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The Role of Secondary School Teacher Training in Their Teaching Practices — A Secondary Publication

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Abstract: This work aims to analyze the effect exerted by the initial and continuous training of secondary school teachers in France on their teaching practices. For this, we carried out a secondary analysis of data from the TALIS survey (Teaching and Learning International Survey), conducted in 2013 in 34 countries, including France. In particular, we focus on practices related to the teaching methods used, classroom management, how to communicate, and the evaluative practices of teachers. In support of binary logistic regression models, we showed that the variables related to initial training play a weak role, and even exert a negative effect on certain pedagogic practices, leading to a reflection on the renovation of this training. On the other hand, our analyses highlighted the greater weight played by certain continuing education actions.

Keywords: Teacher training; Pedagogy methods and tools; Analysis of professional practice

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1. Introduction

In France, the initial professional training of secondary school teachers was entrusted to the regional teaching centers in 1952. The main task of these centers was to train future high school and college teachers in teaching practices [1], by providing teaching in general pedagogy, an introduction to subject didactics, and practical training through various forms of work experience. Following the Education Orientation Act of 10 July 1989 (the Jospin Act), these centers were closed to make way for the creation of University Institutes for Teacher Training (IUFM) in 1990. The aim of these institutes was to prepare future teachers for the CAPES (certificat d'aptitude au professorat de l'enseignement du second degré) competitive examination and then to support them over a one-year period during which successful candidates divided their time between teaching in real-life situations (under the supervision of an educational adviser) and periods of training at the IUFM. Until the 2000s, IUFMs were also responsible for in-service teacher training. Following the reforms of the early 2000s, the IUFMs were integrated into the universities, and the rectorates now supervise in-service training by drawing up a training plan. Initial training in the IUFMs continued to evolve in 2010, with a decree raising the level of study required

to become a secondary school teacher to a Master's level, leading to the creation of so-called "teaching" Master's degrees, incorporating various periods of work experience for students. In 2013, the Orientation and Programming Act of 08 July 2013, known as the Peillon Act, led to the creation of teacher training colleges (écoles supérieures du professorat et de l'éducation - ESPEs). Integrated into universities and renamed INSPEs in 2019 under the Blanquer Act, these schools provide initial training for students intending to work as teachers in education, while at the same time playing a key role in the ongoing training of education professionals.

These few retrospective elements on teacher training show that it is a genuine government concern, as confirmed by the new reform of training for future INSPE teachers, to be introduced in 2021, but also that it has been the subject of scientific debate for many years [2]. More specifically, the question arises as to what impact the training of secondary school teachers might have on their teaching practices.

Data from the TALIS (Teaching and Learning International Survey) international survey carried out in 2013 in 34 countries, including France, provide some answers to this question. This article is therefore devoted to analyzing the effects of secondary school teacher training on their teaching practices through a secondary analysis of the data from this survey.

2. Training secondary school teachers: Challenges and limits

Since the 1990s, a great deal of work has been done on the professionalization of teachers, exploring the complexity of this concept, its issues, and its practices [3-5]. There has also been a great deal of writing on teacher professional development, a polysemous concept whose concepts and theories are so diverse that it is difficult to identify a unified approach [6]. Few French empirical studies have been produced on the specific case of secondary education and, more specifically, on teacher training.

2.1. Initial training that is too "theoretical"

The teaching profession has changed considerably since the early 2000s, becoming more complex as a result of the indeterminate nature of the tasks entrusted to teachers [7]. This situation is likely to have an impact on initial teacher training and, in particular, on the way teachers are trained. This is the source of recurring tensions that lead teachers starting their careers to be critical of the gap between the way they have been trained and the way in which they are called upon to practice their profession. Even when the IUFMs were set up in 1991 with the aim of outsourcing professional training deemed insufficient, teacher training was often described as too "theoretical" by trainees, who felt that it was too far removed from what they were really experiencing and that it dispensed "politically correct" pedagogical and didactic doxas [8]. Daguzon and Goigoux [9] showed that this distortion between theory and practice can take several forms. On the one hand, it may be considered that the resources offered in training, although deemed useful, are too difficult for a novice teacher to mobilize because of his or her level of skills. On the other hand, trainers are sometimes considered to be too far removed from the field or too focused on the learning dimension, whereas teachers are in fact also faced with pedagogical and classroom management issues. In addition, some trainees feel that the teaching they receive does not correspond to their immediate expectations, revealing a time lag that is often problematic in training. Périer showed that cross-disciplinary teaching, particularly in the humanities and social sciences, is also highly criticized because of the gap between theory and practice. This situation no doubt explains the figures quoted by the French Department of Evaluation, Forecasting and Performance (DEPP): according to a survey conducted in 2014, while 90% of French teachers say they are well prepared in their subject area, "far fewer feel that this is the case in terms of teaching, whether in terms of the content to be taught (60%) or classroom practices (58%)" [10]. This perception that initial teacher training is inadequate can have far-reaching consequences, insofar as the first few

years in the profession are recognized as having a major influence on a teacher's professional development, as this is a period when various adjustments are made [11]. According to Ambroise and her colleagues [12], there are several periods during the first few years in the profession: the first is a period of "anticipation," during which teachers are both enthusiastic and anxious at the idea of facing their first class. The second begins with the discovery of the field, often accompanied by a period of disenchantment during which the novice teacher may question his or her professional choice. Finally, there is a "stabilization" phase, during which the teacher builds up a sort of professional routine.

Lastly, Rayou and Véran [13] noted that it is "the discontinuity between the times, places and players involved in training and professionalization that weighs on the conditions for entry into the profession."

To remedy these difficulties, the creation of the ESPEs in 2013, transformed into INSPEs in 2019, was accompanied by a strong desire to transform initial teacher training. The ESPEs have largely put in place systems to train teachers to become truly reflective practitioners, capable of analyzing their own practices. Today, the government has the ambition of integrating initial teacher training on a continuum, allowing "a gradual entry into the career with support and taking responsibility adapted" [14]. This is also what Desbiolles and his colleagues [15] recommended in a report on the establishment of the ESPEs, indicating that it is necessary to go beyond the single framework of the two-year MEEF (Métiers de l'enseignement, de l'éducation et de la formation) master's degree for initial training. The aim of the reform is "to standardize the training on offer with a renewed continuum between renewed initial training, continuing training (during the first three years of practice) and continuing training." For the time being, there is not enough time to assess the real impact of the reform on teachers' initial training, or the link with their in-service training, which has hitherto been deemed inadequate [16].

2.2. Continuing training in France is unclear

Until the 2000s, in-service training for secondary school teachers was the responsibility of the IUFM. At the request of teachers, training courses were organized outside the school holidays. However, not all of them were in the field of pedagogy. Moreover, from a legal point of view, teachers were under no obligation to attend these training courses. Following the reforms of the 2000s, in-service training was supervised by the education authority, which was given the task of drawing up a training plan. It was further transformed in 2013 with the establishment of the ESPEs, which were given a key role in the in-service training of teachers, whereas the IUFMs had gradually lost this role. According to a DEPP survey produced in 2013 and published in 2014, just over one teacher in two (54%) said that in the twelve months prior to the survey they had taken part in courses or workshops on the subjects taught, teaching methods, and other aspects related to education; one teacher in five said they had attended educational conferences or seminars; 18% said they were part of a teacher network focused on in-service teacher training and 13% said they had contributed to mentoring, peer observation or tutoring activities officially organized in the school. This finding raises questions, given that teachers benefit from a wealth of training resources [16]: in addition to the training offered by the national training plan, teachers are also offered training through academic training plans, local initiative training designed to support teaching teams in schools, the courses offered by the M@gistère platform and the online resources created and offered by Canopé [17]. Similarly, various educational movements, such as the Cercle de recherche et d'action pédagogique (CRAP-Cahiers pédagogiques), the Groupement français d'éducation nouvelle, and the Institut coopératif de l'école moderne, to name a few, work together with secondary school teachers to support them in developing their professional practices. The CARDIEs (academic research, development, innovation, and experimentation units) also play a key role in encouraging and promoting the implementation of innovative or experimental

teaching initiatives. The introduction in 2015 of the certificat d'aptitude aux fonctions de formateur académique (CAFFA) means that secondary school trainers now share a common framework and reference framework with certifications organized by the rectorates, in addition to the specific MEEF master's degrees offered by the INSPEs. However, Tardy and her colleagues [16] highlighted the fact that, despite these arrangements, there is a real and growing gap between teachers who train a great deal and those who train little, or even do not take part in any training, as well as growing tensions "between a dominant training model that is being re-produced and new training methods that are evolving rapidly." In reality, this multiplicity of resources is accompanied by their being spread too thinly over a number of platforms, making them difficult to understand and preventing teachers from getting to grips with them easily. The training courses are also said to be insufficiently tailored to teachers' professional contexts, failing to take sufficient account of their expectations [16]. According to the results of the 2013 TALIS survey, the absence of incentive measures and the lack of time due to family responsibilities are additional reasons why teachers do not take part in in-service training activities. Despite the establishment of the INSPEs, which are linked in particular to the desire to develop in-service training for teachers, this issue still remains problematic: a survey carried out in 2019 on the occasion of the Assises de la formation continue des enseignants among 41,000 individuals, 60% of whom teach at secondary level, shows that almost half of the respondents have attended between 4 and 10 days of training over the last three years. Three-quarters of teachers felt that the training on offer was insufficient or very insufficient in terms of quantity and 65% felt that it was insufficient in terms of quality [17]. These results raise questions about the impact of teacher training on teaching practices.

2.3. Issues involved in analyzing teachers' teaching practices

These findings lead us to look more closely at the case of French teachers. How does the initial and in-service training of college teachers influence their teaching practices? It is to this question that this study sets out to provide some answers. In other words, we seek to quantify the impact of initial and in-service teacher training on their teaching practices. Analysis of the factors influencing teachers' teaching practices is crucial because of the proven effect of these practices on student learning. Indeed, for Tardy and colleagues [16], teachers' professional skills are widely considered to be an essential condition for the effectiveness of education systems. Of course, Carette [18] noted a distortion between research based on the paradigm of processes produced to determine the characteristics of teachers considered to be effective on the basis of the results obtained by pupils in assessment tests, and the pedagogical principles commonly advocated in initial or in-service teacher training. After administering 6 tests to 1257 pupils in 16 Belgian schools between 2000 and 2003, he showed that "determining the characteristics of effective teachers would depend on the content and form of the tests to which their pupils are subjected in order to measure this effectiveness" [18].

That said, it is acknowledged that some teaching practices are perceived as being more effective and fairer than others [19]. In primary education, teaching practices are thought to explain between 10 and 20% of the variance in pupil performance at the end of the year [20-22]. This effect is also greater than the school or class effect [19]. Research on the subject has identified the characteristics of so-called "effective" teaching practices, and Talbot produced an eloquent summary of this in 2012.

Although we now know more about the role of teaching practices on pupil learning, research into the processes at work in the construction of these practices, and more specifically into the effect of teacher training on the pedagogical practices they use in teaching, is rarer in France. Consequently, based on the hypothesis that teacher training (initial and in-service) has a significant influence on their teaching practices, we are studying the role played by the dimensions of training selected in this study on the various teaching practices analyzed.

3. Teaching practices in TALIS

Teaching practices are described quite broadly by Bru [23] in terms of the combination of conditions favorable to pupils. “Based on this definition, Amélie Duguet considered teaching practices as representing all the actions implemented by the teacher, more or less consciously, with a view to helping students acquire knowledge.” It appears that the TALIS survey questioned a certain number of these actions, considered to be teaching practices.

3.1. Training data collected by TALIS

The aim of the survey, which was conducted by the OECD in 2008 and repeated in 2013 in 34 countries, was to gather data on teachers’ working conditions, their teaching environment in educational establishments, their teaching practices, their training, their sense of personal effectiveness, and their professional satisfaction in schools at level 2 of the International Standard Classification of Education, which in France corresponds to college level. The implementation of the survey at the DEPP is responsible for conducting the survey. A sample of 250 headteachers and around twenty teachers in each of these schools, selected at random by the DEPP, were interviewed using an online survey (the questionnaire for headteachers did not include the same items as the one for teachers). In the end, 3002 teachers in 204 colleges completed the questionnaire. TALIS looks at teacher training from several angles. Firstly, at the level of their initial training, teachers were questioned about the highest level of training they had achieved, the nature of the elements included in the training followed within the institutional framework, and also their feelings about their preparation for teaching. On the other hand, in-service training can be defined as enabling teachers to learn procedures, to learn how to learn, and to put their knowledge into practice to promote their pupils’ progress [24]. It is apprehended through the training, initiation and tutoring activities in which teachers have participated in the last twelve months prior to the survey, but also through the support received for undertaking these activities, their effects on teaching as reported by the latter, and the obstacles that have prevented them, according to their statements, from participating in in-service training activities.

3.2. The choice of teaching practices included in the analyses

An article aimed at analyzing the structure of secondary school teachers’ teaching practices on the basis of data from the TALIS survey identified more precisely four dimensions to which the teaching practices studied in TALIS relate the methods used, classroom management, the way of transmitting and, finally, assessment practices. Based on this categorization, we sought to explain virtually all the practices selected. It should be noted, however, that two practices were used by more than 99% of teachers: “explaining things differently, for example when pupils have difficulty understanding” and “encouraging pupils to respect classroom rules.” As they were not varied in the teachers’ responses since they were used by most of them, they were excluded from the analysis. **Table 1** shows the frequency with which the practices were used by the teachers in the sample.

According to the OECD [25], less than a third of the teachers in the sample, or even less than a fifth, use teaching practices that are similar to active teaching, such as working in small groups, projects lasting more than a week, or the use of ICT. Similarly, few teachers give pupils different assignments, have several teachers in the same class, let pupils assess their own progress or administer standardized tests, a practice that is more a part of the educational tradition in other countries, such as the United Kingdom or Republic of Korea, which have a strong assessment culture. On the other hand, almost 80% of French teachers apply different teaching methods in class, help pupils to value the act of learning, and use a variety of assessment methods. Controlling disruptive behavior in class and helping pupils to realize that they can achieve good results at school are particularly prevalent among the teachers in the sample.

4. What links are there between the practices used and training?

Teacher training in TALIS is covered by a large number of variables. We therefore had to select some of them in order to introduce them into our analyses.

Table 1. Breakdown of French teachers according to their teaching practices (%)

	Teaching practice	Never/rarely	Often/every session or almost	No answer
Methods used	Applying different teaching methods in the classroom	16	76.8	7.2
	Giving different assignments to students with learning difficulties and/or those who can progress faster	67	18.8	14.2
	Getting students to work on projects that take them at least a week to complete	65.8	18.7	15.5
	Giving the students similar exercises until the teacher is sure they have all understood the material.	37.4	47.2	15.4
Class management	Controlling disruptive behavior in the classroom	5.1	87.9	7
	Teaching several teachers in the same class	80.5	12.9	6.6
	Getting students to work in small groups to find a solution to a problem or exercise together	53.9	31.8	14.3
Way of transmitting	Helping students to value learning	12.5	80.6	6.9
	Motivating students who show little interest in their schoolwork	21.9	71.2	6.9
	Encouraging students to realize that they can achieve good results at school	4.6	88.8	6.6
	Using a problem from everyday life or the world of work to demonstrate the usefulness of new knowledge	36.7	48.7	14.6
	Presenting a summary of what has just been seen	21.6	63.9	14.5
	Observing students as they carry out a particular task in class and give them feedback on their work	18	67.8	14.1
	Adding a written comment to the numerical mark or assessment of the students' work	22.2	62.9	14.9
	Correcting students' exercise books or homework	28.4	55.8	15.8
	Getting students to use ICT in the classroom or on projects	64.4	20.7	14.9
Assessment practices	Using a variety of assessment methods	10.8	82.2	7
	Designing and administering your own test	12.4	73.5	14.1
	Administering a standardized test	77.7	6.8	15.5
	Letting students assess their own progress	71	14.3	14.7
	Getting students to answer questions in front of the class	36.4	49	14.6

Our choice was based on the highest level of initial training achieved, the elements included in the institutional training received from the point of view of the content, pedagogy, and teaching practices of the subject(s) taught, the teachers' involvement in mentoring activities, their participation in in-service training activities over the last twelve months, the subjects covered by the in-service training activities in which they participated and the support received for engaging in these activities. To find out the breakdown of teachers regarding these different dimensions of training, we invite the reader to refer to the DEPP note [10]. A list of

selected items is available in **Appendix 1**.

We began by using chi-square tests to determine the links between variables relating to teacher training and their teaching practices. We then incorporated the significant variables into binary logistic regression models in order to determine the effect, all other things being equal, of items relating to teacher training on the probability of teachers using or not using a particular practice. The dependent dichotomous variables introduced into the models are therefore the various teaching practices as presented above. In addition to the variables related to teacher training, we included several control variables as explanatory factors for teacher practices: the teacher's gender, age, number of years of experience, and status. It should be noted that the majority of the teachers in the sample were women (66.4%), had permanent jobs (95.4%), were 41 years old on average, and had an average of sixteen years' experience in the teaching profession.

Box 1: Binary logistic regression

Modelling a qualitative variable requires the use of logistic regression. This involves predicting the probability of an individual being "classified in one or other of the categories of the response variable" [26]. When the variable to be explained is composed of two modalities, we speak of a binary logistic regression model. Interpreting the estimates in terms of odds ratios means taking into account the exponential of the regression coefficient exp(B). Let's take an example: we are interested in the probability of a teacher administering a standardized test according to gender. If a coefficient greater than 1 is associated with the active modality (woman), this means that the probability of a woman using this practice is greater than that of a man. On the other hand, if the value of the coefficient is less than 1, we will consider that a woman is less likely to use this practice than a man. The odds ratio therefore represents the ratio of the risk of an event occurring to one group of teachers (for example, men) to that of the same event occurring to another group of individuals (in this case, women). These odds ratios should be interpreted in the light of their significance, determined using a null hypothesis test (Student's t), which reads as follows: $t < 1.6$: Not significant (ns); $1.6 \leq t < 1.9$ significant at the 10% threshold (*); $1.9 \leq t < 2.7$ significant at the 5% threshold (**); $t \geq 2.7$ significant at the 1% threshold (***). Finally, the value of the coefficient of determination (Nagelkerke R^2) indicates the proportion of variance explained by the factors included in the model.

This analysis process led us to construct a large number of regression models, which would be long and tedious to present on a case-by-case basis. We therefore offer the reader a summary of the main results.

The table in **Appendix 2** shows, for each teaching practice considered, the variables that have a significant influence on them. Not all teaching practices are influenced by the same type of teacher training variables.

Firstly, it emerges that the level of initial education has an unexpected effect on two practices: having a level of education equal to or less than Bac+2, rather than a bachelor's or master's degree, increases the likelihood of having students work on a project lasting a week or less, as well as having students work in small groups to find a solution to a problem or exercise. On the other hand, it reduces by a factor of three the likelihood of adding a written comment to the numerical mark or assessment of students' work. Furthermore, initial training tends to play a negative role in active teaching practices: for example, elements contained in initial training relating to the content of the subjects taught reduce the chances of getting students to work on projects that take them a week or less, while elements relating to the pedagogical practices of the subjects taught play a negative role in the use of ICT by students in class or in projects. Elements of initial training relating to the pedagogy of the subjects taught reduce the likelihood of correcting students' exercise books or homework. This last variable does, however, have a positive influence on the use of differentiated teaching methods and allow pupils to assess their own progress.

Involvement in monitoring activities is a double-edged sword: a teacher who monitors one or more

colleagues is 2.670 times more likely to help his or her pupils value their learning and 2.482 times more likely to motivate pupils who show little interest in their schoolwork. On the other hand, the results of the models carried out show that the fact of having been assigned a monitor to support them reduces the teacher's likelihood of motivating students who show little interest in their school work (associated coefficient 0.559**) and of developing and administering their own tests (associated coefficient 0.555**).

The in-service training activities in which teachers had participated over the previous twelve months had a disparate effect on their teaching practices. Participation in a qualification program had no significant effect on teaching practices. Participation in courses or workshops reduces the likelihood of developing and administering one's own test. On the other hand, other activities play a positive role, such as participation in conferences and seminars, which gives students slightly more than 1.3 chances of correcting exercise books or homework and using ICT. Similarly, participation in tutoring, peer observation, or coaching activities officially organized in the school significantly increases the probability of referring to a problem in everyday life or in the world of work to demonstrate the usefulness of new knowledge. In addition, a teacher who has taken part in an observation visit to commercial premises, public bodies, or non-governmental organizations is about 1.7 times more likely to teach several teachers in the same class, to refer to a real-life problem as part of his or her practice and to let the students assess their own progress.

However, two types of in-service training activity are particularly prominent in explaining teachers' practices: firstly, participation in individual or group research on a subject of interest to the teacher. This activity gives the teacher 1.3 to 1.6 chances, in addition to applying different pedagogical methods, to give different work to pupils with learning difficulties and/or who can make faster progress, to get pupils to work on projects that take them a week or less, to get pupils to work in small groups to find the solution to a problem, referring to a real-life problem to show the usefulness of new skills, presenting a summary of what has just been seen, observing students as they carry out a particular task in class, correcting exercise books or letting students assess their own progress. On the other hand, participation in a teacher network created specifically for the professional development of teachers increases the chances of having several teachers in the same class by 1.4 times, of applying different teaching methods in a class by 1.5 times, of giving different work to students with learning difficulties and/or who can make faster progress by 1.6 times, and of having students work in small groups to find the solution to a problem by 1.7 times. However, this same in-service training activity has a slightly greater negative impact on the teacher's chances of adding a written comment to the mark, correcting exercise books, and getting pupils to use ICT in class or on projects.

Of the 14 items relating to the subjects covered by the in-service training activities in which teachers had participated over the previous twelve months, only 6 were found to explain teachers' practices. Some of them play a negative role: for example, classroom management and student behavior give teachers 1.6 fewer chances of getting their students to use ICT. Similarly, teaching in a multicultural or multilingual environment gives teachers almost half the chance of developing and administering their own tests. Furthermore, a teacher who has taken part in an activity focusing on knowledge and mastery of the subject has a lower probability of administering a standardized test. Conversely, this variable increases the chances of motivating students who show little interest in schoolwork.

Other subjects covered by in-service training activities also play a positive role: for example, knowledge of course syllabuses (which increases the likelihood of helping students to value their learning, and of making them realize that they can achieve good academic results) and student assessment practices: a teacher who has taken part in this type of training is around 1.5 times more likely to differentiate teaching methods and to let students assess their own progress. Similarly, having taken part in training on new technologies in the world

of work is 2.7 times more likely to help students value their learning and 6.3 times more likely to use different assessment methods, giving this training content a considerable role.

Turning now to the support received during continuing education, we find that there is no significant effect of having benefited from a modified timetable for activities held during course hours. Non-financial support for activities held outside working hours had an effect on a single practice: it reduced the likelihood of using various assessment methods. On the other hand, a teacher who received extra pay for activities outside working hours was 2.4 times more likely to let pupils assess their own progress.

Certain elements included in in-service training activities have a negative impact on teachers' practices: this is the case for activities focusing on collective learning or collective research with other teachers, which reduce the likelihood of referring to a real-life problem, using various assessment methods and having students answer questions in front of the class. Similarly, a teacher who is offered the opportunity to actively learn methods during in-service training activities is 1.3 times less likely to correct exercise books. On the other hand, they were 1.4 times more likely to refer to a real-life problem. In addition, the fact that in-service training activities are spread out over time significantly increases the teacher's likelihood of giving students similar exercises until the material is understood, monitoring disruptive behavior in class, and observing students while they are carrying out a particular task in class.

Finally, it should be noted that the gender and age of the teacher are variables whose effect on teachers' pedagogical practices should not be neglected. For example, being male reduces the likelihood of adding a written comment to the numerical mark, correcting pupils' exercise books, getting pupils to use ICT, developing and administering their own test, and administering a standardized test, while it makes them 1.6 times more likely to get pupils to work in small groups on a problem and to let them assess their own progress. In addition, the older the teacher, the greater the likelihood that they will help their pupils to value the act of learning, motivate those who take little interest in their schoolwork, and make them realize that they can succeed. This last result is undoubtedly related to the work of Ambroise *et al.* [12]: these teachers have probably reached the phase of "they are more likely to opt for student-centered rather than self-centered practices."

5. Discussion

These results raise the question of initial teacher training. Indeed, our analyses lead us to note a weak role for variables linked to initial teacher training and even a negative effect of the latter on certain practices. This finding echoes the work on the inadequacy of initial teacher training with the reality of teaching contexts [8,9]. In France, initial teacher training used to focus more on the content of the subjects taught [10], but the creation of the ESPEs, one of whose stated aims was to promote the development of innovative teaching methods, does not seem to have really solved the problem. It would therefore be interesting to study whether the advent of the INSPEs in 2019, which will integrate initial training more closely into a training continuum, will make it possible to bridge this gap.

Our analyses also raise questions about monitoring activities. Tutoring, as it is called in the French context, represents "all the activities carried out jointly by field instructors (pedagogical advisers or tutors) and/or university instructors (university supervisors) and teachers or students in training, and relating explicitly to the training of the latter" [27]. However, our results indicate that being assigned a tutor can have negative consequences for teachers' practices. This finding may seem surprising, given that, as Chaliès and his colleagues [27] pointed out in a review of the literature on the subject, tutoring in its most traditional form is said to have the virtue of encouraging emotional support for trainee teachers, helping them to come to terms with the

"reality of the job," building their identity as teachers, acquiring professional knowledge, and developing their reflective practice. In this sense, tutoring appears to be an essential component of training. However, its impact on training is also widely debated, and a great deal of research points to the need to revamp the traditional tutoring model and provide more training for tutors [27]. It also remains to be seen what effect the mixed tutoring model introduced in 2014 will have on teachers' practices, with tutoring being provided jointly by a teacher from a school or EPLE and a member of staff appointed by the ESPE.

As far as continuing training is concerned, our analyses call for discussion of the subjects covered during training. In fact, those relating to new technologies in the world of work stand out from the others by the strong positive coefficient associated with them in our models: it is as if the fact of being trained in new technologies in the world of work greatly increases the probability of teachers using various methods. This can undoubtedly be explained by the fact that many innovations have been tried out over the last fifteen years, aimed at using digital technology as a tool for improving assessment procedures. Even if, in the end, digital technology is often used to reinforce traditional assessment methods [28], the fact remains that there is a strong desire on the part of government bodies to encourage teachers to make greater use of digital technology in their assessment practices. Several studies reported by Morlaix and her colleagues [29] have also highlighted the positive effect of using digital technology in the classroom on student motivation and participation. In this context, it comes as little surprise that training in new technologies can have a major impact on helping teachers help their pupils to value the act of learning. In addition to the theme of new technologies and pupil assessment practices, participation in other training courses with content relating to knowledge of the syllabus could be further encouraged in order to reinforce the positive effects on teachers' teaching practices. On the other hand, there are more questions about the fact that many other training subjects play no role at all, or even have a negative effect on teachers' practices. The question arises as to whether it would be preferable to abolish these modules or, on the contrary, to develop them further and revise their content in order to examine whether their effect could be reversed and become positive.

Our analytical models also show that the rate of participation by French teachers in individual or group research is higher than in other OECD countries. This variable plays an explanatory role for a large number of teaching practices, as does participation in a teacher network. These results echo research work on teachers' collaborative practices. These practices go back a long way and have been both amplified and simplified by information and communication technologies [30]. In addition to the creation of associations, thematic communities have developed, giving rise to "discussions and debates, via blog posts or interposed forums" [30]. The 2015 PISA data also show that in the countries with the best results, professional exchanges and training between peer groups are preponderant and enable these education systems to evolve, leading political bodies to encourage teachers to work together. It is therefore easy to assume that these training modules enable teachers to share their practices and develop innovations in this area. Our results argue in favor of increasing teacher participation in this type of training.

It should also be noted that spreading in-service training over time has a positive influence on teaching practices. Here again, we should certainly refer to work on the different phases of the teaching career to understand these results [12]: as young teachers are in a "survival" phase, the temporal dimension influences their ability to shift the focus from self-centeredness to pupil-centeredness. The temporality of training is therefore likely to be crucial in supporting them in this shift from one to the other.

Our results also show how important it is that teachers should not attend these courses only occasionally, and often too infrequently, but that they should form part of a coherent long-term training project. Even today, it is often observed that a large number of teachers participate in virtually no in-service training [16].

In addition, the finding that financial support has a positive effect on the practice of letting pupils assess their own work opens the way to a debate on the remuneration offered to teachers outside teaching hours. As Larré [31] pointed out, monetary incentives have direct implications for teacher behavior. Agency theory highlights the importance of this type of incentive, considering that teachers do not differ from the behavior of the mass of other workers with regard to monetary considerations [31]. In some respects, therefore, pay can be seen as a motivating factor and an incentive to effort. However, the results on this variable should be interpreted with caution, as only 3.4% of French teachers claim to have received a salary supplement.

6. Conclusion

Little research has been done in France on the links between the professional training of secondary school teachers and their teaching practices. Consequently, in this article, using data from the TALIS database, we studied the effect of teachers' initial and in-service training on the practices they say they use with their pupils. To do this, we constructed binary logistic regression models. These validated our hypothesis of the effect of teachers' professional training on their teaching practices, and led us to make a series of observations: firstly, it appears that the variables linked to training have a disparate effect on teachers' teaching practices. While some play no role, or even a negative role, in explaining teachers' practices, others are real factors in explaining the likelihood of a teacher using a particular practice.

In addition, continuing education seems to carry more weight in explaining these practices than initial training, although this observation must be put into perspective because of the small number of elements taken into account in the analysis concerning the latter type of training. In addition, our results provide some food for thought regarding training initiatives that would undoubtedly benefit from further development.

Admittedly, this research comes up against certain limitations. For example, the TALIS data was collected through a questionnaire survey. It would have been interesting to be able to supplement this analysis by collecting data of a more qualitative nature, such as interviews and in situ observations of teachers' practices and the professional development activities in which they participated. This type of material would undoubtedly have provided additional insights into the results presented in this article. Furthermore, our analyses may be subject to certain biases, linked to the potential collinearity of certain variables that we were unable to control. In addition, it would have been interesting to carry out these analyses in relation to the subjects taught by the teachers, in order to see whether the training initiatives might have had more of an effect on the practices of teachers of certain subjects rather than others. This research is also based on data dating from 2013, which may already be considered old, particularly given the changes that have taken place in the training of young teachers with the creation of the ESPEs, which have since been transformed into INSPEs. The aim of the latter is to renew teacher training, helping teachers to adopt teaching practices that are conducive to the success and well-being of all pupils. Nevertheless, this secondary analysis of the data opens the way to a number of debates and research perspectives. If we return to the role of the INSPEs, they are expected to be particularly involved in training teachers in the use of digital technology. We could then look more closely at the effect of in-service training organized within the INSPEs on teachers' digital practices. Lastly, there is a broader issue concerning the factors taken into account in the analysis. The models presented in this work explain less than 10% of the variance in the probability of using the practices mentioned. While such a result demonstrates the importance of not neglecting teacher training to explain their practices, it also shows that it is necessary to take other factors into account to arrive at models with greater explanatory power. New analyses could therefore be produced incorporating variables that are more closely linked to the teaching context, such as the pedagogical

environment in educational establishments, and others that are more dependent on teachers' personal characteristics, such as their sense of self-efficacy.

Disclosure statement

The authors declare no conflict of interest.

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Appendix

Elements included in the initial training

1. Content of subjects taught
2. Pedagogy of the subjects taught
3. Teaching practices in the subjects taught

Current involvement in mentoring activities

1. I act as a monitor for one or more teachers
2. I am currently assigned a monitor to support me.

Participation over the last 12 months in one of the following continuing education activities

1. Courses / workshops (e.g. on subject or methods and/or other education-related topics)
2. Conference / seminar on education
3. Observation visits to other schools
4. Observation visits to commercial premises, public bodies, non-governmental organizations
5. Continuing education courses on the premises of companies, public bodies or non-governmental organizations
6. Qualification program (leading to a diploma)
7. Teacher network created specifically for the professional development of teachers
8. Individual or group research on a subject of interest to the teacher
9. Tutoring, peer observation or coaching activities officially organized in the school

Subjects covered by in-service training activities in which the teacher has participated in the last 12 months

1. Knowledge and mastery of the subject(s) taught
2. Teaching skills in the subject(s) taught
3. Knowledge of course programs
4. Student assessment practices
5. ICT skills to support teaching
6. Classroom management and student behavior
7. Management and administration of the establishment
8. Individualized teaching approaches
9. Caring for pupils with special educational needs
10. Teaching in a multicultural or multilingual environment
11. Teaching cross-disciplinary skills (e.g. problem-solving, learning methods)
12. Approaches aimed at developing cross-disciplinary skills useful for further study or the world of work
13. New technologies in the world of work
14. Advice and career guidance for students

Help/support received for in-service training activities in which the teacher participated

1. I benefited from the time set aside for these activities, which were held during school hours at this school (adjusted timetable).
2. I received extra pay for activities outside of working hours
3. I have benefited from non-financial support for activities held outside working hours (reduced teaching

load, days off, study leave).

Elements included in in-service training activities in which the teacher has participated

1. Activities carried out with a group of colleagues working in the same school or teaching the same group of subjects
2. Activities offering the opportunity to actively learn methods
3. Activities focusing on collective learning or collective research with other teachers
4. Activities spread over time (several sessions spread over several weeks or months)

Appendix 1. List of explanatory variables used in logistic regression models

Teaching practices	Training-related variables	Sign.	value coeff. Ex(B)
	Teaching method		
Apply different teaching methods in class (R2 = 5.2%)	Participation in a teacher network created specifically for the professional development of teachers	**	1,509
	Participation in individual or group research on a topic of interest to the teacher	***	1,812
Give different work to students who have learning difficulties and/or those who can progress more quickly (R2 = 9.6%)	Elements included in initial training: pedagogy of the subjects taught	***	1,817
	Participation in a teacher network created specifically for the professional development of teachers	***	1,599
	Participation in individual or group research on a subject of interest to the teacher Topics	**	1,348
	covered by continuing education activities: student assessment practices	**	1,484
Have students work on projects that take them at least a week (R2 = 3.9%)	Bac+2 level or less (License or Master level reference)	**	2,025
	Elements included in initial training: content of subjects taught	**	0,552
	Participation in individual or group research on a subject of interest to the teacher Elements	***	1,383
Give similar exercises to students until the teacher is sure that they have all understood the material (R2 = 1.2%)	included in continuing education activites: activities spread over time (several sessions spread over several weeks or months)	**	1,337
	Classroom management		
Control disruptive behavior in class (R2 = 6.3%)	Elements included in initial training: pedagogy of the subjects taught	***	2,040
	Elements included in continuing education activities: activities spread over time (several sessions spread over several weeks or months)	**	1,807
Teaching several teachers in the same class (R^2 = 3.3%)	Participation in observation visits to commercial premises, public bodies, non-governmental organizations	**	1,738
	Participation in a teacher network created specifically for the professional development of teachers	**	1,405
Have students work in small groups to find a solution to a problem or an exercise together (R2 = 8.8%)	Gender (reference: female)	***	1,603
	Bac+2 level or less (Bachelor or Master level reference)	***	2,998
	Participation in a teacher network created specifically for the professional development of teachers	***	1,745
	Participation in individual or group research on a subject of interest to the teacher	***	1,558
	Way of transmitting		
Help your students value the fact of learning (R2 = 8.9%)	Age	**	1,050
	Serve as a monitor for one or more teachers:	**	2,670
	Topics covered by continuing education activities: knowledge of course programs	***	1,478
	Topics covered by continuing education activities: new technologies in the world of work	***	2,724

Motivate students who show little interest in their schoolwork (R2 = 6,7%)	Age	***	1,050
	A monitor has been assigned to the teacher to support him	**	0,559
	Serve as a monitor for one or more teachers:	***	2,482
	Subjects covered by continuing education activities: knowledge and mastery of the subject(s) taught	***	1,432
Help students realize that they can achieve good academic results (R2 = 6%)	Age	***	1,053
	Topics covered by continuing education activities: knowledge of course programs	**	1,761
Refer to a problem in everyday life or the world of work to show the usefulness of the new acquired knowledge (R2 = 6.9%)	Participation in observation visits to commercial premises, public bodies, non-governmental organizations	**	1,762
	Participation in individual or group research on a topic of interest to the teacher	***	1,431
	Participation in tutoring, peer observation, or coaching activities officially organized in the establishment	**	1,605
	Elements included in continuing education activities: activities offering the opportunity to actively learn methods	**	1,387
	Elements included in continuing education activities: activities focused on collective learning or collective research with other teachers	**	0,746
Present a summary of what has just been seen (R2 = 1.1%)	Participation in individual or group research on a subject of interest to the teacher	***	1,372
Observe students as they carry out a particular task in class and provide them with feedback on their work (R2 = 2,9%)	Participation in individual or group research on a subject of interest to the teacher	**	1,430
	Elements included in continuing education activities: activities spread over time (several sessions spread over several weeks or months)	**	1,506
Add a written comment to the numerical grade or assessment of student work (R2 = 8,4%)	Gender (reference: female)	***	0,519
	Bac+2 level or less (Bachelor or Master level reference)	***	0,313
	Participation in a network of teachers created specifically for the professional development of teachers	**	0,629
Correct student exercise books or homework (R2 = 7.3%)	Gender (reference: female)	***	0,503
	Elements included in initial training: pedagogy of the subjects taught	**	0,702
	Participation in education conferences/seminars	**	1,377
	Participation in a teacher network created specifically for the professional development of teachers	***	0,638
	Participation in individual or group research on a subject of interest to the teacher	**	1,310
	Elements included in continuing education activities: activities offering the opportunity to actively learn methods	**	0,761
Have students use ICT in class or in projects (R2 = 8.3%)	Gender (reference: female)	***	0,480
	Elements included in initial training: teaching practices of the subjects taught	**	0,629
	Participation in education conferences/seminars	**	1,380
	Participation in a teacher network created specifically for the professional development of teachers	***	0,611

	Topics covered in continuing education activities: classroom management and student behavior	**	0,636
	Evaluation practices		
Use various evaluation methods (R2 = 6.4%)	Topics covered by continuing education activities: new technologies in the world of work	**	6,352
	The teacher benefited from non-financial support for activities that took place outside of working hours (reduction in teaching load, days off, study leave)	**	0,621
	Elements included in continuing education activities: activities focused on collective learning or collective research with other teachers	**	0,638
Develop and administer your own test (R^2 = 3.7%)	Gender (reference: female)	***	0,606
	A monitor has been assigned to the teacher to support them Participation in courses/workshops (e.g. on subject or methods and/or other education-related topics)	**	0,555
	Topics covered by continuing education activities: teaching in a multicultural or plurilingual environment	**	0,718
		**	0,525
Administer a standardized test (R^2 = 3%)	Gender (reference: female)	***	0,606
	Subjects covered by continuing education activities: knowledge and mastery of the subject(s) taught	***	0,683
Let students evaluate their progress themselves (R2 = 8%)	Gender (reference: female)	**	1,648
	Participation in observation visits to commercial premises, public bodies, non-governmental organizations	**	1,753
	Participation in individual or group research on a subject of interest to the teacher	***	1,664
	Topics covered in continuing education activities: student assessment practices	**	1,530
	The teacher received extra pay for activities outside of working hours	***	2,360
Have students answer questions in front of the class (R2 = 5.1%)	Gender (reference: female)	***	0,575
	Elements included in continuing education activities: activities focused on collective learning or collective research with other teachers	***	0,715

Appendix 2. Effect of teacher training variables on teaching practices