

# Teaching Materials for Active Methodologies in University Education

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*In the present university educational model, teaching is less teacher-centered (instruction) and more student-centered (learning). In this context, it is essential to have adequate teaching materials to support the student, both in the learning process and in the evaluation stage of the subjects. Thus, the formative evaluation (it allows knowing the progress of the students, offering proposals for additional learning) becomes more important than merely summative evaluation (with the sole purpose of obtaining a grade). This article presents a teaching-learning proposal based on the experience accumulated by the authors over several years, in which different teaching innovations have been applied. These innovations were intended to facilitate learning, improve results, increase motivation, foster collaborative work and student involvement, among other objectives. It has been found that active methodologies improve learning results through student motivation and involvement. For their part, teaching materials play a fundamental role in guiding and orienting the students' autonomous learning process and, at the same time, facilitating collaborative and participatory dynamics in the classroom.*

*Keywords: teaching innovation, active methodologies, teaching materials, virtual platforms, worksheets*

## INTRODUCTION

This chapter provides a proposal for a teaching strategy based on the experience of the authors, following the implementation of several teaching innovation projects in a series of subjects with similar characteristics.

In particular, all the subjects that have been used in the consolidation of this model are in the area of Applied Economics and, in addition, several of them exhibit the common feature that they are taught in non-economics degrees, which means that the teaching-learning process requires specific actions: on the one hand, because students have little or no previous training in basic aspects of economics, mathematics or statistics;

on the other, because their motivation and interest is low, since they tend to see this type of subjects as complementary, relatively complex and with a language different from the one they are used to<sup>1</sup>.

In addition, some of these subjects generally show somewhat low academic results, mainly for the following reasons:

- Overcrowded groups: the number of students ranges from 75 to 100 per group.
- Great diversity of the student body: both in the options taken in the high school and in the admission modalities.
- A certain rejection of subjects that require calculations: although these subjects do not require outstanding mathematical skills, there is a portion of the student body that has not taken a subject with this kind of content in a long time, which leads them to be considered as complicated subjects.
- Relatively low attendance to theoretical classes: this prevents the acquisition of enough strength regarding the fundamental issues that will later be the basis for all practical applications.
- Low student motivation and involvement: this may be due to the particular focus of the economic subjects in contexts where other types of subjects (legal, sociological, historical, etc.) predominate, and to the degree of complexity that is assumed.
- Low percentage of students taking the tests: sometimes not even half of the enrolled students take the tests.

Accordingly, it is necessary that these subjects have a different focus and approach to the ones that would be used in economic degrees, trying to adapt to the previous knowledge of students, raise their motivation and propose teaching strategies in which students develop all the expected competencies and have sufficient tools and materials to make them active protagonists of their own learning.

Taking into account the above issues, during several academic years a number of innovation initiatives have been implemented with different methodological proposals<sup>2</sup>. All of them were very well received, with a positive impact on the learning process and with some improvement in the academic results that, nevertheless, had not reached the expected and desired levels. Therefore, it was necessary to go deeper into innovation in order to achieve a more relevant impact on the teaching-learning process of students, involving them more in order to improve results.

From this last innovation project, which is more comprehensive, and once contrasted, the proposal described below arises. Furthermore, this proposal is easily adaptable with the necessary adjustments to any type of subject regardless of the area of knowledge to which it belongs.

## **BACKGROUND**

The change in the university educational model has been one of the most important aspects of teaching innovation in recent years. Thus, the teaching activity is increasingly focused on the students -learning-, losing importance to the teachers -teaching- (Gargallo et al., 2015).

These student-centered models have their roots in the psychological theories of constructivism, which focus on how students learn and construct their knowledge (Palazón et al., 2011). Active methodologies -participative and collaborative- have proven to be adequate to improve learning outcomes through student motivation and involvement (Jarauta, 2014; Morell, 2009). There are three main points in which innovations should be focused:

- a) Teaching. A redefinition of roles must take place and the student must adopt an active and positive attitude, while the teacher must become a guide and advisor of the teaching-learning process.
- b) Contents and teaching materials. It is not only important what students are expected to learn, but also how they are going to learn it, so the activities to be accomplished in order to achieve this knowledge are of great relevance.
- c) Evaluation. The purely summative evaluation should be discarded to become formative, that is, learning-oriented, in which feedback is a fundamental part of the process.

All this is seeking to reinforce the necessary motivation and student participation, a key element for the success of the proposed teaching strategy (Izagirre et al., 2020). In this context, the role of teaching materials is crucial. As Zabalza (2004: 135) states, “the methodological renewal must be focused on fostering students’ autonomous learning. Autonomous learning, but “guided”. And this requires the elaboration of “good materials””.

The importance of adequate teaching materials lies in the fact that they are the basis for promoting collaborative and participatory work and, in addition, they must be useful for students to successfully face the evaluation of the subjects.

In turn, in order to structure all the actions, the seven principles for quality teaching of Chickering and Gamson (1987) have been followed, as recommended by López (2016a), which are:

- 1st. To encourage frequent contact between teachers and students.
- 2nd. To develop reciprocity and cooperation among students.
- 3rd. To use active learning techniques.
- 4th. To give feedback to the students.
- 5th. To work in depth on the most important tasks.
- 6th. To encourage high aspirations or expectations among students.
- 7th. To respect and attend to diversity (different talents and ways of learning).

Based on the above considerations, a teaching model has been developed that mixes already consolidated innovations with new ones, encouraging autonomous student work at home and participation and collaborative work in the classroom.

In addition to the general objective of improving learning results, the following specific objectives are intended to be achieved:

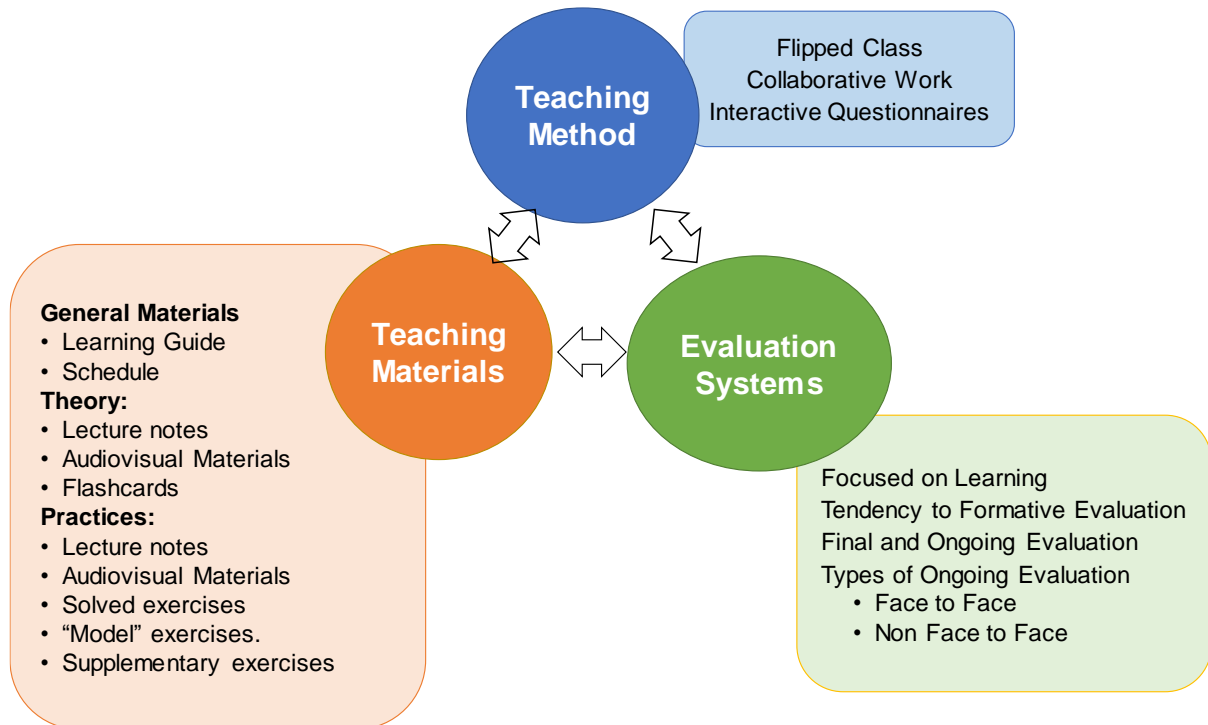
- To increase class attendance, making them more dynamic and participatory.
- To promote collaborative work, adapting the pace and form of learning to the needs and characteristics of the students.
- To increase student involvement and autonomy in the learning process.
- To continuously know the status of the process, adjusting its pace (slower or faster) if necessary.

As we cannot forget that no educational innovation can be carried out without the collaboration and involvement of the students, it is important to explain thoroughly the new model and the objectives it pursues, emphasizing that the new methodology will make it easier for them to learn and pass. But this should not only be done at the beginning of the course, but throughout the whole term, emphasizing the usefulness of the contents and procedures that are being learned.

## **DEVELOPMENT**

The proposal covers the three aforementioned axes, which are summarized in Figure 1 and developed in the following sections.

**FIGURE 1  
MODEL OUTLINE**



### Teaching Materials

The first action focuses on teaching materials. As has been previously mentioned, the quality and adequacy of the materials is critical for the methodology to work, being essential the integration of the activities that are accomplished before the class and those that are developed in the classroom.

The characteristics of these subjects have caused that, for several years, special emphasis has been given to the development of materials adapted to them, and since the texts of applied economics that serve for the subjects of the faculties of economics overflow the contents that form part of these subjects, they are used as a complementary references, but not as reference manuals. For this reason, it has traditionally used its own materials that are provided to students for the proper monitoring of such subjects (text-guide, notes in the Virtual Classroom, presentations, etc...).

In this occasion, the materials that have finally been developed and offered in the Virtual Classroom for student use are as follows:

- a) Notes for each theoretical topic of the course, including:
  - A learning guide or explanations of contents.
  - Worksheets with spaces to be filled in (Figure 2), at least one for each heading, which focus on the main aspects. Each worksheet states the lesson and heading that is being addressed, as well as the objective to be achieved. Thus, the worksheet fulfills a triple purpose: study guide, control and follow-up. It consists of four types of activities: i) "Reflect", where students are invited to inquire about the meaning and usefulness of the corresponding contents; ii) "Review", in this section students are guided to repair and understand the basic issues; iii) "Calculate" involves a practical application of some aspects; and, iv) "Research", where some points of deepening and expansion are proposed through links to different Internet pages. With all this, in addition, the objective is to cover the different learning styles since, as López (2017) states, it is a very appropriate strategy to respect the different talents and ways of learning.

**FIGURE 2**  
**WORKSHEET, MONITORING AND FOLLOW-UP**

Worksheet		
Lesson:	Objective:	Date:
Epigraph:		
Related Competencies:		
<b>Procedure:</b> <i>- At home: do the necessary preliminary work in order to fill in the control card, together with the rest of your team.</i> <i>- In the classroom: you will need your smartphone, tablet or computer, either to solve interactive quizzes or to search for necessary information.</i>		
Team Name: _____		
Name of the members:	ID Card:	Signature:
1.		
2.		
3.		
4.		

**« Reflect »**

In this section, some issues are posed in order to invite students to inquire about the meaning and usefulness of the corresponding contents.

**« Review »**

The resolution of certain questions allow students to be oriented towards those aspects that they should repair and learn about, since these are basic issues.

**« Calculate »**  
**« Apply »**

The practical application of the most important aspects, through resolution of exercises, commentary of news or other procedures, is fundamental for knowledge consolidation.

**« Research »**

Through this type of activity, points of in-depth study and expansion are proposed, through links to different Internet pages.

**« Doubts »**

Finally, a time period is included to express doubts.

b) Notes on each of the practical topics of the program, including:

- Explanations of the different tools to be applied, with solved examples for guidance. Furthermore, in some cases, video tutorials have been developed to facilitate the review and understanding of complex content.
- “Model” exercises of practical nature.
- Solved exercises with detailed explanations.
- Additional exercises.

In order to make it easier to follow the resolution of the different exercises, the data are also provided in a spreadsheet for those who wish to solve them on the computer or tablet. Once they are solved in class, the solutions are made available to the students in the Virtual Classroom.

Finally, it is important to mention that the worksheets corresponding to each practice class have been prepared, with exercises similar to the “type” exercises, which are not available in the Virtual Classroom, but are provided in class in order to continuously monitor the learning process.

c) Detailed schedule of the specific theoretical and practical activities to be developed in each class (Figure 3), specifying the previous work that each student needs to do individually, after reading and understanding the content to be worked on:

- Theory: complete the corresponding worksheet;
- Practice: review the proposed example, performing the “model” exercises indicated.

For the planning of the schedule and workload, we have taken into account the number of credits of the course, 6 ECTS, which is equivalent to 60 classroom hours (4 hours per week, 2.5 hours of theory -in two 75-minute sessions- in a full group and 1.5 hours of practice -in one session- in a split group) and 90 hours of autonomous work.

**FIGURE 3  
SCHEDULE EXTRACT**

<b>Schedule:</b>				
<b>Week:</b>	<b>Day:</b>		<b>In Class:</b>	<b>Previously, at home</b>
<b>5</b>	<b>Oct 7th</b>	<b>Monday</b>	<b>T1-4 Flashcard: Macromagnitudes</b>	<b>Study Lesson 1, Epigraph 2.2 Make T1-4 Flashcard</b>
	<b>G1-G2 Practices (Tuesday/Friday)</b>		<b>P1-3 Flashcard: TV Graphic Interpretation</b>	<b>Study Practice 1, Epigraph 2 Do Model Exercise 5</b>
	<b>Oct 11th</b>	<b>Friday</b>	<b>T1-5 Flashcard: Working Population Survey</b>	<b>Study Lesson 1, Epigraph 3 Make T1-5 Flashcard</b>
<b>6</b>	<b>Oct 14th</b>	<b>Monday</b>	<b>T1-6 Flashcard: Balance of Payments</b>	<b>Study Lesson 1, Epigraph 4 Make T1-6 Flashcard</b>
	<b>G1-G2 Practices (Tuesday/Friday)</b>		<b>P1-4 Flashcard: Nominal, Real and Price Growth</b>	<b>Study Practice 1, Epigraph 3 Do Model Exercises 6, 7 and 8</b>
	<b>Oct 18th</b>	<b>Friday</b>	<b>T1-7 Flashcard: Lesson 1 Review</b>	<b>Lesson 1 Review Make T1-7 Flashcard</b>

### Teaching

The teaching is developed weekly in theoretical modules with a full group and a practical module with a split group. In both modules it is proposed to apply the “flipped classroom” model. This methodology has been integrated gradually since<sup>3</sup> it is not a simple teaching methodology to implement, requiring time and work. As Marqués (2016: 12) states, “Good materials must be available for students to prepare classes, out-of-class and in-class activities must be integrated, and formative assessment must be done accordingly.”

In order to achieve this teaching-learning model, the principles of Chickering and Gamson (1987), updated to incorporate new technologies in Chickering and Ehrmann (1996), have been taken into account. The main characteristics are described below:

- ☑ Work teams have been established composed of two students in the practical classes, which are grouped into four students in the theory sessions.
- ☑ Before each theory class, students must prepare the material corresponding to the session and prepare an individual worksheet, an activity that promotes the understanding of those concepts that may be complex and require reflection and connection with reality. For the practical classes, students must have studied the analysis tools planned for each session, and perform a series of “model” exercises for the application of these tools. In this way, as Marqués (2016: 12) states, “The teacher is still responsible for presenting the contents to the students, but must do so in such a way that they have to do something with the information, interact with it, to relate it to what they already know and thus build the new knowledge, reorganizing previous knowledge when necessary”. In addition, the suggestion of López (2016b) has been followed, who states that, if we want students to adopt an active attitude, we must do it from the first day, as it is more difficult to make them change later.
- ☑ The structure of the theory classes is as follows:
  - The first 30 minutes is for sharing the individual work done at home within the team, having to agree on a worksheet to be handed in at the end of the class. This is one of the stages in which cooperation among students allows them to explain concepts to each other and help each other in the construction of knowledge. The teacher monitors all the teams, checks the attendance of the different members, the work done by each one and clarifies any doubts. This is a critical moment in the class, since the teacher establishes direct contact with the students and, even if they are large groups, one gets to acquire a fairly accurate knowledge about the characteristics of each one of them, their ways of learning, those who present greater difficulties and, therefore, need to be given more attention, etc.

- The next 30 minutes are used to correct the worksheet, section by section. The teacher clarifies any doubts that may arise, explains the most complicated concepts and verifies that all the teams have completed their worksheets correctly. In this way, those contents and concepts that they have found easy to understand, by themselves or with the help of their classmates, take up very limited time and we can focus on those that, on the contrary, have been more complex.
  - The last 10 minutes of the class are assigned to individually answer an interactive questionnaire through a virtual platform<sup>4</sup>. These tools are appropriate for stimulating student participation, as we have seen in previous experiences (López-Martínez and Esteban-Yago, 2019) and, in addition, it is an excellent way to provide timely feedback. In the test, conducted by the teacher, the doubts of those who have not answered well are resolved, so students can detect if there are concepts that have not been properly understood and work on them at home, and the teacher will know the issues that will have to be emphasized again in subsequent classes. Besides, this tool allows to monitor attendance.
- ☑ Furthermore, the practical classes are developed according to the following guidelines:
- The first 30 minutes are dedicated to resolving any doubts that may arise about the corresponding materials, reviewing the examples that have been solved. Likewise, the “model” exercises are corrected, taking into consideration the doubts that may have arisen when performing them prior to the class and explaining everything that we consider that has not been well understood.
  - The teacher then distributes a new worksheet to each team, with questions similar to the “model” exercises. Teams have 30 minutes to complete the worksheet. Again, cooperation among students becomes the focus of attention. During this time, the teacher monitors the activity of all the teams and addresses, in a more personalized way, the doubts and difficulties that the students may have in applying the tools that are being used. As in theory classes, this time allows us to encourage teacher-student contact and respect diversity.
  - The last 10 minutes of the class are dedicated to the group completion of an interactive questionnaire by the students using different devices (mobile or tablet). With some of these tools, competitions can be held, which increases the dynamism of the class. As Flores (2011: 957) states, “ICTs, with all the tools they offer, allow for multiple and different channels for the exchange of ideas, not only between students and teachers, but also among students themselves”. However, Caravaca (2018: 356) concludes that the use of an interactive questionnaire “leads to an improvement in the motivation, enjoyment and participation in class of the students who used it, without actually finding an improvement in the level of learning”. In any case, it is clear that these tools allow us, again, to provide timely feedback. The test consists of questions regarding the interpretation of the results of the exercises on the worksheet. At the end of the test, any remaining doubts are resolved.

Figure 4 summarizes the teaching system described.

**FIGURE 4  
TEACHING METHOD**

Theory Classes		Practical Classes	
At home:	In the classroom:	At home:	In the classroom:
<ul style="list-style-type: none"> <li>▪ Content Study</li> <li>▪ Individual flashcard (Reflect, Review, Calculate/Apply and Research)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Idea-sharing session by groups (Teacher's monitoring) → Team Flashcard</li> <li>▪ Flashcard correction</li> <li>▪ Interactive and individual questionnaires and resolution of doubts</li> </ul>	<ul style="list-style-type: none"> <li>▪ Study of analysis tools and methodological aspects</li> <li>▪ Development of "Model exercises"</li> </ul>	<ul style="list-style-type: none"> <li>▪ Resolution of doubts</li> <li>▪ Correction of model exercises</li> <li>▪ Proposal of a new exercise to be solved by a team of 2 (Monitoring)</li> <li>▪ Interactive group questionnaires</li> </ul>

**Evaluation**

The teaching-learning combination cannot be separated from the evaluation process<sup>5</sup>, since learning-oriented evaluation has proven to be a very effective tool for motivating students and achieving better results, which are the objectives of this project.

Therefore, the first action to be considered is the evaluation system. Most of the subjects we teach include two instruments:

- 1) Final test, which usually contributes 70% of the final grade.
- 2) Continuous evaluation (CE), which are activities that represent the remaining 30%; although, after the experience developed, we advocate increasing this percentage, reducing, consequently, that of the final test.

Until now, CE scores were obtained through the completion of a series of virtual classroom activities (tests, homework, etc.), classroom quizzes (in which peer correction was used) and various records of classroom participation. These were learning-oriented activities, as they allowed for self-evaluation and progress monitoring, although they did not encourage students to attend the theoretical classes.

In spite of not modifying the two main evaluation instruments (test and continuous evaluation), in recent years different activities have been incorporated in the continuous evaluation, with the intention of stimulating class attendance. However, being aware of the heterogeneity of the student body, which cannot always attend classes regularly (workers and students combining several courses), two ways of carrying out the continuous evaluation have been established:

- a. Distance learning classes: activities are carried out and assignments are handed through the Virtual Classroom, which will determine the grade in this CE modality.
- b. Face-to-face classes: the grade takes into account class attendance, the handing in of the worksheets completed in each session and the participation in the different interactive questionnaires that have been carried out in the classroom. In addition, it can be complemented with the virtual classroom activities foreseen for the distance learning classes.

Likewise, it is intended that CE ceases to be only "summative" (with the sole purpose of obtaining a grade) and becomes "formative" (it allows knowing the progress of the students, offering proposals for additional learning). In this way, assessment becomes a key instrument in the student-centered learning process, where, as Gargallo et al. (2018: 166) state, a learning environment that fosters learner autonomy and other regulatory skills has to be created.

**CONCLUSIONS**

On many occasions, there are subjects in the study plans that include different approaches, or conceptual and methodological aspects compared to the majority of disciplines that make up the degree.



This is the case with economics subjects in non-economics degrees and, as a result, some are considered complicated by students, which affects their performance and motivation.

In the face of this situation and over the course of several years, innovations aimed at improving results, making teaching more dynamic, increasing motivation, fostering collaborative work and student involvement, among other objectives, have been incorporated.

Finally, we have reached the integrative proposal presented here, the results of which have been compared and have turned out to be very positive<sup>6</sup>. The development of this experience allows us to highlight the following conclusions:

1. The university educational model should be basically focused on the students, encouraging their participation and placing them at the center of the learning process. Active methodologies have been demonstrated to improve learning results through student motivation and involvement.
2. To this end, it is necessary to present a global proposal, focusing simultaneously on teaching materials, teaching-learning methods and evaluation systems, since this is what guarantees coherence and the achievement of a comprehensible and feasible model.
3. The “flipped classroom”, together with other collaborative and participatory methodologies, are very appropriate to improve the dynamics of the classes, achieving greater attendance and interest of students.
4. In this context, teaching materials play a fundamental role in guiding and orienting the autonomous learning process of students, while they can also serve for collaborative and participatory dynamics in the classroom.
5. In addition to good manuals or notes for the study of the contents, we consider two tools that constitute a very relevant and fundamental part of this project:
  - The schedule, which details the specific activities to be performed in each class, as well as the previous work to be done by the student.
  - The worksheets, with different activities to achieve the planned objectives, which serve a triple purpose: study guide, control and follow-up.
6. The evaluation must be formative, that is, it must be a key instrument in the learning process, which makes it possible to know and guide the student’s progress.

Finally, it is necessary to indicate that the model presented, although based on a specific subject, is easily adaptable to other types of subjects regardless of the type of discipline or area of knowledge.

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## ENDNOTES

1. These shared concerns resulted in the creation of the Teaching Innovation Group “Applied Economics in non-economic degrees (“EcoNoEco”)” of the University of Murcia, which teaches, in addition to the Degrees in Business Administration and Economics, Biotechnology, Pedagogy, Labor Relations and Human Resources, Sociology and Social Work.
2. Such as, for example, the improvement of the materials offered to students through the Virtual Classroom; the implementation of peer correction in practical activities (Esteban-Yago, García-Luque & Rodríguez-Pasquín, 2017); the development of the flipped classroom model in some theoretical contents (Esteban-Yago & Rodríguez-Pasquín, 2018); or the use of virtual platforms in teaching (López-Martínez & Esteban-Yago, 2019).

3. In Esteban-Yago and Rodríguez-Pasquín (2018) the beginning of the application of the flipped classroom methodology is exposed.
4. Specifically, in the experiences that support the current proposal, we have used Socrative, Kahhot! and, more recently, Wooclap.
5. In Esteban-Yago, García-Luque and Rodríguez-Pasquín (2017), we delve deeper into previous experiences related to evaluation.
6. For example, in addition to the increase as regards class attendance and the percentage of students taking tests, in the last five years, in the subject that has been used as a reference in this proposal, the success rate (percentage of students passing the tests) has increased by 24.5 points and the performance rate (percentage of students passing the tests) has increased by 30.2 points.

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