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# Supporting teacher reflection during online professional development: a logic modelling approach

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## ABSTRACT

This article aims to shed light on our understanding of how teacher reflection could be fostered through online teacher professional development. In this respect, the presented article starts from three theoretical foundations, namely the characterisation of online teacher professional development, logic modelling and fostering teacher reflection. Based on these foundations, a logic model is constructed and subsequently used to analyse an online teacher professional development programme. The examined online teacher professional development trajectory is the Digital Didactics programme, which originated in Flanders (Dutch-speaking part of Belgium). Twenty participants and four coaches participated in the study. The results explain how reflection was fostered through several online teacher professional development programme features. The reflective practices that formed the main outcomes of this study were mainly from a behavioural, attitudinal and social nature. The conclusions drawn can inform both theory and practice on how online teacher professional development could instigate teacher reflection.

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## KEYWORDS

Teaching online; online teacher professional development; online technologies

## Introduction

Teacher professional development (TPD) has been characterised as a strophic interaction between enactment and reflection (e.g. Clarke & Hollingsworth, 2002). According to Schön (1987), reflection refers to teachers' thinking about their practice both outside of the learning environment ('reflection on action') and during the teaching process ('reflection in action'). While it can be an individual activity, research has shown that meaningful teacher reflections stem from exchange of teachers' personal knowledge and beliefs, practices and goals for student learning (Holmberg, 2014; Parke & Coble, 1997; Schön, 1983). Further, interaction with peers and experts may deepen and challenge the teachers' reflections (Borko, 2004), and definitely when technology is being used (Jolly & Boud, 2015).

The infusion of technology into education not only led to more courses being taught in an online or blended environment, but also led to the fact that teacher professional development could be offered online. In examining online teacher professional development (OTPD) studies, whether related to online teaching or not, one sees that teacher reflection can be supported by the use of online technologies, and vice versa, that online technologies can be used to support teachers' reflective practices which in turn could support teacher learning (Dede, Ketelhut, Whitehouse, Breit, & McCloskey, 2009; Prestridge, 2010, 2017). For example, online tools for reflective actions on online

teaching practices can contribute to teachers' learning and to their acceptance of teaching with technology (van der Meij, Coenders, & McKenney, 2017). Hence, it could be argued that OTPD research could benefit from fostering reflective practices as reflection not only contributes to teachers' learning but also affects technology acceptance (van der Meij et al., 2017).

This article reports on one such effort to support teacher reflection, the Digital Didactics (DD) programme.<sup>1</sup> It originated with the Belgian Network for Open and Distance Learning and was funded by the European Social Fund. The professional development programme was mainly designed as an online linear trajectory and will be discussed in detail further on. The aim of this study was to *understand how teacher reflection could be fostered through online teacher professional development*. Three main foundations underpin the study: (1) a characterisation of OTPD design, (2) logic modelling, and finally (3) fostering teacher reflection. Each of these is described below.

## Theoretical framework

### *Characterisation of OTPD design*

Many studies have already described OTPD design characteristics (e.g. Dede et al., 2009; Prestridge, 2010, 2017; Prestridge & Tondeur, 2015). Qian, Hambruch, Yadav, and Gretter (2018) characterised the design of OTPD as aligned with: (a) the participants' backgrounds; (b) the course curriculum; and (c) a motivational concept to improve teacher engagement. Next to that, Prestridge and Tondeur (2015) argued that OTPD consists inter alia of connections made between reflection, investigation and dialogue, and advocated for OTPD approaches that enable self-efficacy and self-renewal. Moreover, Riviou, Domingo, and Barrera (2014) highlighted that OTPD should: address teachers' needs; acknowledge the benefits of peer support; provide hands-on experiences; be in a supportive environment; have specific professional development strategies and actions; and evaluate the professional development trajectory and one's personal evolution.

An important consideration made by Prestridge and Tondeur (2015) is that the key elements of effective professional development remain guiding axioms for face-to-face, mix mode and/or online professional development. Hence, OTPD design can be informed to a large extent by effective professional development literature, but that a contextualisation needs to be done in light of offering this TPD online. The research done pertaining to the important components of TPD for online and blended learning by Philipsen, Tondeur, Pareja Roblin, Vanslambrouck, and Zhu (2019) proves to be highly relevant in light of the focus of this paper. Philipsen, Tondeur, Pareja Roblin, et al. (2019) specified and presented key components of TPD for online and blended learning that can guide decision-making processes when one designs and develops TPD programmes. Their six synthesised key findings pertaining to TPD for online and blended learning target: the programme and environment, the goals and relevance, the strategies, the context, the teacher change and finally the dissemination and evaluation of the programme (Philipsen, Tondeur, Pareja Roblin, et al., 2019). Some of these components are also supported by other studies which target the same subject (e.g. MacDonald & Campbell, 2012; Nihuka & Voogt, 2012; Wang, Chen, & Levy, 2010).

### *Logic modelling*

While OTPD studies often integrate a description of how the online programme was developed, fewer start from a logic modelling approach. To address this existing lacuna, the approaches of conjecture mapping (Sandoval, 2014) and logic modelling (e.g. Newton, Poon, Nunes, & Stone, 2013) were viewed as particularly relevant. Both conjecture mapping and logic modelling articulate the individual design features innate to an intervention, sometimes accompanied by assumptions or hypotheses on how enacting those design features could yield certain outcomes (McKenney & Reeves, 2019; Sandoval, 2014). The remainder of this section describes the logic modelling approach in general, while the subsequent section explains its application in this OTPD case.

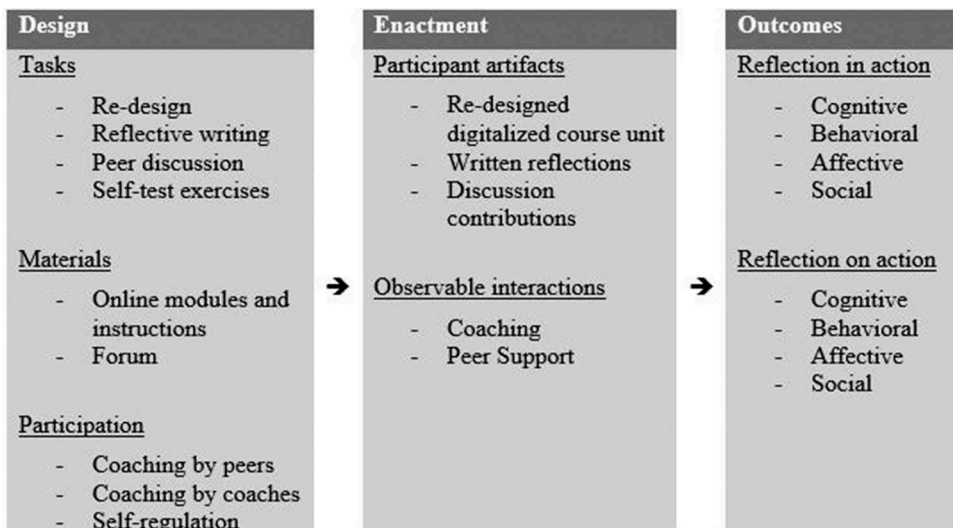
The *design* concerns the inputs for learning. Most designs require attention to three aspects: tasks, materials and (expectations about) participation (McKenney & Reeves, 2019; Sandoval, 2014). The tasks refer to the activities that the learners have to do in the intervention and procedures they should follow (McKenney & Reeves, 2019; Sandoval, 2014). The materials include all the resources used for the intervention including digital or analogue documents, programmes or instruments (McKenney & Reeves, 2019; Sandoval, 2014). Finally, whether implicit or explicit, each of these is designed with some expectations of how participants will engage, including their roles as well as any norms and values for behaviour and interaction (McKenney & Reeves, 2019; Sandoval, 2014).

Together, these characteristics of the design influence the learning processes, or the *enactment* of the intervention (in this case, OTPD). To study enactment processes, attention can be given to several clusters of variables (Sandoval, 2014). In this study, we focus on artefacts created by the participants as a result of their activity and observable interactions between the participants. Both may be able to former give insight into learning and performance. Just as design features, enactment processes are planned with a clear goal and purpose. Namely, they consider how the enactment processes could instigate specific outcomes (Sandoval, 2014).

These *outcomes* can be cognitive (knowledge increase), behavioural (skill mastery) or attitudinal (gained interest). And because of their affordances for each of these, we also note the importance of social network effects (Philipsen, Tondeur, Pynoo, et al., 2019). When for example participants participate in an OTPD programme, they become part of a group of people all following the same programme and often a sense of mutual endeavour develops within that group (Philipsen, Tondeur, Pynoo et al., 2019). This is important because previous research has shown that one's social environment (e.g. friends, family and colleagues) can have a great effect on one's perception, acceptance and use of technology (Seale, 2013; Seale, Georgeson, Mamas, & Swain, 2015). In this article we therefore consider cognitive, behavioural, affective and social aspects of both reflection in action and reflection on action.

### **Fostering teacher reflection**

Building on the discussion above, [Figure 1](#) provides the logic model for the OTPD which served as the context for this study. Here, key elements of design, enactment and outcomes are visualised. [Figure 1](#) also serves as an advanced organiser for the remainder of this section, which elaborates the theoretical underpinnings for an OTPD scenario aiming to foster teacher reflection.



**Figure 1.** Logic model of this study.

## Tasks

The DD programme offered tasks in two parts. One part is the self-test approach without any specific coaching yet. The second part adds three other tasks in which the participants will receive coaching. Hence in total there were four tasks. This is illustrated in Table 1.

The OTPD consists of seven online modules and is available in English, French and Dutch at [www.digitaledidactiek.be](http://www.digitaledidactiek.be). The seven modules are: Basis, Design, Development, Implementation and follow-up, Cooperative learning, E-coaching and Concerns. For each module, four main learning tasks were offered: self-test exercises, re-design, reflective writing and peer discussion. Each of these is described here.

The *exercises* (which were open to all visitors of the website and not only those enrolled in the DD programme) were designed to offer the participants the chance to self-regulate their learning needs and to foster reflection on their own knowledge on the design of a digitalised course unit. The exercises represented the main body of information seen in that specific module and this was done through scenario-based reasoning activities and automatic feedback. The automatic feedback is constructed in such a way that it aims to evoke reflective practices. Jolly and Boud (2015) and Williams, Brown, and Benson (2015) argued that the use of this kind of feedback on online performances can support reflection. The automatic answer should provide hints on the error and how to correct it to instigate self-reflection on one's knowledge and skills (Jolly & Boud, 2015; Williams et al., 2015). This principle of automatic feedback is built in with all the modules of the website (mainly in the Dutch version). In this way the programme aims to evoke reflective

**Table 1.** Tasks of the Digital Didactics programme.

Self-test	Guided by coach
Self-test exercises within each module with automatic feedback.	Additional tasks with feedback from a coach: <ul style="list-style-type: none"> <li>– Re-design task</li> <li>– Reflective writings</li> <li>– Peer discussion</li> </ul>

The screenshot shows the '3 · Development' section of the website. The 'Exercises' tab is active. A list of exercises is shown, with 'Digital learning environment' selected. The exercise text discusses the 'Digitale Didactiek' bank's plan for new employees. Below the text, three options are listed: CMS, LMS, and LCMS. The LCMS option is selected. A feedback message is displayed below the options, indicating that the chosen answer is incorrect and providing advice on how to proceed.

This screenshot presents how the website provides automatic feedback. The participant has to select the correct answer to the question. In this case a question on which digital learning environment system fits best. If the participant selects an incorrect answer, feedback is given: *“It is best that you read the theory on digital learning environments again. It is important to make the right developmental choices from the beginning. If you don't do this, you might run the risk of choosing an environment that won't allow you to realize your plan.”*

**Figure 2.** Example of automatically generated feedback.

processes with the participants on a regular base. [Figure 2](#) presents an example of such an exercise with automatically generated feedback.

The three other main learning tasks of the guided trajectory were: (1) the re-design of existing course content to a digital course unit, (2) reflective writings, and (3) the peer-discussion task. Each of them will now be discussed in detail.

The *re-design* task concerned transformation of an existing course unit to a digitalised course unit. The duration of the DD programme was reasonably extensive. It lasted five months and had most of the time weekly courses (from March 2015 to June 2015). The re-design task aimed to offer hands-on experiences with the content of the course and because the participants were asked to choose a real-life work-related problem, they were also working on a useable end product (Philipsen, Tondeur, Pareja Roblin, et al., 2019). The interaction that takes place during this – collaborative – design is essentially enactment and reflection (Voogt et al., 2011). During the re-design process and as the participants gradually moved through the different modules, they were asked to look back on the programme, their product and process. This recurring examination of their progress could foster participant reflection and elucidate insights into their own performances (Bevins, Jordan, & Perry, 2011).

The *reflective writing* task prompted the participants to contemplate the programme, products and processes. The aim of this task was to make the participants reflect on each module and the assignment related to them. To illustrate, the first module targeted the basis of the programme, namely technological and pedagogical content knowledge (TPACK) (Koehler & Mishra, 2008). The related reflective writing task aimed to make teachers reflect on how they could use the theory and practices seen in the first module. The participants could choose whether to write these immediately in the forum or in a separate file. These written reflections have already showed to be related to professional identity formation and can be of particular interest when one is professionalising for the integration of technology (Philipsen, Tondeur, Pareja Roblin, et al., 2019). An example of such a reflection is: 'This [module 1] structures some insights and makes you aware of certain theories that you learned a while ago ... and seeing this [module 1] again provides a good base to start'.

The *peer discussion* task was designed to stimulate social cohesion amongst the participants (e.g. Philipsen, Tondeur, Pynoo et al., 2019) and to facilitate an environment that could foster reflection (Soisangwarn & Wongwanich, 2014). The participants were asked to comment on their peers' contributions in the forum and their assignments. This form of peer coaching has proven to be an important component of – online – TPD and which promotes reflection (Philipsen, Tondeur, Pareja Roblin, et al., 2019a; Soisangwarn & Wongwanich, 2014).

## Materials

As mentioned previously, seven modules were created. Each module is presented in the same way: a page that presents the general overview followed by theory, cases, self-test exercises and in-depth information about the topic from that specific module. On the left side of the screen is a drop-down menu that presents a module-sensitive content outline which also helps participants monitor their progress through the use of checkboxes. [Figure 3](#) shows the content outline for the theory section of module 1 (Basis).

## Participation

The trajectory presented in this study was free of charge and all the participants received online coaching in small groups and were asked to provide peer coaching as this contemplated the third task. The *coaching* was integrated to foster reflection amongst the participants. The coaches of the DD programme thus deliberately probed the participants with questions that targeted the participants' reflective practices (e.g. 'How do you see yourself teaching in this online environment?' and 'How does this affect your vision of the teaching profession?'). Within the programme, four online coaches worked on a voluntary basis and each of them started with a group containing a maximum of 10 participants. The coaching furthermore entailed providing

1 · Basis (TPACK)

Overview Theory Cases Exercises In-depth

**THEORY**

- The TPACK model
- Instructor profiles
- Interactive figure
- TPACK in 2 minutes
- Types of tools and their educational potential
- Developing your own TPACK
- Objective – method – tool

**The TPACK model as starting point**

The training digital didactics uses the TPACK model (Koehler & Mishra, 2006) as the starting point through the various modules. The TPACK model indicates that successful ICT implementation assumes that a teacher:

- knows **what** needs to be taught.
- knows **how** to teach this in the best way
- knows **which** ICT tool provides potential to achieve this
- is aware of the **context** in which it operates

The TPACK model, as illustrated in figure 1 on the following page, underlines the importance of various types of knowledge that complement and overlap each other (click on the fields for more explanation). The basic principle of TPACK is the overlap between the different fields, it is, in other words, not sufficient that teachers solely have knowledge of ICT, pedagogy and subject content. TPACK underlines the very importance that you understand that these three domains are **coherent** and mutually reinforcing one another. The model indicates in this way that ICT can never be the guiding factor, however ICT is rather a solution for didactical challenges the teacher faces. The current training will start with the TPACK principle in the sense that it focuses strongly on the **link** between **technology** and **didactical** opportunities. The cases also make a link with the **substantive expertise** of teachers.

**LINKS**

Do you want to start immediately?

- Make the exercises
- Read the case stories

Do you want to learn more?

- Be inspired by external sources.

Figure 3. Content outline of module 1.

suggestions on their tasks and by keeping in regular contact with the participants to follow their progress. Their contact with the participants was solely online and was either synchronous (e.g. chat or Skype) or asynchronous (e.g. forum or mail). In addition to coaching from the facilitators, we also asked the participants to provide feedback to one another. Stover, Kissel, Haag, and Schoniker (2011) and Soisangwarn and Wongwanich (2014) showed that (peer) interaction and coaching successfully can evoke reflection. Thus, it was deemed important to facilitate this peer interaction in the DD programme. Finally, it was expected that participants could self-regulate enough to complete all the tasks and stay apace with their cohort. This stems from the view that self-regulated practitioners adequately reflect on their professional activities (Manning & Payne, 1993).

## Methods

Given the need to further understand how OTPD could instigate certain results (Powell & Bodur, 2019), this study set out to explore how specific design features could lead to certain enactment processes which in their turn instigate reflective outcomes (Sandoval, 2014; Wozniak, 2015). It used the aforementioned theoretically informed logic model as an analytical frame.

## Data collection and analysis

Four sources of data were used to explore how the OTPD could support teacher reflection. First, there were interviews with the participants on different moments to capture their experiences. Second, a focus group was held with the four coaches to check if their experiences matched the ones from the participants. Third, there were researcher observation notes from during the OTPD programme (such as for example how participants interacted with each other during online contact moments). Fourth, a document analysis was conducted on the assignments of each participant and their contributions in the forum.

The transcript of the focus group and the ones from the interviews with the participants were imported into Nvivo10 and were analysed using an inductive approach, without predetermined categories (Patton, 2015). The transcripts were analysed using a thematic analysis (Braun & Clarke, 2006) that was grounded in an interpretive paradigm. Using this paradigm requires one to go

beyond mere description (Patton, 2015), and although thematic analysis is widespread and frequently used, it often remains poorly defined and under-acknowledged (Boyatzis, 1998; Roulston, 2001). Thematic analysis offers a clear method for identifying, analysing and reporting themes or patterns in one's dataset (Braun & Clarke, 2006). The process of conducting a thematic analysis has been described in various ways (e.g. Braun & Clarke, 2006; Howitt, 2010), but the central process generally has three main steps, namely transcribing, coding and analysing the data. For the participant assignments and the researcher's observation, content analysis was used (Patton, 2015).

## Participants

The participants mentioned in the present study are the 20 participants who completed the DD programme. For clarity, and because not all participants were teaching at the moment they participated in the DD programme, we will from now on describe all 20 consistently as 'participants'. Initially, 40 participants started with the programme and they were mixed male ( $n = 16$ ) and female ( $n = 24$ ) and their ages were mainly situated between 25 to 45 years old ( $n = 14$ ) and 46 to 65 years old ( $n = 14$ ). There were three main reasons that could be identified that contributed to the drop-out of 20 participants. First, the programme was free of charge. Second, most participants added the programme to their current job and finally, the programme was quite intense as indicated by Maria, one of the coaches: 'I just think that it is quite an intensive programme and that we lost some participants because of that.' The DD programme was delivered and supported by four coaches. These coaches worked on a voluntary basis, were all female and between 36 and 49 years old. They all had extensive experience in educational technology and pedagogical advising.

## Results

### Participant artefacts

This section will now present what the artefacts looked like. The artefacts can be seen as the result of the three different tasks given during the DD programme. The design task led to the creation of digitalised course units. The reflective writings led to contributions in the forum (either as an uploaded file or immediately written in the forum). The peer discussion led to peer discussions held in the forum. We will now discuss each artefact separately.

First, during the design task the participants were asked to re-design a part of their course into a digitalised course unit called a digital learning path. A (Dutch) example of a part of a digital learning path is presented in [Figure 4](#).

The example given in [Figure 4](#) presents the artefact that results from the re-design task. It is a screenshot of what one part of a digitalised course unit may look like. In this particular example the title of the page is given on the top of screen in the upper bar. In the centre of the screen one can find the main body of text with on the right side a link to some exercises and in-depth information. On the lower bar at the bottom of the page, navigation buttons are present.

The second task, the reflective writing, led to participants uploading a separate file or to immediate responses in the forum. To illustrate this, we now present an excerpt (in Dutch) of a forum contribution in which the participants reflect on a certain topic and which is followed by feedback from the coach.

As shown in [Figure 5](#), we can clearly see that the participant is reflecting on the division of teacher roles in an online environment. This is not surprising because prior to this task they (the participants) saw some theoretical approaches towards different roles of teachers in online environments. Research on the enacted roles of teachers in online environments shows that many teachers only use an administrative or evaluative role (Philipsen, Tondeur, Pynoo, & Zhu, 2017).



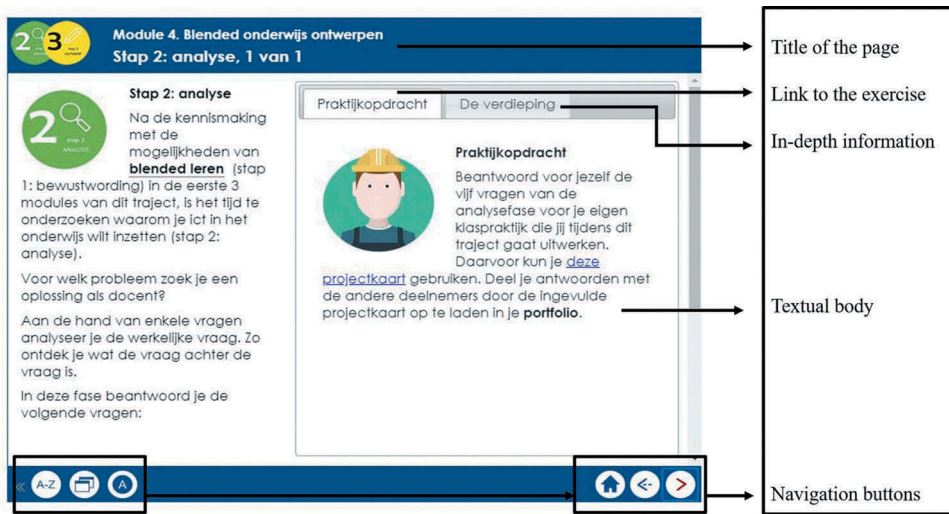


Figure 4. Example of a digitalised course unit.



Figure 5. Excerpt of a forum contribution.

Hence, it is still worthwhile to acquaint participants who aim to professionalise themselves for online teaching with the different roles of teachers in an online environment.

Third and as a final artefact, participants responded to the contributions of their peers in the online forum. It has to be mentioned that this was done less than the other two tasks inherent to the guided DD programme. An example of such a peer interaction is presented in Figure 6.

24/03/2015 om 12:08 BEWERK VERPLAATSEN SPLITSEN PRULLENBAK SPAM REACTIE #27303

Ik heb er nog eentje. Misschien is deze meer aangewezen voor deze opdracht.

**BIJLAGEN:**  
 M1-Analyse-content-2 [redacted].docx  
 Participant 1 uploads a task related to a content analysis for a course unit digitalization proposal.

Bijdrager  
 Participant 1

---

25/03/2015 om 15:39 BEWERK VERPLAATSEN SPLITSEN PRULLENBAK SPAM REACTIE #27354

Om dit te digitaliseren zouden we als groep aan kunnen werken (iedereen een stukje) om zo ons gemeenschappelijk project voor heel Vlaanderen uit te werken. Wat wij ons toch hebben voorgenoem.

**Participant 2 uploads his remarks to the uploaded file:**  
*"To digitalize this part we could work on it as a team where everyone does a part and which would enable us to work out the project for the whole of Flanders. What we intended to do."*

Bijdrager  
 Participant 2

---

25/03/2015 om 16:13 BEWERK VERPLAATSEN SPLITSEN PRULLENBAK SPAM REACTIE #27358

Dag [redacted]

Dit is alvast een mooie analyse. De manier waarop je het thema analyseerde zit alvast zeer goed, al lijkt dit een zeer uitgebreid thema. Het is me op dit moment ook niet duidelijk welk stuk van de opleiding je wil digitaliseren en welke onderdelen opgenomen blijven tijdens de activiteiten in het leerbedrijf of nog op een andere manier. Kan je er een stukje uittfilteren dat je in het verdere leertraject concreet kan gaan uitwerken? Hiervoor zal je niet alleen het thema moeten opsplitsen in subthema's, maar ook keuzes moeten gaan maken welke doelstelling je voornamelijk wil bereiken. Afhankelijk hiervan kan je dan gaan kiezen welke werkvorm(en) je daarbij kan inzetten en welk type hulpmiddel(en) je daarin kunnen ondersteunen. Misschien helpt het jou om module 2 al eens kort door te nemen en met die informatie in je achterhoofd je analyse nog eens kritisch te bekijken om je keuze te maken. Kan je tegen einde volgende week dan je definitieve keuze doorgeven, door deze analyse te herwerken en opnieuw te posten op het forum? Dit maakt uiteraard niet van de hele de reden dat je niet kan uitwerken, maar dat het wel kan...

Moderator  
 Coach

**Feedback from the coach:** *"This is already a nice analysis. The way in which you analyzed the theme is excellent, even though it seems like a very extensive theme [...] Can you filter out that part that you want to create? You will not only need to divide the theme in subthemes, but you should also make choices regarding the objectives you want to reach [...]"*

Figure 6. Peer contributions / interactions on the forum.

### How the design features influenced the participant artefacts

In this section, we will examine how the online DD programme design affected the (quality) of the artefacts. Based on the interviews and the participant assignments, three main design features instigated reflectional practices and affected the artefacts of the participants. The recurrent exercises with both automatic feedback on the website itself (1), feedback given by the coach and peers (2) and being out of their comfort zone (3) were all seen as triggers for reflection. With one of the participants (female, 39 years old), these reflections led to the fact that she now questions more thoroughly the rationale of adding online features in a course. She stated the following when a colleague asked her to support his development of an online educational course:

My response is then immediately, and this is due to the DD programme, that I ask: 'Why do you want to do that? What is the merit? How is it now? What is the reason that you want to do it?' My questions are guided much more towards the 'why' of teaching online, rather than the idea that we just merely need to digitalise our courses because we have to.

The following quote supports that the feedback given in the programme – both by the coach and by the website itself – helped to create a (part of) a digitalised course unit or learning path:

I liked the fact that we got immediate feedback in the online exercises. They freshened up my memory on how to develop my learning path. I was a bit sceptical about this automatic 'feedback-thing' in the beginning to be honest ... but together with the feedback from the coaches I got to finish my assignment.

### How the participant artefacts influenced reflection

Based on the introduction provided earlier, we will now examine how the artefacts influenced reflection and whether it relates to knowledge, behaviour, attitudes or social networks. First, the participants indicated that the iterative process of constantly working on the same real-life problem did foster reflective practices. One participant wrote in his reflection assignment:

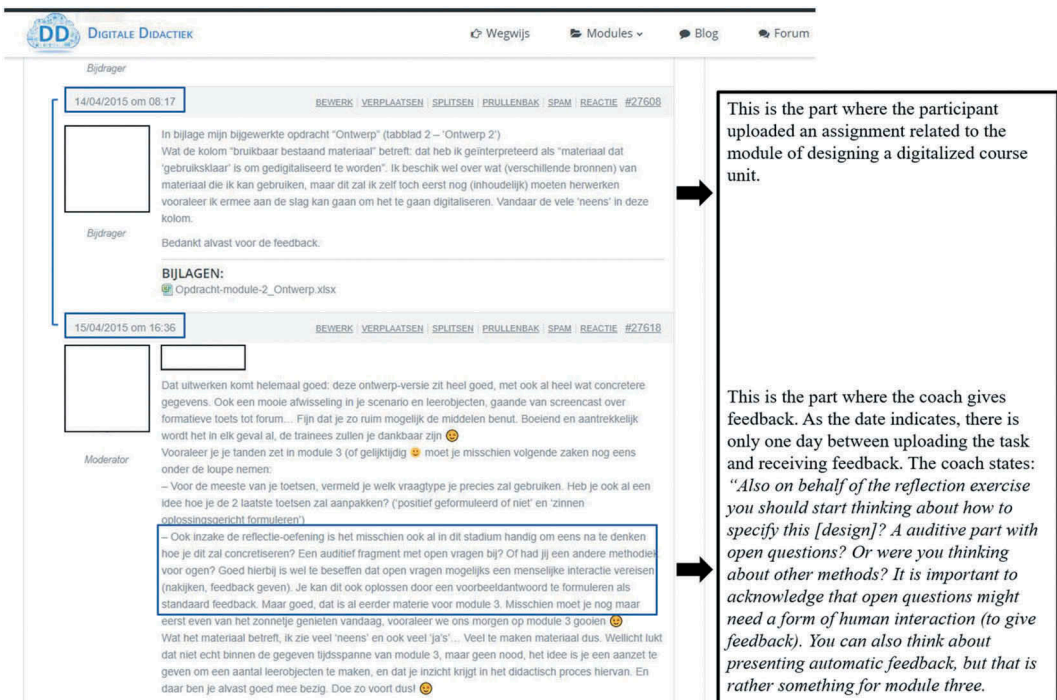
Looking back at your work every week forces you to take time and evaluate what you have done. When I put my finished assignment aside for some days and then take a second look, I notice my mistakes more easily.

Thus, if the participants deliberately take a step back from their work and re-examine it at a later moment, this could be seen as an effect on their behaviour. Thus, it might be argued that the constant and iterative examination of the digitalised course units resulted in a recurring process of reflection on the product. Furthermore, since this reflection on the assignment is done after – a part of – the assignment is finished, this can be seen as reflection-on-action. The following quote supports that statement:

While we were beginning to develop our digital course unit I had some difficulties with choosing a clear focus. At a certain point I really got frustrated because there wasn't any progress in my work ... When I had a chat session with [X – the coach] I got the advice to put my assignment away for a few days and to then look at it back again and re-question my approach to the assignment ... It is basically such a small and trivial form of advice, but it worked for me ... and I've been doing it ever since.

The quote above not only informs us about how the design of the artefacts instigated reflection, but also shows that the deliberate integration of feedback from the coach in the DD programme contributes to the reflective practices of the participants. This was one of the main tasks given to the four coaches, to reply hands-on and to emphasise strongly the reflection on their tasks. This is supported by the following figure, [Figure 7](#). This reflection on the assignment can also be seen as reflection-on-action, and also portrays a specific way of behaving. However, this last example also adheres to creating an attitude with the participants regarding the importance of reflection. Besides motivating the participants to actually do the reflective assignments, the DD programme also strived towards facilitating a positive attitude towards the benefits of reflection. This is indicated by one of the coaches:

We really emphasize each module that reflecting on both your process and product is vital ... and sometimes it is more about an attitudinal change [with the participants] than not understanding the benefits.



The screenshot shows a forum thread on the DD platform. The top navigation bar includes 'Wegwijs', 'Modules', 'Blog', and 'Forum'. The forum post is titled 'Opdracht-module-2\_Ontwerp.xlsx' and was posted on 14/04/2015 at 08:17. The participant asks for feedback on a digitalized course unit assignment. The coach replies on 15/04/2015 at 16:36, providing detailed feedback and emphasizing reflection. Two callout boxes highlight specific parts of the coach's feedback:

**Callout 1:** This is the part where the participant uploaded an assignment related to the module of designing a digitalized course unit.

**Callout 2:** This is the part where the coach gives feedback. As the date indicates, there is only one day between uploading the task and receiving feedback. The coach states: *“Also on behalf of the reflection exercise you should start thinking about how to specify this [design]? A auditive part with open questions? Or were you thinking about other methods? It is important to acknowledge that open questions might need a form of human interaction (to give feedback). You can also think about presenting automatic feedback, but that is rather something for module three.*

**Figure 7.** Emphasis on reflection in the feedback from the coaches.

## Observable interactions

In relation to the peer interaction it was noticed that talking to one's peers could instigate the effect of feeling responsible to finish the DD programme. The peer coaching that the participants experienced motivated some participants to continue with the programme. One participant indicated:

This feedback that I got from [X] helped me realise again why I enrolled myself in this course. I thought about quitting the programme but I should finish what I started.

### How the design influenced observable interactions

With this programme, we pulled the participants out of their comfort zone. Doing so often also leads to putting them in a place where they question the things they usually take for granted. One participant stated: 'I thought I knew so much about teaching, but when this course introduced me to online teaching ... I realized there was even more to learn.' A statement supported by Gaby, one of the coaches: 'You literally sometimes see the fear in their eyes when you ask them something with which they are not familiar.' She continues: 'and then it is pleasant to make them look back on their knowledge and making them see that they still can learn a lot'. The following figure, [Figure 8](#), illustrates how the design of the programme instigated peer interaction by taking the participants out of their comfort zone.

### How the observable interactions influenced reflection

The reflective writings and the construction of the DD website – and its assignments – mainly guided the participants to examine their work after the learning moment has passed. This means that during the DD programme the participants were probed with questions that made them think about their previous actions, knowledge, attitudes or networks. We notice that in their reflective writings many participants remain at the surface of reflection. This entails that the participants do not examine their own professional identity as to who they are as an online teacher. In the DD programme we tried to steer them more towards reflecting on their own profession by providing questions that targeted their teaching role. The following two figures, [Figure 9](#) and [Figure 10](#), present an example of a reflection that is more superficial and one that goes deeper.

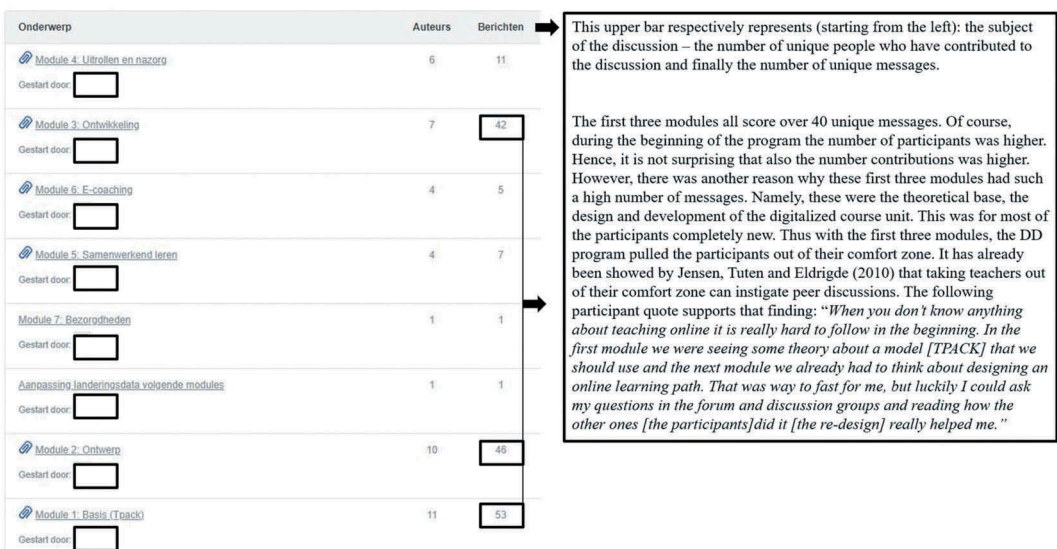


Figure 8. Example of how the design of the DD programme affected peerinteraction.

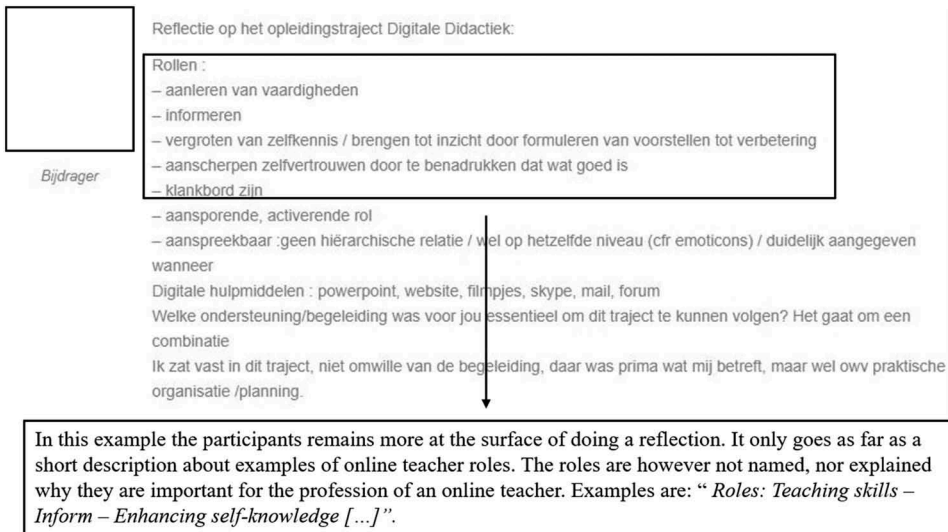


Figure 9. Example of a participant reflection.

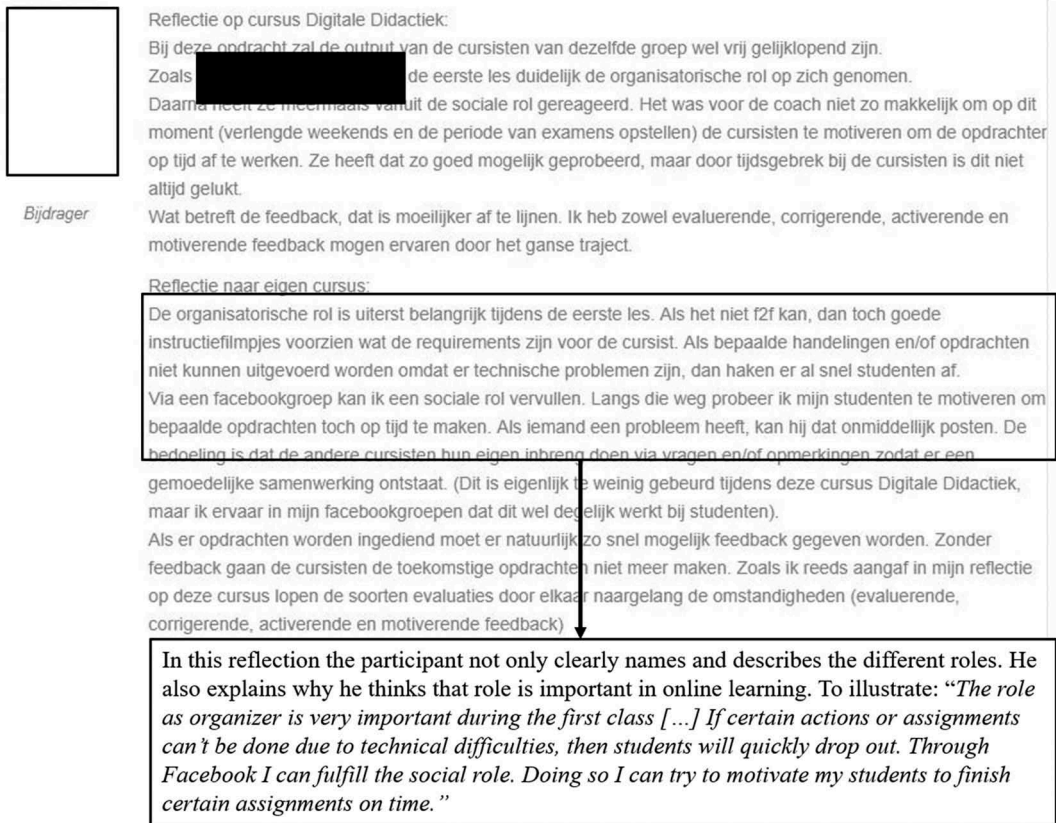


Figure 10. Example 2 of a participant reflection.

Figures 9 and 10 are examples of reflection-on-action. These participants are taking a step back to reflect upon the meaning of the DD programme for their own practice. This result is mainly one that adheres to a change in behaviour and also to the attitude of reflecting. If we further examine the differences between the previous two figures, [Figure 9](#) and [Figure 10](#), we could deduce that the attitude of engaging in reflection differs with the participants given the fact that the quality of the reflective writings is vastly different. However, we acknowledge that the 'deductive leap' taken here is quite big, hence this would need further examination.

Next to a change in reflective behaviour, the DD programme also instigated a change in the participants' networks. Some participants indicate in their reflective writings and their assignments that they are becoming more convinced of the fact that creating a digital course unit or learning path is not a one-person job. One participant states: 'If I want to get this [designing a learning path] done in my school, I will have to ask a lot of colleagues for help.' This quote essentially targets the fact that this participant recognises their professional network. Another participant values the people on the team and indicates an expectation of hopefully being able to use this new network in the future: 'I hope that I can stay in contact with the people from my team, because I've learned so much from them.' These two quotes basically target the same subject, namely the fact that the participants are reflecting on their network and how it could be used in the future.

## Discussion

The goal of the current study was to investigate how teacher reflection could be fostered through online teacher professional development. This is an important step in order to explore how specific online design features could be associated with the quality of teachers' reflection ([Albion & Tondeur, 2018](#)). For those who design and develop an online or blended professional development programme it is often challenging to find and combine the most suitable design features and to understand how those design features affect specific outcomes ([Powell & Bodur, 2019](#)), such as teachers' reflection. To explore this relationship, a logic model was used as a method to articulate how specific design features could lead to certain enactment processes which on their turn instigate outcomes (cf. [Sandoval, 2014](#); [Wozniak, 2015](#)).

The findings of this qualitative study show that specific design features impacted reflectional practices and affected the artefacts of the participants involved in the online professional development. First, the exercises with automatic feedback on the website itself stimulated the teachers to reflect about their educational practices. An example of automatic feedback was the supplementary information given as to why the participants' answers were strong or weak. Also [Jolly and Boud \(2015\)](#) stressed the need for online hints for the correction in an online environment. Further, the reflective writing tasks and automatic feedback prompted the participants to reflect on how they could use the theory in the online modules (cf. TPACK) for their own practice. This is in line with the study of [Prestridge and Tondeur \(2015\)](#) indicating that an online space, including scaffolds such as prompts, can help to shape teachers' thoughts. According to these authors, the online design features can act as an embedded part of connecting what is happening in their online professional learning to the real educational context. An interesting finding in this respect is that the participants involved in the current study argue that the iterative process of constantly working on a real-life challenge did foster reflective practices.

The findings also stress the importance of design features that support the feedback given by the coach and peers. It seems that with the help of the online coach the participants were able to reflect more deeply about their practice (cf. [Prestridge & Tondeur, 2015](#)). The online coaching helped the participants of the DD programme reflect upon their tasks and also aimed to take the participants out of their comfort zone. Apart from the role of the coach, the results also point to the importance of an (online) social network. Social interactions were also highlighted by [Borko \(2004\)](#), [Jolly and Boud \(2015\)](#) and [Williams et al. \(2015\)](#). What does distinguish this study from other current existing literature is the clear depiction of the importance of letting participants of an OTPD

examine their current social network and how they could get more out of it in the future. This social network – and by this we mean all networks a person has which he/she uses professionally – has proven to be an important key player in a person's engagement with technology.

In the current study, the peer discussion task was specially designed to stimulate social cohesion amongst the participants (cf. Philipsen, Tondeur, Pynoo, et al., 2019) and to facilitate an environment that could foster reflection (Soisangworn & Wongwanich, 2014). The participants were asked to comment on their peers' contributions in the forum, and their progress and results of the delivery task. This form of peer coaching has proven to be an important component of – online – TPD and which promotes reflection (e.g. Philipsen, Tondeur, Pareja Roblin, et al., 2019; Soisangworn & Wongwanich, 2014). To illustrate, the study by Prestridge, Tondeur, and Ottenbreit-Leftwich (2019) indicates that the online social network plays a significant role to act with greater agency in their own classrooms. When individual reflection is coupled with sharing through professional learning, the broader educational landscape through the application of ICT is multiplied (see also Philpott & Oates, 2016).

### Limitations and suggestions for further research

A major limitation of this study is to be found in the small sample size of participants. Although the 20 participants did supply sufficient data for this study, a larger group could have yielded a more robust data set. This opens up possibilities for future research which can target the question of how OTPD can foster teacher reflection on a large scale. Next to that, Bolldén (2016) and Philipsen et al. (2017) indicate that the examination of online teaching roles is an important feature in the process of TPD for online and blended learning. In this respect the DD programme and the study presented here could have focused more on these online teaching roles, given their importance in the TPD process for online and blended learning (Baran, Correia, & Thompson, 2011).

### Conclusion

This study set out to investigate how online teacher professional development can support teacher reflection. Based on the results we cautiously conclude that four OTPD features played pivotal roles in fostering teacher reflection. The first feature is to build in regular automatic feedback moments. In the DD programme, the participants had to go through online exercises which provided them hands-on with feedback on their answers. The second feature that instigated reflection complements the automatic feedback and constitutes professional and peer feedback. Professionals – in this study the coaches – and peers stimulated each other's reflection. As shown in the results, the coaches recognised that taking the participants out of their comfort zone can lead to reflective practices (Jensen, Tuten, & Eldridge, 2010). The third OTPD programme feature that instigated reflection with the participants was the examination of one's own network. The participants' network was highlighted in their reflective writings and mainly related to the realisation on how the participants could benefit from their network in the future. The last feature of OTPD that in this study fostered reflection was the fact that not only did the coaches' feedback take the participants out of their comfort zone, but the assignments also had the same effect. Hence, OTPD tasks and assignments should definitely be challenging enough for the participants' current state of knowledge, skills, attitudes or social networks.

### Note

1. [www.digitaledidactiek.be](http://www.digitaledidactiek.be)

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