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Peer review methodology in online environment for in-service and pre-service teachers education

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Abstract. Lo scopo di questo lavoro è quello di analizzare l'efficacia della metodologia di peer review in ambiente online, sperimentata in corsi per insegnanti di matematica in servizio e pre-servizio, e di riconoscerne le somiglianze e le differenze. Questo lavoro mira anche a mostrare come una piattaforma di e-learning possa essere utilizzata per implementare la metodologia di peer review al fine di sviluppare le capacità di progettazione degli insegnanti. Per l'analisi dei dati, abbiamo utilizzato il quadro teorico della Trasposizione Meta-Didattica (MDT), alla ricerca di cambiamenti nelle prasseologie dei docenti. L'analisi dei dati mostra che la metodologia di peer review sembra essere una strategia efficace che permette agli insegnanti in servizio e pre-servizio di cambiare le loro prasseologie e di migliorare il loro ruolo di "educational designer". Rimangono, tuttavia, delle questioni aperte, che cercheremo di approfondire nei prossimi lavori.

1. Introduction and theoretical framework

In recent years we have experienced important and rapid changes in technology. Borba, Askar, Engelbrecht, Gadanidis, Llinares and Aguilar (2016) trace the steps of this evolution, focusing on the mathematics education. In the Nineties, the "read-only" web was born, more commonly known as Web 1.0 and, together with it, e-Learning 1.0 appeared and the concept of Learning Object as an autonomous and reusable digital entity (Chiappe, Segovia and Rincon, 2007). Students changed their way of communicating and new problems arose for research related to collaborative learning. As a result, Web 2.0 was born, offering the opportunity to participate to open communities and to become producers of information. Together with Web 2.0 also e-Learning 2.0 was born, according to which knowledge is seen as the result of social negotiation and learning as a process that arises within a community, which aims to achieve shared meanings. However, the need to define an individual perspective and to build one's own learning path starting from a plurality of points of view and topics, led to the e-Learning 3.0. This quick digression on technological evolution in recent years shows how educational research struggles to catch up with innovation. Indeed, technological progress influences the way students learn, but also the way teachers plan their educational activities (Clark-Wilson, Aldon, Cusi, Goos, Haspekian, Robutti and Thomas, 2014). Teachers focused on the results of educational research for a long time. However, this ongoing evolution confronts them with an important challenge: becoming researchers in educational design (Laurillard, 2012). There are many studies that highlight the possibility of improving how teachers design their learning activity (for example Hoogveld, Paas, Jochems and Van Merrienboer, 2002). In this context, the collective dimension, collaboration and participation in communities of inquiry (Jaworski, 2001) and dialogue with experts in the educational domain become essential components that can foster the development of new resources and patterns of use, according to the documental approach of Gueudet and colleagues (Gueudet, Buteau, Mesa and Misfeldt, 2014).

Starting from the above assumptions and, in particular, from the need for teachers to become researchers in educational design, we designed two training courses, the first one for in-service mathematics teachers (C1) and the second one for pre-service mathematics teachers (C2), in which we tested the peer review methodology in an online environment. Peer review can be seen as a new assessment method (Andersson et al, 2018), that allows participants to consider and specify the quality of a product or the performance of other

peer participants, e.g. through feedbacks (Topping, 2009). Each in-service and pre-service teacher first designed an Educational Path (EP) to be carried out in their classes or future classes on a specific mathematical content, then she reviewed a colleague's EP and finally she delivered a final version of her own EP which took into account the reviewer's feedback. The main aim of this work is to analyse the similarities and differences between C1 and C2, in terms of effectiveness of the peer review methodology, involvement of the participants and change in teachers' praxeologies. A praxeology includes, on the one hand, the "know-how", i.e. a family of similar problems and techniques available to solve them (praxis) and, on the other hand, the "knowledge", i.e. the argument or discourse that describes and justifies the techniques applied and that can produce new ones (logos) (García, Gascón, Ruiz Higueras & Bosch, 2006).

More in detail, our research questions are as follows: How does peer review methodology foster and design of educational pathways? What similarities and differences are there between two teacher training courses C1 and C2, in terms of the effectiveness of peer review methodology designed and implemented in an online environment?

This work also aims to show how an e-learning platform (specifically Moodle) can be used to implement the peer review methodology in order to develop teacher design capabilities.

In order to carry out our analysis we use the theoretical framework of Meta-Didactic Transposition (MDT) (Arzarello, Robutti, Sabena, Cusi, Garuti, Malara and Martignone, 2014), that originates from Anthropological Theory of Didactics (ADT) of Chevallard. It was developed to describe and analyse how two communities, the researchers' community and the teachers' one, influence each other when they interact in a mathematical training course for professional development. As in the ADT framework, the MDT framework refers to didactic transposition, but with a different meaning: it does not transpose a mathematical content, but a knowledge related to the teaching and learning of mathematics, to foster the professional development of teachers. During a training course for teachers, the researchers/trainers, through tasks, techniques and justifying discourses, aim to change the existing praxis of teachers, giving rise to new ones, starting from the syllabus and the objectives of the course. The tasks, techniques and discourses, developed in the teacher training processes, are called meta-didactic praxeologies in the framework of the MDT. During the meta-didactic transposition, external components (e.g. the use of specific ICT tools) may become internal components at the end of the course. New shared practices are generated not only through direct interaction between the two communities, researchers and teachers, but also through brokering. A broker is an intermediary that belongs to several communities and she facilitates the exchange and interaction among them promoting the transfer of knowledge related to the mathematics teaching and learning from one community to another (Rasmussen, Zandieh and Wawro, 2009). Within the framework of the MDT, teachers-researchers usually act as brokers between the two communities. However, from our point of view, the role of broker can also be played by an online platform, properly organized and structured by the researcher.

2. Methodology

We designed two training courses: a blended course (one part face-to-face and another online) for in-service mathematics teachers (C1), aimed at illustrating some research in mathematics education, transferable to didactic contexts; a course, completely online, of "Methodologies and technologies for Mathematics Education" for pre-service mathematics teachers (C2), aimed at training participants as prospective teachers.

C1 took place at the University of Salerno and focused on argumentative competence, as transversal competence in mathematics education. It consisted of 33 hours, splitted into 17 face-to-face hours (4 meetings) devoted to lectures and workshops with Mathematics Education experts, 12 hours for online work and 4 hours for a final discussion face-to-face meeting. The experts' training lectures focused on: mathematical rules and facts (first lecture); formative assessment and Black and William's strategies (Black & Wiliam, 2009) (second lecture); open problems (third lecture); linguistic competence (fourth lecture). The online activities were designed and carried out on the Moodle platform. The experimentation involved 166 mathematics teachers of all school levels: 34 primary school teachers, 27 middle school teachers and 105 high school teachers. At the end of the course, a certificate of participation was issued to teachers who attended meetings and engaged in online activities.

C2 was provided as part of the Master's Degree Course "Professione docente, tra saperi, abilità e certificazioni", at the University of Molise, for getting the 24 CFU (training credits) necessary for participants to be prospective teachers. The course, completely online, involved 108 pre-service middle and high school teachers and consisted of 30 hours. It was designed on Moodle platform and organized in three macro-sections[1]: main methodologies and theoretical frameworks developed in mathematics education research; study of processes mediated by the use of technologies; design and development of methodologies for mathematics teaching and learning. For each macro-section, on the Moodle platform, the lectures (downloadable in pdf format or viewable online in video format), a folder with scientific papers and a discussion forum were available. For each lecture the course's trainer started a discussion on the forum through a post summarizing the lecture and inviting the students to comment. At the end of the course, participants took an exam which consisted in describing the activities carried out by them during the course. In this regard, a final section on the platform was intended for the online activities that the pre-service teachers had to carry out before the exam. The final grade (expressed in thirtieths) took into account the performance of pre-service teachers in the online activities and their involvement on the forum discussions. The following Table 1 shows the methodological details of the two training courses and how the peer review methodology was implemented.

Table 1: methodological details of the two training courses C1 and C2

In both courses	Participants had to carry out online activities that consisted of designing, reviewing and redesigning educational paths (EP), concerning a certain chosen mathematical content. They had to expose the EP phases and, for each of them, specify the tools (e.g. software, textbooks) and methodologies (e.g. collaborative learning) used and how this was done. The peer review methodology was experienced in an online environment and implemented as follows. Each participant was asked: - to upload on the Moodle platform an EP on a specific mathematical content, usually carried out or to be carried out in their own classes, by means of the Moodle Workshop module (*Phase 1*); the platform automatically sorted the EPs among the participants, so that each participant was delivered a colleague's EP to review; - to review a colleague's EP according to specific review criteria providing feedback by means of the Workshop module (*Phase 2*); - to rework her own EP (if considered appropriate), starting from the reviewer's feedback, and submit the final version on the platform by means of the Moodle Task module (*Phase 3*). Specific instructions on how to carry out the activities were given to the teachers at each phase.
In C1	Phases 1, 2 and 3 were preceded by a *Phase 0* concerning an initial delivery of EP (using the Moodle Task module) before the interaction of the teachers with the experts, i.e. before the four face-to-face training lectures. The EP in Phase 0, therefore, is not influenced by the training course. Phase 1 started after the lectures with the experts and, in this phase, the teachers were asked to eventually modify their EPs and deliver a new version took into account the interaction with the experts. The revision criteria, in Phase 2, were detailed taking into account the lectures with the experts: after each lecture a new revision criterion was introduced and, therefore, a revision criterion was defined for each face-to-face training lecture. More in detail, the review criteria were as follows (criterion 1 is related to the first lecture, i.e. mathematical rules and facts; criterion 2 to the second lecture, i.e. formative assessment and Black and William strategies; criterion 3 to the third lecture, i.e. open problem; criterion 4 to the forth lecture, i.e. linguistic competence): 1. within the Educational Path you are reviewing, are there specific activities for the students' understanding of the "mathematical facts" dealt with (definitions, theorems)? If so, are these activities considered to be appropriate?

[1] Annex A of the Decree of 10 August 2017, no. 616, regulating the procedures for achieving the 24 CFU, necessary, in addition to the degree, to access the competition as a teacher, according to the provisions of Legislative Decree no. 59/2017, implementing Law no. 107/2015 (MIUR, 2017).

	2. are there any formative assessment sessions planned? If so, are any of Black and William's strategies made explicit? Is the technology used, and in what way? How is the argumentation present as a formative assessment tool? 3. are there any tasks proposed to the students that plan to describe the solving procedure and to justify the correctness? Are there open issues where the formulation and justification of conjecture is required? If not, do you think it is possible to introduce open-ended problem-solving activities? 4. are there tasks that require thinking about the validity of a statement through its interpretation in a mathematical context? Is the possibility that linguistic competence influences the results of tasks that require the elaboration of argumentative texts considered and evaluated?
In C2	Before Phase 1, participants were given some EPs examples. In Phase 2, the following review criterions was defined: "Are the design phases described in detail and designed in accordance (or in disagreement) with the theoretical references described in this course? Are the tools used in the classroom activities described? Are the ways in which learning can be assessed described? Have design choices been justified?". In Phase 3, participants were asked to summarise the adjustments in the "Comments" section of the Task module.

The peer review methodology was experienced with the aim of improving the design capabilities of the participants. Indeed, the peer review process allows each in-service and pre-service teacher to receive feedback on her own EP from a colleague, but also to review, and thus to observe, another colleague's EP. This dual mechanism can offer each participant the opportunity to improve her own EP in the Phase 3.

3. Data analysis

In this paper we want to analyse the similarities and differences between C1 and C2 courses in terms of effectiveness of the peer review methodology, by using the theoretical framework described above, i.e. the Meta-Didactic Transposition (MDT) (Arzarello et al., 2014). More in detail, we look for changes in teachers' praxeologies, i.e. changes in the design of their EPs (e.g. focus on argumentative competence, design of new activities, change of activities already designed) uploaded in Phase 3, i.e. after the peer review and, therefore, after each participant has received feedback from the reviewer. We analyse also the similarities and differences between C1 and C2 also in terms of participants' involvement, providing numerical data on the number of participants who have completed all phases. All data were collected through the Moodle platform.

4.1 Training course for mathematics in-service teachers (C1)

In C1 course, 166 in-service teachers were involved (34 primary school teachers, 27 middle school teachers and 105 high school teachers). Of these, 102 teachers completed all the phases and received the certificate of participation (22 primary school teachers, 22 middle school teachers and 58 high school teachers).

Previous data analyses have already been carried out, starting from the productions of the in-service teachers involved in this C1 course, developed in different ways in order to highlight different aspects. For example, Dello Iacono, Pierri and Taranto (2018) analysed primary school teachers EPs comparing the EPs in Phase 0, before the interaction with the experts, and in Phase 3, i.e. the final EPs at the end of the training course, after the peer review. The analysis showed that most primary school teachers changed their EP in Phase 3 compared to the Phase 0 delivery, i.e. as a result of the course lectures and the colleague's review. The researchers also show that some teachers not only change the activities previously designed in Phase 0, but even design new ones, aimed at developing argumentative skills in students. However, their analysis was conducted without using the MDT framework. In this paper, we want to compare the different analyses, providing new data and analyzing them by using the lenses offering by the Meta-Didactic Transposition (MDT) (Arzarello et al., 2014). Almost all the in-service primary school teachers, in the final version of EP (Phase 3), focused more on argumentative competence, often recalled during the lectures by experts (Phase 1). We report, for example, the comments of a teacher T1, who writes in Phase 3:

T1 *We have always to ask the children how they reasoned: they have to argue and then proceed to compare the different arguments.*

Many teachers also make explicit reference to the lectures in Phase 3, such as T2, which speaks explicitly of "mathematical facts", "formative assessment" and "self-assessment":

T2 *It is not appropriate to teach "rules", but it is necessary to propose problems and not just exercises. Even in textbooks the word "rule" or alternatively the sentences "you have to, you must, …" often recurs, but it is necessary to change the paradigm and replace the rules with facts, the exercises with problems, "I must" with "I can". It is necessary to foster a relational and not instrumental view of mathematics. This means making people grasp the differences among meanings so that knowledges can be transformed into competences.* [...] *The teacher will assess not only the product, but also the process that led to the final result, while students will express their satisfaction through self-assessment rubrics.*

It is interesting to note a change in praxeologies in both T1 and T2. In particular, the change in T2 design seems to be a consequence of the (first two) lessons with experts, i.e. Phase 1.

The focus on argumentative competence by the teachers in Phase 3 is not only the result of interactions with experts, but also a consequence of the reviews received from colleagues in Phase 2. For example, teacher T3, reviewing a colleague's EP, writes:

T3 *During the first phase the teacher proposes discussions and debates but there is no "section" where "all the arguments and reflections reported by students" are collected and recorded.*

T3 feedback leads the teacher T4, in Phase 3, to add problem-solving activities to her own EP with argumentation request. She writes:

T4 *In each phase, preliminary activities will be proposed aimed at constructing reasoning by means of worksheets that will allow students to find the solution of puzzles, arguing all possible alternatives.*

We can note that a change in the praxeologies in T4, that seems due to the feedback received from the reviewer T3, i.e. Phase 2.

Dello Iacono, Pierri and Taranto (2019) analysed the middle school teachers' EPs of the same experiment, comparing the deliveries in Phase 0 (before the interaction with the experts), in Phase 1 (after the interaction with the experts, but before the peer review phase) and in Phase 3 (after the peer review phase). They analysed the data using the MDT framework, but only to compare the EPs in Phase 0 and Phase 1, i.e. the experts were considered the only *brokers*, not considering the intermediation of the platform in the peer review phase as *brokering*. The researchers identified three categories of approaches to the EPs' re-design: in-service teachers who modified their EP taking into account only the input received during the course lectures (*Category 1*); in-service teachers who modified their EP taking into account only the reviewer's feedback (*Category 2*); in-service teachers who modified their EP taking into account both the course lectures and the reviewer's feedback (*Category 3*). Regarding Category 1, the teacher T5: in Phase 0 describes an EP not focused on argumentative competence; in Phase 2 receives positive feedback from the reviewer; in Phase 3 delivers a new EP focused on argumentative competence. It seems that the peer review influenced the delivery in Phase 3 poorly because the reviewer, though expressing positive judgements about the EP, failed to give useful suggestions to improve the design. T5, however, designs a new EP in Phase 3 with argumentation requests for the students. For example, in the redesigned EP, T5 proposes the following questions:

T5 *"Think of a number, multiply it by two, add five, subtract the number you thought of, add eight, subtract two, subtract the number you thought of, subtract one". In your opinion, is it possible that the teacher, not knowing the number you thought of, can guess your result? If so, in what way? Argue in an appropriate way. What happens if you add an even number and an odd number? Do you find a regularity? If so, why? Argue. And if you add two odd numbers, what happens? If you think it's true, write the statement.*

According to our theoretical framework, there seems to be a change in the praxeologies of the teacher T5 and his/her redesign seems to be the result of interaction with experts alone. However, T5, in Phase 2, reviews the EP of a colleague who expressly refers to argumentative competence. This could have a significant influence on her new EP design, which T5 calls "Argomentando" (Arguing).

As far as Category 2 is concerned, an example is given by T6, who: in Phase 0 describes an EP already focused on argumentative competence; in Phase 2 the review suggests to better clarify some points of the design and, in particular, to highlight the objectives and assessment methods and procedures; in Phase 3, she changes her own EP following the reviewer's suggestions. Therefore, it seems that the interaction with the experts had no significantly influenced T6 EP's design, which already contained explicit references to argumentation competence. The redesign in Phase 3, and therefore a change in the teacher's praxeologies according to the Meta-Didactic Transposition (MDT), instead, seems to be a consequence of the reviewer's request for clarification in Phase 2.

With regard to Category 3, significant examples are those of teachers T7 and T8. T7 makes substantial changes to her work in Phase 3, adding explicit references to the training course. She states that she appreciated the reviewer's comments because they allowed to analyse aspects that she had not considered. T8, on the other hand, in Phase 2, receives from the reviewer the suggestion to experiment the EP in order to evaluate its effectiveness and, in Phase 3, she attaches the transcripts of an experiment carried out in class with his students. Therefore, the changes in the praxeologies of T7 and T8 teachers (according to MDT framework) seem to be due both to the course lectures (Phase 1) and to the feedback received from reviewers during the peer review (Phase 2).

As far as high school is concerned, Albano, Dello Iacono and Pierri (2020) analysed teachers EPs of the same experiment, comparing (analogously to middle school teachers' case) the EPs in Phase 0, Phase 1 and Phase 3. They identified 3 levels that take into account any changes or improvements in the EPs carried out by teachers in the transition from different phases: *Level 0*, i.e. no changes or suggestions for changes; *Level 1*, i.e. reworking with change/integration of design details (e.g. methodologies, tools) without evidence of features resulting from interactions with experts or reviewer feedback; *Level 2*, i.e. rework explicitly influenced by expert interaction or reviewer feedback (e.g. focus on argumentative competence). The researchers show that the number of teachers at Level 0 decreases with the transition from Phase 1 to Phase 3 (consequence of peer review), while the number of teachers at Level 2 increases significantly. Moreover, in the transition from Phase 1 to Phase 3, 10 teachers at Level 1 reached the same level while 10 teachers reached Level 2. The achievement of Level 2 by in-service teachers can be seen as a significant change in teachers' praxeologies, according to the MDT framework.

Taking into account the data analysis carried out, we can state that almost all the teachers (both primary, middle and high school) modified their EPs (and therefore changed their praxeologies) taking into account the inputs received during the *meta-didactic transposition*. That is, both the course lectures (and the interaction with the experts) and the peer review phase (i.e. the platform properly organized and structured by the researcher), fostered a changing of the teachers' existing praxeologies, giving rise to new ones.

4.2 Training course for pre-service teachers (C2)

As far as C2 is concerned, all 119 pre-service teachers involved in the course completed all the activities. In this work we analyse the pre-service teachers' EPs by comparing the deliveries in Phase 1, Phase 2 and Phase 3. We can identify 3 categories of approaches to the EPs' re-design: *Category 1*, i.e. pre-service teachers who do not refer to the course content in Phase 1 and do not make substantial changes (e.g. references to the course, aspects concerning methodology, tools, assessment) in Phase 3 (27 pre-service teachers belong to this category); *Category 2*, i.e. pre-service teachers who do not refer to the course content in Phase 1 but make substantial changes in Phase 3 (19 pre-service teachers belong to this category); *Category 3*, i.e. pre-service teachers who make explicit references to the course content in Phase 1 but do not make substantial changes in Phase 3 (27 pre-service teachers belong to this category); *Category 4*, i.e. those who make explicit references to the course content in Phase 1 and substantial changes in Phase 3 (46 pre-service teachers belong to this category). Pre-service teachers, whose approaches to the EPs' re-design belong to Category 2 or 4 (which are more than 50%) are those who have changed their EPs (and therefore their praxeologies according to MDT framework) as a result of the peer review. We report some comments of two pre-service teachers, T9 and T10, concerning Categories 2 and 4 respectively. T9 designs an EP in Phase 1 without any reference to the course content. Despite this, she receives a positive feedback from the

reviewer with no change request. However, in Phase 3, T9 modifies her EP and writes the following in the "Comments" section of the Task module:

T9 *I have just read the comments made by my colleague on my work and they are very concise, just 3 sentences, almost as if to indicate that my work has not been read. The evaluation appears positive, without any critical remarks, which I would have sincerely appreciated as an opportunity for personal growth* [...] *In any case, reviewing the work of a colleague, I realized that I had not sufficiently motivated my choices in terms of methodologies and tools used for the lesson. Therefore, I thought it was necessary to add a suitably wide section to motivate my choices about face-to-face lessons, textbooks, diagrams and maps, blackboard and Lim. I also wanted to talk about problem solving, a very important topic. I also included as methodologies the use of GeoGebra software, initially omitted, and the use of an e-learning platform (socloo). I have therefore motivated also these last 2 methodological-instrumental choices.*

It is interesting to note that the changes in T9's praxeologies are not a consequence of the feedback received from the reviewer, but rather the result of the review carried out. In fact, T9 explicitly states that, "reviewing the work of a colleague", realized that she omitted some sections and she did not adequately justify her choices.

T10, in Phase 1, includes explicit references to the course contents in her EP: problem solving, cooperative learning, role of visualization. She received positive feedback from the reviewer, but with the request for more detail on the evaluation and assessment section. So, in Phase 3, T10 modifies her EP accordingly by following the reviewer's advice and she writes in the "Comments" section of the Task module:

T10 *attached my EP "The sweet fractions" properly integrated in the evaluation/assessment section as suggested by my colleague reviewer. In this regard, I have more detailed the "assessment" part also integrating it with two evaluation grids to be filled in in two separate steps.*

Therefore, it seems that the suggestions of the reviewer in Phase 3 have fostered a change in T10's praxeologies. In this paper we do not analyse how much the participation in discussion forums, in the C2 course, has influenced the change in the pre-service teacher praxis. However, we can state that 69 out of 119 pre-service teachers actively participated in the discussion forums (12 out of 27 in Category 1, 12 out of 19 in Category 2, 14 out of 27 in Category 3, 36 out of 46 in Category 4).

4. Discussion and conclusions

In this paper we have analysed the effectiveness of peer review methodology in an online environment, tested in two courses: the first one for in-service mathematics teachers (C1, a blended course with face-to-face lectures and online activities) and the second one for pre-service mathematics teachers (C2, an exclusively online course). Our research questions were the following: "How does peer review methodology foster a and design of educational pathways? What similarities and differences are there between two teacher training courses C1 and C2, in terms of the effectiveness of peer review methodology designed and implemented in an online environment?". In order to answer this question, we analysed the data according to the theoretical framework of Meta-Didactic Transposition (MDT) (Arzarello et al., 2014). In particular, we looked for changes in teachers' praxeologies, i.e. changes in the design of their Educational Paths (EPs), trying to understand the motivations underpinning these changes. Data analysis shows that the design of an educational course, which integrates the peer review methodology and interaction of teachers with experts in Mathematics Education (as in C1 course) can positively influence teachers' design skills. For example, T1 and T2 change their EPs due to the course lectures. However, many in-service teachers (e.g. T4 and T6, but also T7 and T8) and most of pre-service teachers (more than 50%, e.g. T10) change their EP design due to feedback received from reviewers in the peer review phase. In addition, some in-service (e.g. T5) and pre-service (e.g. T9) teachers change their EP not as a result of the reviewer's feedback but rather as a consequence of the review carried out. Therefore, also a completely online course, including peer review methodology and interaction between teachers through discussion forums (as in C2 course) can also be effective in changing teachers' existing praxeologies. From a meta-didactic transposition point of view, it seems that the peer review methodology has positively promoted changes in the praxeologies of both in-

service and pre-service teachers. Indeed, peer review methodology allows each teacher, on the one hand, to receive feedback from the reviewer and, on the other hand, to view the work of a colleague. Both of these mechanisms can promote a change in teachers' praxeologies (an improvement of EPs). In this work we also showed how an e-learning platform (specifically Moodle) can be used to implement the peer review methodology. According to MDT theoretical framework, also the platform, properly organized and structured, can act as a *broker*, that is an intermediary able to facilitate the exchange and interaction between the community of researchers and teachers. It should be noted that in C2 course only the platform has played the role of *broker.* The use of the online platform is essential, especially when the number of participants is high. By properly integrating the Workshop module and the Task module, it is possible to manage all deliveries easily and immediately and automatically distribute them among participants. The use of the "Comments" section of the Task module can help the researcher to identify changes in the redesign phase and to understand the reasons underpinning these changes, as in C2 course. However, some open questions about the effectiveness of the peer review methodology remain: how do the specification of review criteria, more than one reviewer for each EP and the assessment of EPs influence the effectiveness of the methodology? We will try to answer these questions in future works.

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