.20	-.08	1

Note. ** $p < .01$; * $p < .05$

Figure 2. Spearman correlations between variables in the flipped classroom condition.

Traditional condition. Pearson correlations (see Figure 3) showed that there were lower Kahoot! scores for older ages, and therefore, less acquired knowledge.

Regarding the analysis of the associations between the assessed variables (usefulness, interest, and difficulty) in the components of each methodology, it was observed that usefulness and interest had a significant positive correlation in each component. Likewise, there was a significant negative relationship found between usefulness and difficulty in the in-class lecture, interest and difficulty encountered in the in-class lecture as well as interest and difficulty found in the Kahoot!.

With regard to associations between the assessed variables (usefulness, interest, and difficulty) of different components, it should be mentioned that usefulness assigned to the in-class lecture positively correlated with usefulness assigned to the Kahoot! and practical activities, but there was a negative correlation with the difficulty found in the Kahoot!. Furthermore, difficulty encountered in the in-class lecture positively correlated with difficulty in the Kahoot! and practical activities, but there was a negative correlation with interest in the Kahoot!. Finally, difficulty in the Kahoot! was significantly positively associated with difficulty in practical activities.

	1	2	3	4	5	6	7	8	9	10	11
1. Age	1										
2. Kahoot! score	-.44**	1									
Explanation of content (in-class lecture)											
3. Usefulness	-.05	.06	1								
4. Interest	.09	-.09	.82**	1							
5. Difficulty	.00	-.16	-.39*	-.38*	1						
Assessment of acquired knowledge/clarification of content (Kahoot!)											
6. Usefulness	.01	.25	.37*	.16	-.28	1					
7. Interest	-.07	.21	.28	.19	-.32*	.74**	1				
8. Difficulty	.25	-.13	-.34*	-.33*	.72**	-.27	-.37*	1			
Practical activities											
9. Usefulness	.26	.19	.49*	.57**	-.21	.17	.19	-.39	1		
10. Interest	.39	.16	.35	.53**	-.06	.21	.17	.25	.82**	1	
11. Difficulty	.18	-.04	-.18	-.14	.43*	-.28	-.25	.54**	-.31	-.25	1

Note. ** $p < .01$; * $p < .05$

Figure 3. Spearman correlations between variables in the traditional condition.

4.4. Moderation analysis

Three moderation analyses were performed to explore if usefulness, interest or difficulty found in the explanation of content (viewing the video lecture in the flipped classroom condition versus the in-class lecture in the traditional condition) moderated the relationship between the condition and the Kahoot! total score. The *difficulty perceived during the explanation of content* variable was the only one that moderated the relationship between the condition and the Kahoot! total score (see Figure 4).

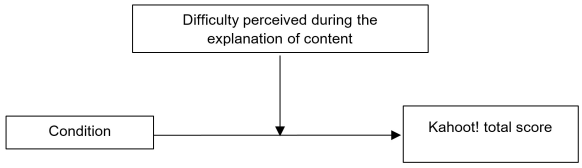

Figure 4. Difficulty found in the explanation of content moderated the relationship between the condition (flipped classroom versus traditional) and the Kahoot! total score.

The totality of the model explained 24.9% of the variance in the Kahoot! total score, which was significant, $F(3.71) = 8.50$, $p < .001$. The interaction condition and level of difficulty were marginally significant, $F(1.71) = 3.55$, $p = .064$, indicating that the level of difficulty encountered during the explanation of content influenced the condition-score relationship in the Kahoot!. The interaction explained 3.17% of the variance in the Kahoot! total score. Regardless of the difficulty perceived during the explanation of content, it was observed that when difficulty was perceived as low, $b = -1317.11$, 95% CI [-2334.99, -303.213], $t = -2.59$, $p = .012$, and moderate, $b = -1914.96$, 95% CI [-2752.72, -1077.19], $t = -4.56$, $p < .001$, and high, $b = -2675.33$, 95% CI [-3874.07, -1476.59], $t = -4.45$, $p < .001$, the traditional condition obtained a higher Kahoot! score (see Figure 5).

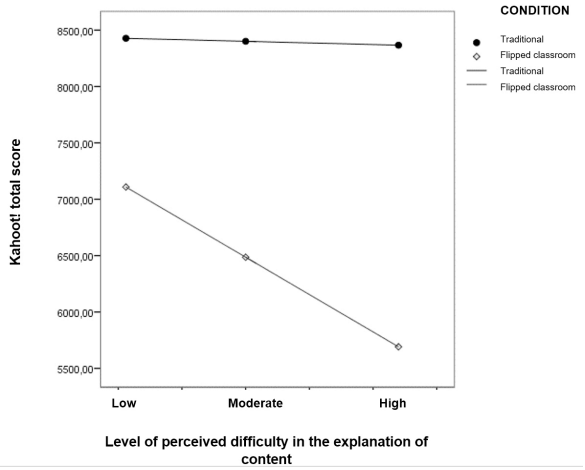

Figure 5. Level of difficulty as a moderating variable in the relationship between the condition and the Kahoot! score.

4.5 Differences in the acquisition of knowledge according to the methodology used

Kahoot! score. Significant differences were observed in the Kahoot! total score between both conditions, $t(79) = 4.53$, $p < .001$. Participants in the flipped classroom condition obtained lower scores ($M = 6543.02$; $SD = 2023.52$) than the participants in the traditional condition ($M = 8407.90$; $SD = 1656.88$).

Correctly answered exam questions. There were no significant differences between both conditions regarding the number of correct answers in the exam, X^2 (2, N = 132) = 0.98, p = .612. In the flipped classroom condition (n = 43) 83.7% of the students correctly answered the 3 questions that assessed content related to the lesson. In the traditional condition (n = 89), 82% correctly answered the 3 questions.

4.6. Qualitative analysis of students' opinions on each methodology

After analysing the open-ended questions from the questionnaire regarding each component in the methodology used to teach the lesson, different aspects were highlighted.

With regard to the *explanation of content* component in the flipped classroom condition (viewing the video lecture), students indicated that the time needed to view the video outside of class was a drawback (e.g. *'the video was long', 'it takes time to make summaries and take notes', 'the time involved outside of class'*). Students also reported that another drawback was not being able to ask questions at the time of the explanation (e.g. *'unable to ask a question at the moment'*). In the traditional condition, it was pointed out that even though the lecture was clear and concise, it meant low student participation (e.g. *'it would have been more interesting if there had been spontaneous questions', 'more dynamism'*).

As for the *assessment of acquired knowledge and clarification of content* component via Kahoot!, comments were positive in both conditions. In general, students indicated that it was a clarifying and entertaining activity (e.g. *'I loved it! Thanks', 'doing the quiz, seeing the results I think helped to clarify ideas. Thanks!', 'the activity was really interesting, clarifying and fun'*), and requested to do this activity in other lessons (e.g. *'do it in all the lessons prior to preparing the topic', 'add more questions to revise more subject content', 'more classes like this, it helps to revise and study', 'do it more'*).

Students highlighted positive aspects of the *practical activities* in the flipped classroom condition (e.g. '*the practical cases were very interesting to do after the explanation'*), although some students stated that it was necessary to speed up the time when forming groups and reduce the number in each group (e.g. *'time is lost when doing it in groups', 'the first part was dragged out', 'the groups are too big'*). In the traditional condition, some students suggested doing more practical activities (e.g. *'do it more often'*).

Finally, regarding the flipped classroom methodology in general, different positive aspects were noted. It was viewed as being more dynamic, facilitating knowledge acquisition in comparison with typical class lectures (e.g. *'I think this is a much more dynamic and interesting way to learn the subject concepts', 'I like it more when the class is dynamic because we have a better understanding of the concepts and it is more entertaining', 'this way of learning is better than what we are used to', 'in general I loved it, both preparing the class with the video and the class activities, although it was time consuming', 'this way of working is very interesting and makes the class more entertaining and dynamic', 'I like this way of teaching better, we are more attentive and the concepts are retained more than a conventional theory class'*).

5. Discussion and conclusions

The aim of this paper was to implement and assess the flipped classroom teaching methodology in a lesson of an undergraduate Psychopathology course from the Psychology degree, and compare it with the traditional teaching method in terms of: 1) usefulness, interest and difficulty assigned to the components of each teaching methodology used, 2) the relationships between usefulness, interest and difficulty assigned to each assessed component and the variables of age and level of acquired knowledge, 3) the possible moderating effect of usefulness, interest and difficulty assigned to the explanation of content between the condition and the level of acquired knowledge, 4) the level of acquired knowledge, and 5) the qualitative opinions provided by students on each methodology. Regarding implementation, the flipped classroom methodology was carried out through: 1) the use of ICT during the process of acquisition and assessment of knowledge, 2) an increase in student-teacher interaction while theoretical concepts were put into practice, 3) greater active engagement and attitude by students prior to class and, 4) carrying out activities that enhanced meaningful learning and activated student participation in the classroom.

With regard to usefulness, interest and difficulty assigned to each of the assessed components, there were differences observed between both methodologies in terms of difficulty in doing the practical activities. Students who received the explanation of the lesson through the traditional method rated the practical activities of content integration as more difficult. This might suggest that group activities and the presence of the teacher during these activities in the flipped classroom decrease the difficulty that students encounter when theory is put into practice through practical activities.

Regarding the relationships between values of usefulness, interest and difficulty assigned to each of the assessed components, age and the Kahoot! total score, it is noteworthy that older participants obtained a lower score. This might be because ICTs are not used as often with the older population, which could be a factor to consider when deciding on whether to use this teaching methodology in the classroom. As for the assessment of the explanation of content, it was observed that difficulty following an explanation via video in the flipped classroom methodology was associated with a lower acquisition of knowledge (Kahoot! total score), greater difficulty in doing the class activities, and a lower perception of usefulness. It seems fundamental to ensure that students have adequately understood basic concepts prior to the practical activities. Therefore, including activities that require students to answer questions on the topic, such as those carried out via Kahoot!, may be useful because a discussion can be held regarding the incorrect alternatives in each question, enabling students to reach the highest levels of understanding, as carried out in other studies (e.g. McLaughlin et al., 2014; Tune et al., 2013).

Lastly, it should be noted that in both teaching methodologies, usefulness assigned to each of the components was found to be related to the interest assigned to each component, so it seems necessary to enhance the usefulness of each activity done in class, facilitating meaningful learning.

Regardless of the difficulty found when listening to the explanation, moderation analysis shows that students in the traditional methodology showed higher Kahoot! scores in the assessment of acquired knowledge than students in the flipped classroom methodology. This

could be because students in the traditional methodology had the chance to ask questions during the in-class lecture, which is something that students who worked with the course material on their own were unable to do. In future studies, online platform forums should be included (e.g. in Moodle), so that students can ask the teacher questions while viewing the video out of class. Furthermore, before answering questions in class via Kahoot!, a good practice might be to clarify any doubts the students had while they were viewing the video. In this study, Kahoot! was used with the aim of clarifying any doubts, which was highly valued. It should be noted that any differences found in the assessment via Kahoot! (students who attended the traditional class correctly answered a greater number of questions) could be due to a methodological difference. Thus, this result might be influenced by the difference in time passing between the explanation of content and assessment, since students in the traditional condition answered the questions immediately after the in-class lecture, whereas students in the flipped classroom condition answered the questions 1-3 days after viewing the video prior to class. This means there is a difference between both conditions given that in the traditional condition, all the students who did the Kahoot! had attended the explanation of the theory in the same session.

Nevertheless, when the level of acquired knowledge was assessed in the final exam, there were no significant differences in the number of questions answered correctly. This absence of differences between the two conditions in acquiring knowledge is consistent with what other authors have reported (e.g. McLaughlin et al., 2013). Yet, this result could be due to the type of assessment used. That is to say, practical activities in the classroom were designed to develop higher-order cognitive processes (comprehension, application and analysis) according to Bloom's revised taxonomy (Anderson & Krathwohl, 2001), but assessment focused exclusively on the level of recognition. It is possible that evaluation through activities that assess higher-order cognitive processes will reveal differences between the two teaching methodologies at the acquired knowledge level, as found in other studies (e.g. Albert & Beatty, 2014; Missildine et al., 2013).

One of the limitations of the study was the sample loss since some students did not do the practical activities out of class, and/or did not answer the Kahoot! questions. In addition, as previously mentioned, it was not verified if the students had viewed the video prior to class. The level of previous knowledge on the subject topic was not taken into account, for example if the student had taken the course in previous years. Pseudonyms were used in the assessment of each component, so we could not relate the results of students who had attended class with their exam results. It should also be noted that the assessment questionnaires were specifically designed for this study, so there were no previous validation studies. Therefore, future studies should compensate for these limitations. It would be interesting to include a validated instrument to measure students' perceptions of the learning environment and increase the number of questions in the assessment questionnaires with regard to students' preferences for implementing this methodology in other subject topics, their satisfaction with the methodology in general, and the implications of working with this methodology.

Finally, students widely accepted this new methodology, as revealed by their overall positive comments. These results were in line with those found in the literature (e.g. Bishop & Verleger, 2013; Limniou et al., 2015), which showed positive opinions from students on this methodology. Moreover, the use of recognition questions, in this case through the Kahoot! platform, was an attractive method for students and useful in resolving doubts.

To conclude, we believe it would be advisable to implement the flipped classroom methodology in other Psychopathology course lessons, given its potential to encourage active student participation and increase students' responsibility for their own learning, among other aspects. In this study it has been verified that this methodology does not interfere with the acquisition of knowledge and it is rewarding for students. Thus, the implementation of this methodology in other lessons would be particularly interesting as it is a course that requires time and resources to put acquired knowledge into practice. This could be facilitated if the class lecture was reduced and time used for carrying out activities (e.g. case analysis) was increased. This, in turn, would allow students to put higher-order cognitive levels into practice, thereby transferring theoretical content into professional practice.

6. References

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