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Developing teachers' digital identity: towards the pedagogic design principles of digital environments to enhance students' learning in the 21st century

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ABSTRACT

Digitalisation provides valuable opportunities for learning; how-ever, it imposes demands on teachers. Teachers are expected not only to be profound users of educational technologies but also to engage in the design of digital environments such as online courses, learning management systems, and mobile applications. This article argues that originated in cultural-historical traditions, Galperin's pedagogical theory might offer an approach to outline the pedagogic design principles of digital environments to empower teachers to develop their digital identity, enhance students' learning and their development as learners. Two empirical snapshots are presented to exemplify the use of Galperin's theory to design assignments and modules in digital learning environ-ments. By engaging in learning and design of digital environments based on the suggested design principles, teachers and students may reposition themselves as active agents in knowledge practices to nurture teacher digital identity and enhance students' capacity in learning to learn.

Introduction

'One of the core functions of 21st-century education is learning to learn in preparation for a lifetime of change' (Miliband 2003). This vision of the future of education, which Miliband articulated in his speech to the North of England Conference in 2003, suggests the importance of learning to learn in the politics of education (Wirth and Perkins 2008). In addition, the speed of digitalisation is constantly challenging and affecting the way we live, work and learn. Recent work on capacity building for the digital transformation of education and learning imposes requirements for educators' skills and competencies and focuses on the development of teachers' digital competence (Mishra and Koehler 2006; Redecker 2017; Starkey 2020). The importance of learning to learn approach and the contemporary digital transformations shifts the emphasis to the demands to understand how to design digital environments to enhance students' agentic capacity to learn. Such a two-dimensional focus is of particular significance for teacher education and their pedagogical practice that aims at preparing students for their future and the uncertainties

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that go with it (Claxton 2013; Smith et al. 2016). There is a broad consensus that digitalisation can promote educational quality: it can enhance professionalism, student activity, improve the quality of students' digital skills and, in a broader sense, the quality of their schooling and therefore their lives in general. Students in the 21st century have grown up online and expect the same levels of technology in their learning environments as in their day-to-day lives. Crucially, students' potential future success could be severely compromised by a lack of digital proficiency. To address these needs, teachers are expected not only to be profound users of educational technologies but also to engage in the design of digital environments to adapt to the needs of the students. Such digital environments are online courses (e.g. Massive Open Online Courses – MOOCs), learning management systems (LMS) and various applications. We should not, therefore, under-estimate the demands imposed on teachers to educate digitally informed and agentic life-long learners. However, to achieve this, teachers need to enhance their professionalism, develop their professional digital competence (PDC) (Instefjord 2014; Instefjord and Munthe 2016) and, in a broader sense, nurture their digital identity (Gorospe et al. 2015; Ertmer 2005; Robson 2018).

By drawing on classic theories of teacher professionalism and their application to teaching, the Organisation for Economic Co-operation and Development (OECD) con-ceptualises teacher professionalism as consisting of three major domains: (i) professional knowledge – as a set of knowledge and professional uses in teaching and learning that is acknowledged through qualifications and memberships, (ii) autonomous decision making over curricular choices, instructional planning, classroom standards and conduct and (iii) peer networks as a core component of classic professionalism (OECD 2016). To enhance their professional knowledge, maintain autonomous decision making and engage in peer networks, teachers as professionals in the 21st century are urged to become digitally competent agentic practitioners.

Digital competence involves a wide range of knowledge, skills and attitudes that are required when using digital technology (Instefjord and Munthe 2017; Røkenes and Krumsvik 2016). Teachers' PDC is conceptualised as a two-fold framework within which a teacher, on the one hand, as a professional constantly develops his or her digital competence and, on the other hand, by engaging in teaching practices, enhances the development of the digital competence of his or her students (Ferrari, Punie, and Redecker 2012; McGarr and McDonagh 2019). The emphasis on the developmental aspect makes teachers' PDC to be inherently connected with teachers' professional *identity* as digitally competent teachers.

However, to inform practices in how teachers are supported to develop their digital competence and identity, we need to conceptualise an approach to interact with digital technology so that ideas can be taken away, tested and implemented in educational practice and research without losing their essence. In doing so, a theoretical approach may become a tool to inform conceptual understanding that has implications for educational practice. The theoretical foundations of this article are located in the work of Vygotsky and Galperin and draw on the developments of these cultural-historical scholars to outline the pedagogic principles to design digital envir-onments aimed to enhance teachers' digital identity and students' agentic capacity to learn. By adopting a theory-informed approach, this study argues that (i) Galperin's theory may offer a useful approach to inform the design principles of digital learning

environments; (ii) by engaging in learning in online courses constructed after the suggested design principles, teachers are able to interact with the available (digital) resources and make meaningful contributions to the online learning practices, develop their understanding about how to learn online and, therefore, enhance their *digital identity* and (iii) by applying the suggested design principles to design digital learning spaces for their students, teachers may empower their students develop their understandings about how to learn online and, in doing so, reposition themselves as active agents in knowledge practices and enhance their *agentic capacity in learning to learn.*

Having discussed the cultural-historical perspective on teacher digital identity and the Vygotsky–Galperin approach to developmental teaching and learning, the pedagogic principles to design digital environments are outlined. Two empirical snapshots are offered to provide examples of a MOOC Module and an assignment designed based on the suggested design principles. It is argued that the adopted structural design is aimed at helping teachers to (i) foster their digital identity, (ii) enhance students' learning and (iii) their development as learners.

What is teacher digital identity?

There is burgeoning evidence that the identity teachers develop is closely related to their teaching practice and to students' learning (Beauchamp and Thomas 2009; Friesen and Besley 2013; Varghese et al. 2005; Walkington 2005). Indeed, teacher identity has recently emerged as a focal point among educational researchers concerned with teacher development (Beijaard, Meijer, and Verloop 2004; Gaudelli and Ousley 2009; Søreide 2006). In particular, teacher professional identity is understood as the way that teachers, both individually and collectively, view and understand themselves as teachers (Mockler 2011). On the one hand, teachers may see themselves as a combination of subject matter experts, pedagogical experts and didactical experts (Beijaard, Verloop, and Vermunt 2000). On the other hand, by explicating the link between teacher identity and pedagogic practice, Bernstein (2000) proposes pedagogic identity as the relation between the teacher, the learner and the socially constituted body of knowledge. The relational aspect of teacher pedagogic identity indicates that teacher professional identity is shaped within interactions of the teacher with him or herself, as well as with their social, cultural and professional environment (Akkerman and Meijer 2011). During these interactions an image is created with which the individual refers to himself as a professional teacher and which is composed of the set of expectations developed by the individual, as well as of others' expectations (Lasky 2005). Such an understanding corroborates with the basic assumptions about teacher identity (Rodgers & Scott, 2008): (a) identity is influenced by context, (b) identity is formed through relationships, (c) identity is changing over time and (d) identity involves meaning making. Taking account of identity as a uniting theme, discourse shifts towards the teachers' perspective, in which the teacher as an agent becomes the main starting point in understanding and stimulating teacher identity. In this view, *teacher digital identity*, is seen as a dynamic and ongoing process that involves making sense and reinterpret the beliefs, values and educational experiences in light of new contexts and frames of relationships in contemporary digital society (Gorospe et al. 2015; Robson 2018).

In an attempt to explain the link between the individual and social dimensions of teacher identity, Vianna and Stetsenko (2011) offer an approach associated with the social practice theory (Lave and Wenger 1991) that concerns individuals (teachers) through engagements in sociocultural practices as the grounding for both identity development and learning. The key grounding for the development of identity is sought in teachers engaging in contextually situated sociocultural practices organised according to community norms and values (e.g. online courses) (Martin and Sugarman 2000; Suad Nasir and Kirshner 2003).

While sharing this perspective, Stetsenko (2017) believes that it can be further strengthened by revealing the conditions under which learning, and identity show their interplay. This goal can be achieved from a position termed as transformative activist stance (TAS) which is developed on the grounds of works by Vygotsky and his follower Galperin. This position capitalises on the dynamics of participation in community practices and on unique individual contributions to transform these practices as the grounding for both identity and learning. 'Identity is about the search of a meaningful activity that can make a difference that matters to others and to ourselves and therefore constitutes the uniqueness of ourselves' (Stetsenko 2017, 228).

Given this perspective of TAS, *teacher digital identity* may be developed by teachers' engagement in online learning and design of digital environments; this engagement precisely constitutes the pathway for individuals (teachers) to acquire the cultural (digital) tools that allow for participation in and contribution to social practices (of teachers and students) and thus the pathway to becoming unique individuals and professionals. In this view, teachers' engagement in (i) learning and (ii) design of digital environments can be seen as an active project of becoming digitally agentic individuals capable of enhancing learning with technology and the development of students as learners. Such premises are visible in other studies (Avidov-Ungar and Forkosh-Baruch 2018; Ertmer 2005) that emphasise the need for teachers to be confident about their digital identity to create meaningful learning experiences that connect, engage their students and enhance their development as learners.

Vygotsky–Galperin approach to teaching and learning

Learning as the development of humans was addressed in the theory of Vygotsky, who suggested a social, historical approach to understanding the development of the human mind (Leontiev 2005). By adopting this non-dualist approach to mind and society, he argued that higher mental functioning is rooted in social life (Wertsch 1991) and therefore learners' participation in social practical activity using tools was the main factor influencing the development of human mind.

However, Vygotsky himself did not specify how the qualities of the tools acquired by the learner affect learning and may enhance the learner's understanding of how to go about learning. Galperin, a cultural-historical scholar, greatly extended Vygotsky's arguments about the leading role of tools in the learner's development by specifying the kind of tools that can play such a role (Stetsenko and Arievitch 2002).

In line with Vygotsky, Galperin's learning and teaching methodology aimed at identifying the essential characteristics of a target concept. However, Galperin went further by showing the necessity for creating activities specifically aimed to reveal the essential

characteristics of concepts for learners. In these activities, learners develop their under-standing of all the essential characteristics of the concepts to be able to apply these concepts in various contexts. Galperin also saw the benefits of such an approach in assisting teachers' efforts at externalising, unravelling and explicating the learning pro-cess for students, which he believed remained invisible for teachers and students in the approaches suggested by Vygotsky (Engeness and Lund 2018).

The contribution of Galperin indicates that learning and development involve enga-ging in social experience and aim at initiating changes in the existing psychological functions by establishing new relationships between these functions. Therefore, the development of a learner comprises quantitative and qualitative changes. Quantitative changes are characterised by the accumulative formation of new psychological functions: that is, the acquisition of new knowledge and skills. Qualitative changes are characterised by modifying the structure of the existing psychological functions and establishing new relationships between these functions to enhance students' capacity to be in control of their own learning. Students' capacity to learn how to master new types of learning activities constitutes *learning to learn*, which brings about qualitative changes in the psychological functions and the development of the learner (Engeness and Lund 2018). Such an understanding has pedagogical implications for the design of digital environ-ments aimed at enhancing (i) teachers' digital identity and (ii) students' agentic capacity to learn. Galperin offers such an approach by introducing his study of orientation.

Learning as an orienting activity

Galperin suggested that a learning activity comprises orienting, executive and control parts. The orienting part urges for careful planning of the learning activity, and the executive part ensures the performance of the learning activity. Galperin envisioned the control part as the development of learners' attention as well as their ability to analyse and reflect on their own learning and suggest ways of further improvement. In summary, Galperin's analytic framing conceptualised in detail the learning activities that aimed at facilitating the development of new and reorganising the existing psychological functions in learners.

Galperin's study of orientation offers implications for the pedagogical design princi-ples of digital environments. Planning the learning activity (orienting part) involves identifying the following aspects: (1) the outcome of the action with its particular characteristics (e.g. what concept are the students to learn?), (2) the units/parts of the outcome of the action and the order in which they will have to be developed (what are the essential characteristics of the target concept and in which order should these characteristics be presented for students?), (3) tools that are available for the students (what resources and tools are useful for the students?) and (4) the overview of the entire activity – the scheme of action as a whole is termed as an operational scheme of thinking (Engeness 2020) (how will the students engage in learning?). Galperin indi-cated that the operational scheme of thinking enhances students' understanding of the learning process they will engage in. Such a scheme makes learning conscientious and different from the purely mechanistic learning wherein the prescribed instructions are followed; this conscientious learning may enhance learners' understanding of how to go about learning (Engeness and Lund 2018).

The orienting part urges for the careful planning of the type of orientation that learners are going to be exposed to during the learning activity. Galperin argues that orientation can be specific for a particular task or it can be used in several situations that comprise the essential characteristics of a target concept. In addition, the orientation can be either provided in its final form that is ready to be used in a learning activity or it can be constructed by learners. The construction of the orientation by learners, in turn, can happen either by trial and error or by following an approach offered by the teacher.

Based on these premises, Galperin identified three types of orientations. (i) *Incomplete*, where mediational tools and the essential characteristics of the concept are identified by learners through trial and error. In this case, learning happens very slowly with many mistakes, and the activity of learning is extremely sensitive to the slightest changes in the conditions. (ii) *Complete*, where learners are told by the teacher about all essential characteristics of the concept necessary to solve a particular problem. However, these essential characteristics are specific and can be used only when solving a particular problem. The learners are supplied with all the necessary tools and the operational scheme of thinking. Learning happens quickly and with minimum mistakes; however, the transfer of the skills developed during such an activity is possible only when there is a close similarity in the learning situations. (iii) *Complete but constructed by learners* following an approach offered by the teacher aimed at identifying the essential characteristics of the target concept, identifying the necessary tools and co-constructing the operational scheme of thinking. Using an approach offered by the teacher, a specific orientation suited to solve the task at hand can be constructed by learners. With the third type of orientation, learning happens quickly and with minimum mistakes; such an approach to learning may be transferred to other learning situations. Therefore, learners' understanding of how to go about learning may be enhanced.

The third type of orientation may enhance learners' agentic capacity as confident and effective learners and may have implications for the design of digital learning environments aiming to develop their capacity in learning to learn.

Learning as a process of dialectical transformations

The orienting part of a learning activity includes the careful planning of the transformation of the activity from the external to the internal plane. According to Galperin, the transformation of the learning activity is described by the measure of its acquisition by the learners engaged in the activity: that is, when transferred from the social external plane to the internal individual plane. Galperin outlined the dialectically developing phases this transformation may go through: (i) motivation, (ii) orientation, (iii) materialised action, (iv) communicated thinking, (v) dialogical thinking and (vi) acting mentally (Engeness and Edwards 2017). In the motivation phase, a learner's attitude and relation to the learning outcomes that have to be achieved are formed. In the orientation phase, Galperin identified the three types of orientations presented above. In the third phase, materialised action, learners interact with material (real objects) or materialised objects (digital resources, simulations, animations, etc.); over time, they become less dependent on the material support the objects provide and more aware of the meanings they carry. Speech becomes the main guiding tool in the fourth phase, communicated thinking, which reflects learners' engagement with material or materialised objects. Note that

communicated thinking does not imply learners' ability to explain the activity they are involved in, but to complete the activity by talking. In the communicated thinking phase, an activity already acquires the characteristics of ideal, theoretical activity, but it is still 'visible' and available for monitoring from outside. The fifth phase, dialogical thinking, establishes a dialogue of a learner with him/herself so that the activity is being mentally transformed. In dialogical thinking, a mental activity: (i) presents itself as a reflection of the materialised activity on the ideal plane where material or materialised objects are substituted with their images, (ii) is directed to the images of the material or materialised objects and (iii) reflects learners' ability to mentally perform the activity with the images of the material or materialised objects. The transformation from communicated thinking to dialogical thinking occurs by substituting the externally oriented speech with its image. In dialogical thinking, the activity is directed inside the learner, thus establishing communication with him/herself (as another person). Learners' ability to perform an activity in the form of dialogical thinking reflects the pathway the activity has undergone from its materialised to dialogical form. In the final phase, acting mentally, activity has become a pure mental act with the focus on its outcome. The activity is performed with the inner speech that does not include the dialogue with a learner as 'another person' but becomes a purely individual activity completed by means of mental images and meanings that help a learner to deal with similar or differing situations on the basis of previous experience.

These phases of the transformation of external social activity to the internal plane of a learner may have implications for the design of digital educational spaces where learners are supported by both material and social resources.

Pedagogical design principles of digital learning environments

An emerging solution for designing complex learning settings is to define generic design principles that explicate the central features of one's pedagogical approach to guide the designer (Kali 2006). Design principles are supposed to emerge from previous research and inform future design activities (Bell, Hoadley, and Linn 2004). They are seen to operate as a bridge between the theories of learning and pragmatic aspects of learning (Paavola et al. 2011). The origin of design principles can be either theoretically, empirically or practically informed (Hewitt and Scardamalia 1998; Kaptelinin and Nardi 2006; Paavola et al. 2011).

Several attempts have been made to develop different sets of principles for the design of digital environments. For example, the Knowledge Practices Laboratory (KP – Lab) project aimed to develop and investigate the theoretical foundations, pedagogical practices and methods as well as tools that support collaborative knowledge creation processes both in educational and working contexts. The project has developed a general pedagogical approach called trialogical learning, representing the knowledge creation metaphor of learning. In trialogical learning, the focus is not only on learners, social processes or dialogues but also on a third element that is, on jointly developed 'objects' (knowledge artefacts, processes or practices), meant for some later use (Paavola et al. 2011). Based on these premises, the following design principles (DP) were suggested. DP (1): organising activities around shared objects. DP(2): supporting the integration of personal and collective agency and work (through developing shared objects). DP(3): emphasising the development and creativity in working on shared objects through

transformations and reflection. DP(4): fostering long-term processes of knowledge advancement with shared objects (artefacts and practices). DP(5): promoting cross-fertilisation of various knowledge practices and artefacts across communities and institutions. DP(6): providing flexible tools for developing artefacts and practices. However, these design principles appeared to not be as straightforward and overarching as anticipated. Aimed for the design principles to provide a bridge between theory and practice, the case showed that a complementary and more concrete framework was needed to bridge theory to practical pedagogical or technical design solutions.

Hewitt and Scardamalia (1998) took a theory-informed approach and explored various interpretations of the term 'distributed cognition' from the situative, cognitive and combined perspectives. In their work, they focused on the educational implications of an individual-level and community-level processes that arise in the classroom. Computer-supported intentional learning environments (CSILE) were designed to support the contributions to a communal database. The suggested knowledge building community model comprised the following approaches: (1) classroom activity defined by advances in knowledge rather than completion of tasks, (2) greater access to distributed expertise and (3) student-created artefacts as mediators of distributed cognition. CSILE attempted to facilitate student work in a 'many-to-many' environments in which all notes were readable by the entire class. For over a decade, the authors (Hewitt and Scardamalia 1998) have been engaged in the twofold design process involving the ongoing refinement of the CSILE software package and the ongoing reworking of teacher and classroom practices. Over time, they have identified a set of design principles to foster educationally beneficial distributed practices: (1) support effective peer interactions, (2) integrate different forms of discourse, (3) focus students' attention on communal problems of understanding, (4) promote awareness of students' contributions, (5) encourage students to build on each other's work and (6) emphasise the work of the community. To work productively in such contexts, students must be able to assess their personal knowledge needs and establish relevant courses of action. At the same time, they must understand the group processes to assess the knowledge advances for the group as a whole and to analyse their work in light of what is being accomplished both within and outside their local community. However, the emphasis on the social aspect did not reflect the role of the activity in the design of digital learning environments.

Numerous studies have adopted the founding principles of activity theory: (i) unity of consciousness and activity and (ii) the social nature of the human mind to inform approaches to design (Kaptelinin and Nardi 2006). By considering technology as a mediator between human beings and the world, the activity theory brought to light important new issues; for example, the aspects of the user interface that should be taken into account in design: (i) physical aspects (operating with a device as a physical aspect), (ii) handling aspects (the logical structure of interaction with the interface) and (iii) subject-object–directed aspects (how objects 'in the computer' are related to objects in the world). The underlying principles of activity theory were used to reconsider some of the most central concepts of human–computer interaction (HCI), including concepts of transparency, affordance and direct manipulation.

Another attempt was made to translate the underlying concepts and principles of activity theory into concrete and practical tools that can help to design digital environments and other products. For example, the foundations of activity theory were used to

develop an analytical tool, the Activity Checklist (Kaptelinin and Nardi 2006), which was intended to elucidate the most important contextual factors of HCI by pointing to specific areas that a researcher or practitioner should pay attention to: (1) object-orientedness, (2) tool mediation, (3) internalisation–externalisation, (4) hierarchical structure of activity and (5) development. The Checklist has been used for the analysis, evaluation and design of various technologies, including Apple data detectors (Nardi, Miller, and Wright 1998), an information system for a newspaper (Macaulay, Benyon, and Crerar 2000), a website (Hedestig and Kaptelinin 2002) and a collaborative tangible user interface (Fjeld, Morf, and Krueger 2004).

To summarise, these examples of theory-informed designs show that a theory can be a powerful tool to select strategies and identify priorities in the design. However, these examples also indicate the need for teachers to have specialised knowledge and competencies. Learning and teaching in modern classrooms urge for pedagogic approaches to inform the design of digital environments to facilitate conceptual learning and the development of students' understanding of how to go about learning. Galperin's theory might offer such an approach.

Design principles of digital environments informed by Galperin's pedagogical theory

From the perspective of Galperin's pedagogical theory, the following design principles (DP) of digital environments aimed to enhance students' learning and their capacity in learning to learn may be suggested.

DP(1): When designing a digital environment, it seems important to identify (i) the target concept about which students need to develop their understanding (ii) the essential characteristics or structural parts of the target concept. In addition, the sequence of presenting the essential characteristics of the target concept to students should be identified based on their prior knowledge and skills.

DP(2): If a learning activity is to adequately assist the development of students' learning and their understanding of the learning process, it might be organised according to the third type of orientation: complete and constructed by students using an offered approach.

DP(3): The overview of the entire activity, termed by Galperin as the 'operational scheme of thinking', might be integrated into digital environments to enhance students' understanding of the learning process they engage in.

DP(4): The phase of materialised action indicates that some resources to assist the development of learners' conceptual understanding should be presented in the materialised form (digital resources, animations, etc.). Students' experience from interactions with the materialised resources is transferred through collaborative interactions to the internal plane of the learner (materialised action – communicative thinking – dialogical thinking – acting mentally).

DP(5): The phase of communicative thinking urges to create premises for social interactions in digital environments (e.g. discussion forums and collaborative video meetings).

DP(6): The role of feedback as well as facilitation of the learning process by teachers need to be accounted for in the design: feedback provided to students in digital environments might assist them to develop their conceptual understanding and to enhance their

understanding about how to go about learning. Such feedback is particularly appreciated by the students in the phases of materialised action and communitive thinking (Engeness 2018, 2020). In the later phases of the learning process, such as dialogical thinking, feedback might be provided on request or with regard to how well students master the activity they are engaged in.

In summary, these design principles are intended to (i) enhance students' learning through their actions and interactions with the available digital tools and students' gradual meaning-making of these digital tools and (ii) by adopting the third type of orientation, develop students' understanding about how learn in online environments. In doing so, students might enhance their capacity in learning to learn and position themselves as active agents in knowledge practices. In the following, two empirical snapshots are presented as examples of assignments and modules designed based on the principles arising from Galperin's pedagogical theory. Although these examples are included in the PDC MOOC for English teachers in Norway, they may exemplify a useful approach to design digital environments for students of various age groups.

Empirical snapshot #1: Assignment – A Digitally Competent English Teacher

The PDC MOOC for English teachers was first introduced in Norway in 2019. The course was developed by researchers and development specialists from Østfold University College. The PDC MOOC has a structure of an xMOOC; it is built-in on the Canvas platform and is aimed to enhance the development of PDC in English teachers in Norway. xMOOCs is defined as institutionally focused, largely reliant on video resources and providing automated assessment through quizzes (Armellini & Rodriguez, 2016; Fidalgo-Blanco, Sein-Echaluce, and García-Peñalvo 2016), and all of these elements are present in the PDC MOOC. The PDC MOOC comprises eight modules to be completed by its participants (teachers) over the course of 20 weeks.

The assignment A Digitally Competent English Teacher is included in Module 1 Learning and Teaching English With Digital Technology and is a typical assignment in the PDC MOOC. The text of the assignment is presented in Figure 1.

The design of this assignment follows Galperin's dialectically developing phases of the learning process. First, the teachers are suggested to interact with the research articles (materialised action) to be introduced to the target concept (teacher PDC). In the following step, the teachers are offered to engage in the online collaborative group meetings to develop their understanding and reflect on what it means to be a digitally competent English teacher (communicated thinking). If feedback is desired, the teachers might invite their course instructor to the online meeting. Finally, the teachers are offered to post their reflections on the discussion page (dialogical thinking) by responding to, elaborating upon and commenting on the posts of other teachers and/or writing their own reflections on the target concept.

From the perspective of Galperin's types of orientations, the assignment is designed according to the orientation of the third type: complete and constructed by learners by following a given approach. The teachers had to select and utilise the theoretical resources (research articles) and digital tools useful to solve the assigned task. By engaging with the research articles, the teachers identify the characteristics of the concept of teacher PDC, and by engaging in the online collaborative meetings, the teachers may

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A Digitally Competent English Teacher

In this task, we would like you to reflect on what it means to be a digitally competent English teacher by following these steps:

i) Having read the articles by Røkenes and Krumsvik (2016) 'Prepared to teach ESL with ICT? A study of digital competence in Norwegian teacher education' and by Ottestad, Kelentrić and Guðmundsdóttir (2014) 'Professional Digital Competence in Teacher Education', we would like you to reflect on **what it means to be a digitally competent English teacher**.

ii) We would like you to do so by engaging in the online collaborative group meetings. In addition, by engaging in the collaborative group meetings online, you will become familiar with the chosen software. Each group will elect a group leader responsible to arrange the online group meeting and invite other group members to the meeting. You will need to agree on the date and time of the meeting in advance.

In the meeting, you will be able to introduce yourself, get to know each other and reflect on what it means to be a digitally competent English teacher. If you would like to, you may invite your course teacher to your collaborative group meeting.

iii) After the collaborative group meeting, please write your reflections about what it means to be a digitally competent English teacher on the next page in this course (discussion page). Your reflection will appear as a discussion post and you will be able to read the posts of other participants from other collaborative groups. You can comment, respond and elaborate on previous posts as well as present your reflections on the matter.

Please watch the video where we explain how to set up a meeting on Skype, Messenger, Whereby and Teams (link to the video).

Figure 1. Assignment a digitally competent english teacher.

present themselves as social resources to each other to develop their understanding of the target concept. The technology, in turn, is used as a mediation tool that accommodates teachers' online interactions by connecting the physically distanced teachers. In addition, the need to engage with various software and select the most appropriate one to set up the online group meetings may contribute to enhancing the teachers' digital identity as conscientious users and co-designers of digital environments. The text of the assignment presented as a list of sequential steps exemplifies an operational scheme of thinking (in Galperin's terms), indicating teachers how to engage and progress in the learning process.

In summary, teachers' engagement in the assignment designed after the suggested design principles exemplifies how teachers may develop (i) their conceptual understanding about what it means to be a digitally competent English teacher and (ii) develop their understanding of how to learn in the digital environment. In doing so, teachers enhance their capacity to orient themselves in the digital environment, interact with the available digital resources, make their meaningful contributions to the online learning practices

and, hence, develop their *digital identity*. By applying the suggested design principles to create online assignments for their students, the teachers might construct digital environments that act as *a mediator* and *a tool* to enhance students' capacity in learning to learn.

Empirical snapshot #2: Designing a Module – Multimodal Texts

The second empirical snapshot shows how a module in the online course may be designed based on Galperin's pedagogical principles. The design of several modules in the PDC MOOC has been informed by Galperin's pedagogical design principles. Figure 2 presents the structure of the modules in the PDC MOOC.

Module 4 Multimodal Texts (MMT) is a typical example of the modules in the PDC MOOC. The aim of the MMT module is to develop teachers' understanding of the concept of multimodality and enhance their digital competency to create multimodal texts in digital environments. The module comprises three main parts: (i) theoretical part introducing the concept of multimodality in teaching and learning English (4.0–4.4.6), (ii) practical part introducing the relevant digital tools to create a multimodal text and the aspects of design (e.g. Universal Design, Copyright Law and Creative Common Licences) (4.5–4.5.8) and (iii) examination task, creating a multimodal text (4.6–4.6.3). The sequential design of the module is presented in Figure 3.

In the first part of the Module, the teachers are introduced to the theoretical resources to reveal the essential characteristics of the multimodal texts (materialised action). The teachers may develop their understandings of the available theoretical resources by engaging in online group discussions (communicated thinking) and assess their understandings of the target concepts by engaging in the multiple-choice quiz (dialogical thinking). The second part of the module is structured in a similar way: introduction to the theoretical resources by presenting relevant digital tools and reflecting on the issues of universal design, creative common licences, etc. (materialised action), followed by online discussions to develop teachers' understandings of the target digital tools (communicated thinking) and finally,
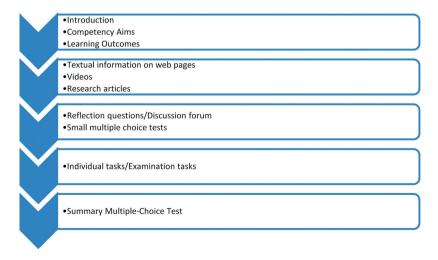

- Introduction
- Competency Aims
- Learning Outcomes

- Textual information on web pages
- Videos
- Research articles

- Reflection questions/Discussion forum
- Small multiple choice tests

- Individual tasks/Examination tasks

- Summary Multiple-Choice Test

Figure 2. The structure of the Modules in the PDC MOOC.

Module 4 – Multimodal Texts

4.0 Introduction and Competency Aims

    4.1 Introducing Multimodal Texts

    4.2 Theory on Multimodal Texts

      4.2.1 Multimodality and Multimodal Literacy

      4.2.2 Pedagogy of Multiliteracies

      4.2.3 Mode and Modality

      4.2.4 Semiotic Resources and Semiotic Technology

      4.2.5 Analysis of Multimodal Texts

Discussion: Knowledge Practices

Test Yourself

    4.3 Multimodal Texts and English Language Learning

    4.4 Learning by Design: Using Multimodal Texts for Teaching and Learning Practices

      4.4.1 Classroom as an Environment for Multimodal Resources

      4.4.2 How to Use Multimodal Texts for Teaching and Learning

      4.4.3 How to Create Multimodal Texts

      4.4.4 How to Assess Multimodal Texts

      4.4.5 Examples of Multimodal Planning and Teaching

      4.4.6 Challenges of Multimodal Teaching and Learning

Discussion: Development Assessment Criteria for Multimodal Texts

Test Yourself

    4.5 Assignment: Pre-Assignment Readings

      4.5.1 Universal Design

      4.5.2 Creative Common Licenses

      4.5.3 Copyright Law

      4.5.4 Reference Techniques

      4.5.5 Remediating Texts

      4.5.6 Examples of Remediated Multimodal Texts

      4.5.7 Tools and Methods to Remediate Texts

      4.5.8 How to Create a Video

    4.6 Examination Assignment: Create a Remediated Multimodal Text

      4.6.1 Collaborative Group Meetings

      4.6.2 Drafted Remediated Text

      4.6.3 Submit the Examination Assignment: Remediated Multimodal Text

Test Yourself in Module 4: Multimodal Texts

Figure 3. The sequential design of module 4 multimodal texts.

a multiple-choice test to explicate their (mis)understandings (dialogical thinking). When engaged in the examination assignment, the teachers follow similar phases: selecting a monomodal text to be remediated into a multimodal text (materialised action), engaging in collaborative online group meetings to develop their understandings of the target concept – the remediated multimodal text (communicative thinking), submitting a draft to receive feedback from the course instructor and creating a multimodal text and a reflection video (dialogical thinking). The text of the examination assignment is presented in Figure 4.

From the perspective of Galperin's types of orientations, both the MMT module and the examination assignment are designed according to the third type of orientation: complete and constructed by learners. The varieties of the resources (theoretical and digital) the teachers may select to develop their conceptual understanding enable them to create a multimodal text and reflect on the pedagogical value of the designed text. The assessment criteria of the examination task might indicate an approach to engage in learning, design an MMT and reflect on its pedagogical value. In doing so, the teachers may develop their understandings about how to engage in online learning and enhance their capacity in learning to learn. From this perspective, the structure of the MMT module and examination assignment utilising the third type of orientation may offer an approach to learning that the teachers may pursue. In the MMT module designed after the suggested principles, teachers master the essence of learning through studying a phenomenon of multimodality, which carries a new function: not as a studied object but as *a tool* for studying the *essence of online learning*. By adopting the suggested design principles, learning in the MMT module may be aimed at bringing about (i) acquisition of new conceptual knowledge and (ii) the development of teachers' understanding of the nature of online learning to empower teachers to meaningfully act and interact in the digital environment and, in doing so, enhance their digital agency. On the one hand, by engaging in online learning and propelling themselves forward, the teachers reposition themselves as independent agentic learners. On the other hand, applying the suggested design principles in their teaching practice to create digital learning spaces for their students, the teachers may allow participation in and contribution to the social learning practices of their students to enhance their agentic capacity to learn. In doing so, teachers' professionalism as digitally competent educators may be enhanced.

In summary, by engaging in learning in the PDC MOOC, constructed after the suggested design principles teachers may develop their understanding about how to learn online which may contribute to nurturing their *digital identity* because it offers educators opportunities to engage in practices with technology; it also offers the baseline from which a meaningful contribution to these practices can be made as the core grounding for human development and learning. By applying the suggested design principles to create digital environments for their students, the teachers may offer an approach for students to develop their understanding of how to learn online and enhance their *agentic capacity to learn*. In doing so, the designed digital environment becomes *a mediator* and *a tool* to study the essence of online learning.

Concluding reflections

Further research is required to make arguments about the pedagogic potential of the design principles presented here; however, this discussion is timely and may contribute to

Creating a Multimodal text

The main goal of this assignment is to remediate a self-selected monomodal text into a new, multimodal text. The multimodal text should be used as a self-produced teaching resource that provides added pedagogical value in relation to the original text.

Use an analogous printed or digital text (monomodal) as a starting point for the remediation. The remediated, multimodal text will be put into a pedagogical context, and you should be able to argue why and how the remediated multimodal text will enhance the development of students' conceptual understanding.

You will need to submit the following three elements, which together constitute the examination assignment:

A. Original text (file/link)

B. Remediated, multimodal text (file/link)

C. Reflection video in which you reflect on the theoretical grounds to justify the chosen modes. In addition, you will need to reflect on the pedagogical value of the remediated text by explaining how the remediated text may enhance the development of students' conceptual understanding.

You may also write a declaration giving other participants the right to use your remediated texts in their teaching practice if they follow the copyright law in the correct manner.

How to Engage in the Examination Assignment?

We suggest that you follow the steps outlined below to solve the examination task.

1. Read the task carefully and brainstorm ideas about the text that might be remediated, theoretical resources and digital tools that might be useful. Please read carefully the assessment criteria.

2. The group leader will arrange a collaborative meeting online to exchange these ideas with other students. The aim of this meeting is to solve the examination task by engaging in discussions with your peers. You will present your ideas about the text you would like to remediate, the resources that might be useful to solve this task and the pedagogical value of your remediated multimodal text.

3. Create a draft – a plan for how to solve the examination task: which text you would like to remediate and how you will remediate this text. Submit your draft to the course teacher to receive feedback on your ideas.

4. Remediate your target text and submit the following: (i) original monomodal text, (ii) remediated multimodal text and (iii) reflection video.

Figure 4. Examination assignment: creating a multimodal text.

extending our understanding of teacher professionalism in the 21st century. While the past 20 years have seen a substantial increase in the presence of digital technology in schools and universities, the much-promised technology-led transformation of the processes and practices of education have failed to materialise into tangible benefits (Selwyn 2016). However, after decades of critical views on educational digital technology, it is now time to offer

teachers useful approaches and powerful tools to become efficient users and designers of digital technology. Inspired by Galperin's pedagogical theory, the suggested design principles might offer such an approach. It is our responsibility to help teachers to harness the pedagogic potential of digital technology to engage in meaningful practices that nurture teacher digital identity and enhance students' agentic capacity in learning to learn.

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References

Akkerman, S. F., and P. C. Meijer. 2011. "A Dialogical Approach to Conceptualizing Teacher Identity." *Teaching and Teacher Education* 27 (2): 308–319. doi:10.1016/j.tate.2010.08.013.

Armellini, A., and B. C. Padilla Rodriguez. 2016. "Are Massive Open Online Courses (Moocs) Pedagogically Innovative?" *Journal of Interactive Online Learning* 14 (1): 17–28.

Avidov-Ungar, O., and A. Forkosh-Baruch. 2018. "Professional Identity of Teacher Educators in the Digital Era in Light of Demands of Pedagogical Innovation." *Teaching and Teacher Education* 73: 183–191. doi:10.1016/j.tate.2018.03.017.

Beauchamp, C., and L. Thomas. 2009. "Understanding Teacher Identity: An Overview of Issues in the Literature and Implications for Teacher Education." *Cambridge Journal of Education* 39 (2): 175–189. doi:10.1080/03057640902902252.

Beijaard, D., N. Verloop, and J. D. Vermunt. 2000. "Teachers' Perceptions of Professional Identity: An Exploratory Study from a Personal Knowledge Perspective." *Teaching and Teacher Education* 16 (7): 749–764. doi:10.1016/S0742-051X(00)00023-8.

Beijaard, D., P. C. Meijer, and N. Verloop. 2004. "Reconsidering Research on Teachers' Professional Identity." *Teaching and Teacher Education* 20 (2): 107–128. doi:10.1016/j.tate.2003.07.001.

Bell, P., C. M. Hoadley, and M. C. Linn. 2004. "Design-based Research in Education." *Internet Environments for Science Education* 2004: 73–85.

Bernstein, B. B. 2000. *Pedagogy, Symbolic Control and Identity: Theory, Research, Critique.* Boulder, CO: Rowman & Littlefield.

Claxton, G. 2013. *What's the Point of School?: Rediscovering the Heart of Education.* Oxford: Oneworld Publications.

Engeness, I. 2018. "What Teachers Do: Facilitating the Writing Process with Feedback from EssayCritic and Collaborating Peers." *Technology, Pedagogy and Education* 27 (3): 297–311. doi:10.1080/1475939X.2017.1421259.

Engeness, I. 2020. "Teacher Facilitating of Group Learning in Science with Digital Technology and Insights into Students' Agency in Learning to Learn." *Research in Science & Technological Education* 38 (1): 42–62. doi:10.1080/02635143.2019.1576604.

Engeness, I., and A. Edwards. 2017. "The Complexity of Learning: Exploring the Interplay of Different Mediational Means in Group Learning with Digital Tools." *Scandinavian Journal of Educational Research* 61 (6): 650–667. doi:10.1080/00313831.2016.1173093.

Engeness, I., and A. Lund. 2018. "Learning for the Future: Insights Arising from the Contributions of Piotr Galperin to the Cultural-historical Theory." *Learning, Culture and Social Interaction*. Epub ahead of print 6 December 2018. 10.1016/j.lcsi.2018.11.004.

Ertmer, P. A. 2005. "Teacher Pedagogical Beliefs: The Final Frontier in Our Quest for Technology Integration?" *Educational Technology Research and Development* 53 (4): 25–39. doi:10.1007/BF02504683.

Ferrari, A., Y. Punie, and C. Redecker. 2012. "Understanding Digital Competence in the 21st Century: An Analysis of Current Frameworks." In *European Conference on Technology Enhanced Learning* (pp. 79–92). September. Springer, Berlin, Heidelberg.

Fidalgo-Blanco, Á., M. L. Sein-Echaluce, and F. J. García-Peñalvo. 2016. "From Massive Access to Cooperation: Lessons Learned and Proven Results of a Hybrid xMOOC/cMOOC Pedagogical Approach to MOOCs." *International Journal of Educational Technology in Higher Education* 13 (1): 24. doi:10.1186/s41239-016-0024-z.

Fjeld, M., M. Morf, and H. Krueger. 2004. "Activity Theory and the Practice of Design: Evaluation of a Collaborative Tangible User Interface." *International Journal of Human Resources Development and Management* 4 (1): 94–116. doi:10.1504/IJHRDM.2004.004495.

Friesen, M. D., and S. C. Besley. 2013. "Teacher Identity Development in the First Year of Teacher Education: A Developmental and Social Psychological Perspective." *Teaching and Teacher Education* 36: 23–32. doi:10.1016/j.tate.2013.06.005.

Gaudelli, W., and D. Ousley. 2009. "From Clothing to Skin: Identity Work of Student Teachers in Culminating Field Experiences." *Teaching and Teacher Education* 25 (6): 931–939. doi:10.1016/j.tate.2009.02.017.

Gorospe, J. M. C., L. F. Olaskoaga, A. G. C. Barragán, D. L. Iglesias, and B. O. A. Agirre. 2015. "Formación Del Profesorado, Tecnología Educativa E Identidad Docente Digital." *RELATEC: Revista Latinoamericana De Tecnología Educativa* 14 (1): 45–56.

Hedestig, U., and V. Kaptelinin. 2002. "Re-contextualization of Teaching and Learning in Video Conference-based Environments: An Empirical Study." *Proceedings of the 2002 Conference on Computer Support for Collaborative Learning. Foundations for a CSCL Community*, January, 179–188. Boulder, CO.

Hewitt, J., and M. Scardamalia. 1998. "Design Principles for Distributed Knowledge Building Processes." *Educational Psychology Review* 10 (1): 75–96. doi:10.1023/A:1022810231840.

Instefjord, E. 2014. "Appropriation of Digital Competence in Teacher Education." *Nordic Journal of Digital Literacy* 9 (4): 313–329.

Instefjord, E., and E. Munthe. 2016. "Preparing Pre-service Teachers to Integrate Technology: An Analysis of the Emphasis on Digital Competence in Teacher Education Curricula." *European Journal of Teacher Education* 39 (1): 77–93. doi:10.1080/02619768.2015.1100602.

Instefjord, E. J., and E. Munthe. 2017. "Educating Digitally Competent Teachers: A Study of Integration of Professional Digital Competence in Teacher Education." *Teaching and Teacher Education* 67: 37–45. doi:10.1016/j.tate.2017.05.016.

Kali, Y. 2006. "Collaborative Knowledge Building Using the Design Principles Database." *International Journal of Computer-Supported Collaborative Learning* 1 (2): 187–201. doi:10.1007/s11412-006-8993-x.

Kaptelinin, V., and B. A. Nardi. 2006. *Acting with Technology: Activity Theory and Interaction Design*. Cambridge, MA: MIT Press.

Lasky, S. 2005. "A Sociocultural Approach to Understanding Teacher Identity, Agency and Professional Vulnerability in A Context of Secondary School Reform." *Teaching and Teacher Education* 21 (8): 899–916. doi:10.1016/j.tate.2005.06.003.

Lave, J., and E. Wenger. 1991. *Situated Learning: Legitimate Peripheral Participation*. Cambridge: Cambridge University Press.

Leontiev, A. N. 2005. "Study of the Environment in the Pedological Works of LS Vygotsky: A Critical Study." *Journal of Russian & East European Psychology* 43 (4): 8–28.

Macaulay, C., D. Benyon, and A. Crerar. 2000. "Ethnography, Theory and Systems Design: From Intuition to Insight." *International Journal of Human-computer Studies* 53 (1): 35–60. doi:10.1006/ijhc.2000.0376.

Martin, J., and J. Sugarman. 2000. "Between the Modern and the Postmodern: The Possibility of Self and Progressive Understanding in Psychology." *American Psychologist* 55 (4): 397. doi:10.1037/0003-066X.55.4.397.

McGarr, O., and A. McDonagh. 2019. "*Digital Competence in Teacher Education*. Output 1 of the Erasmus+ Funded Developing Student Teachers' Digital Competence (DICTE) Project, 2019." https://dicte.oslomet.no

Miliband, D. 2003. *21st century Teaching: Leading Modern Professionalism*. April 7. Speech delivered to the Teacher Training Agency. Retrieved May 17, 2007, from http://www.dfes.gov.uk/speeches/search_detail.cfm?ID=65

Mishra, P., and M. J. Koehler. 2006. "Technological Pedagogical Content Knowledge: A Framework for Teacher Knowledge." *Teachers College Record* 108 (6): 1017–1054. doi:10.1111/j.1467-9620.2006.00684.x.

Mockler, N. 2011. "Beyond 'What Works': Understanding Teacher Identity as a Practical and Political Tool." *Teachers and Teaching* 17 (5): 517–528. doi:10.1080/13540602.2011.602059.

Nardi, B. A., J. R. Miller, and D. J. Wright. 1998. "Collaborative, Programmable Intelligent Agents." *Communications of the ACM* 41 (3): 96–104. doi:10.1145/272287.272331.

OECD. 2016. "Supporting teacher professionalism." Insights from TALIS 2013. https://read.oecd-ilibrary.org/education/supporting-teacherprofessionalism_9789264248601-en#page1

Paavola, S., M. Lakkala, H. Muukkonen, K. Kosonen, and K. Karlgren. 2011. "The Roles and Uses of Design Principles for Developing the Trialogical Approach on Learning." *Research in Learning Technology* 19 (3): 233–246. doi:10.1080/21567069.2011.624171.

Redecker, C. 2017. *European Framework for the Digital Competence of Educators*. Luxembourg: Publications Office of the European Union. https://doi.org/10.2760/159770

Robson, J. 2018. "Performance, Structure and Ideal Identity: Reconceptualising Teachers' Engagement in Online Social Spaces." *British Journal of Educational Technology* 49 (3): 439–450. doi:10.1111/bjet.12551.

Rodgers, C. and K. Scott. 2008. The development of the personal self and professionalidentity in learning to teach. In M. Cochran-Smith, S. Feiman-Nemser, D.J. McIntyre and K.E. Demers (Eds.), Handbook of research on teacher education: changing contexts (pp. 732–755). New York: Routledge

Røkenes, F. M., and R. J. Krumsvik. 2016. "Prepared to Teach ESL with ICT? A Study of Digital Competence in Norwegian Teacher Education." *Computers & Education* 97: 1–20. doi:10.1016/j.compedu.2016.02.014.

Selwyn, N. 2016. *Education and Technology: Key Issues and Debates*. London: Bloomsbury Publishing.

Smith, K., S. M. Gamlem, A. K. Sandal, K. S. Engelsen, and K.-W. Tong. 2016. "Educating for the Future: A Conceptual Framework of Responsive Pedagogy." *Cogent Education* 3 (1): 1227021. doi:10.1080/2331186X.2016.1227021.

Søreide, G. E. 2006. "Narrative Construction of Teacher Identity: Positioning and Negotiation." *Teachers and Teaching: Theory and Practice* 12 (5): 527–547. doi:10.1080/13540600600832247.

Starkey, L. 2020. "A Review of Research Exploring Teacher Preparation for the Digital Age." *Cambridge Journal of Education* 50 (1): 37–56. doi:10.1080/0305764X.2019.1625867.

Stetsenko, A., and I. Arievitch. 2002. "Teaching, Learning, and Development: A Post-Vygotskian Perspective." In *Learning for Life in the 21st Century*, edited by G. Wells and G. Claxton. (pp. 84-87). Oxford: Blackwell Publishers.

Stetsenko, A. 2017. *The Transformative Mind: Expanding Vygotsky's Approach to Development and Education*. Cambridge: Cambridge University Press.

Suad Nasir, N. I., and B. Kirshner. 2003. "The Cultural Construction of Moral and Civic Identities." *Applied Developmental Science* 7 (3): 138–147.

Varghese, M., B. Morgan, B. Johnston, and K. A. Johnson. 2005. "Theorizing Language Teacher Identity: Three Perspectives and Beyond." *Journal of Language, Identity, and Education* 4 (1): 21–44. doi:10.1207/s15327701jlie0401_2.

Vianna, E., and A. Stetsenko. 2011. "Connecting Learning and Identity Development through a Transformative Activist Stance: Application in Adolescent Development in a Child Welfare Program." *Human Development* 54(5): 313–338. Retrieved from http://www.karger.com/DOI/10.1159/000331484

Walkington, J. 2005. "Becoming a Teacher: Encouraging Development of Teacher Identity through Reflective Practice." *Asia-Pacific Journal of Teacher Education* 33 (1): 53–64. doi:10.1080/1359866052000341124.

Wertsch, J. V. 1991. *Voices of the Mind*. Cambridge, MA: Harvard University Press.

Wirth, K. R., and D. Perkins 2008. "Learning to learn." http://geology.wwu.edu/dept/faculty/hirschd/courses/2012/winter/306/handouts/learning.pdf