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## The streamline of the continuing professional development training of teachers

### Introduction

In the context of recent events (the COVID-19 pandemic, the war in Ukraine, states of emergency in several European countries, informational warfare), the transfer of professional activities from the traditional real-world environment to the online environment has escalated. This trend has also made its mark in the educational system, including the training and continuing professional development (CPD) of teaching staff (Rad et al., 2021; Braicov, 2022; Lieberman, Wood, 2002; Kennedy, 2005; Trotter, 2006; Mushayikwa, Lubben, 2009; Roth et al., 2011; Darling-Hammond et al., 2017; Dede et al., 2008; Bates et al., 2016; Jensen et al., 2016; Fischer et al., 2018; Parsons et al., 2019; Laurillard, 2016; Schleicher, 2016; Ho et al., 2015; Obura, 2016; Patraşcu & Rotaru, 2006; Pogolşa et al., 2018; Andriţchi, 2007; Cara, 2006; Afanas, 2022; Braicov et al., 2021).

Three to four years ago, most general and vocational educational institutions had no prior experience with e-learning or distance education. Their traditional approach to organizing online educational activities usually relied on free tools from G Suite.

Although universities have more experience in delivering distance courses – most of them use Learning Management Systems, offer e-courses, and apply clear digital management regulations – they still lack innovative pedagogical models that would extensively leverage ICT tools for the quantitative and qualitative optimization of continuous professional development, including that of teaching staff.

As the education system is in a constant process of modernization, decreasing the pace of continuous professional training (CPT) for teaching staff may have a long-lasting negative impact on this system.

As a result, the question arises: *Can we create a pedagogical model that will leverage modern educational advancements in the e-learning dimension and the wide range of Information and Communication Technologies (ICT) tools to optimize both qualitatively and quantitatively the continuous professional development process for teaching staff?*

## Related Works

Lieberman (2002) mentions three main models of CPD for teaching staff: direct learning (courses, workshops, etc.); school-based learning (peer learning, critical friends, mentoring, action research); out-of-school learning (through learning networks, visits to other schools, school-university partnerships, etc.).

Kennedy (2005) identifies nine models of CPD for teaching staff:

1. The *training* model is considered universal, in which teachers are largely passive and professional development is controlled and standardized by authorities. In this universally recognized model, the training program is delivered to the teacher by an expert, with a passive role played by the learner.
2. The *award-bearing* model is based on the completion of study programs with the provision of incentives (awards or diplomas), usually validated by universities, but not exclusively. This external validation can be seen as a quality assurance mark, but may also be perceived as control exerted by the validating authorities.
3. The *deficit* model is an approach that focuses on identifying and remedying deficiencies or weaknesses in individuals' skills, knowledge, or performance in an educational context. In this model, the emphasis is on correcting or addressing what is considered lacking in an individual's professional competencies.
4. The *cascade* model supports a technocratic view of teaching, where skills and knowledge are preferentially over attitudes and values. This is a type of approach in which skills and knowledge are initially acquired by a small group of participants, usually teachers or educators, and then disseminated to other colleagues or professionals.
5. The *standards-based* model involves compliance with and fulfilment of certain standards of specific pre-defined standards or criteria in the teacher training and evaluation process. This model implies strict adherence to the rules, regulations or established standards to assess and enhance professional competencies.
6. The *coaching/mentoring* model involves experienced mentors providing personalized support, feedback and guidance to learners. It is a *one-to-one* or small-group approach that allows the professional development of the target group tailored to their individual needs.
7. The *community of practice* model leverages professional communities to share experiences, exchange ideas and collaboratively solve problems. It is considered

that this model develops a sense of belonging and collective learning, serving as an effective tool for teachers' self-professional development, communication and collaboration with colleagues, as well as for generating and debating ideas, projects and partnerships (Kennedy, 2005).

8. The *action research* model involves teachers in the systematic investigation of their own teaching practices and student performance dynamics. This approach helps teachers identify areas for improvement, implement changes, and evaluate the impact of these changes on student learning.
9. The *transformative* model aims to improve teachers' skills and knowledge. At the same time, it supports the challenge and fundamental transformation of their educational practices and perspectives.

Kennedy later groups these models into *transmission*, *transitional*, and *transformative* models, according to their fundamental purposes. As the author maintains, *transmission*-focused CPD models equip teachers with the skills and knowledge necessary to comply with educational reforms. In contrast, *transformative* models support teachers' learning and contribute to modelling educational policies and professional practices. Transformative-focused CPD activities include collaborative research and professional inquiry activities, allowing teachers to experiment with different methods to develop their practical professional skills. At the intersection of transmission and transformative approaches are transitional models. Transitional models assume that professional development is an evolutionary process and changes must be managed gradually and strategically.

Trotter (2006) presents various theories of adult learning and professional development and identifies three relevant elements for the design of teacher professional development: one's own experience as a resource for new learning, learning opportunities derived from students' interests and needs, as well as reflection and research.

Mushayikwa and Lubben (2009) introduce a model for self-directed professional development, suggesting it as a key element for successful professional development in disadvantaged environments. The authors identify two main factors for self-directed professional development: classroom effectiveness and professional effectiveness.

The non-profit organization Creative Learning Exchange (CLEX), which promotes systemic thinking in education, developed the CPD model for STeLLA (Science Teachers Learning from Lesson Analysis) teachers in 1990. This model focuses on understanding students' thinking and constructing coherent subject matter content. A study conducted by Kathleen (2011) showed that students whose teachers participated in the STeLLA program made better progress in learning compared to students from the control group, whose teachers received only content training.

Darling-Hammond et al. (2017) examined the characteristics of effective CPD programs based on a review of recent studies on successful professional development models and identified seven common design elements: content focus, active learning strategies, teacher collaboration involvement, effective practice models, expert support, time for feedback and reflection, and module timing.

Dede et al. (2008), Bates et al. (2016), and others believe that CPD represents a vital component of teachers' continuing development, and evolving technologies

enable the emergence of new and different forms of professional development. They argue that online CPD has a unique and significant potential to be spread throughout the world and educational policies promote the use of ICT as a mechanism for CPD. Teachers from around the world have started to create communities for their own professional development through social networks like Facebook, Twitter, and others.

Schleicher (2016) emphasizes that successful professional development programs encourage the development of teachers' learning communities and support teachers in sharing their experiences with the whole community.

Since 2010, Massive Open Online Courses (MOOCs) have become a common format for learning. Although MOOCs were initially designed to provide free education to underserved populations, Ho et al. (2015) identified teachers among MOOC course who have improved their teaching skills.

Douglas (2016) proposes the *transformative continuous professional development* (TCPD) model for high school teachers, providing them the tools, resources and support needed to continuously enhance their teaching abilities. The model emphasizes personalized learning, reflective practice, collaboration among teachers, and the integration of innovative teaching techniques.

Several Moldavian researchers have approached the subject of the continuous professional development of teachers. Patrașcu and Rotaru (2006) investigated the system of CPD and the concept of educational technologies for CPD. Pogolșa et al. (2018) contributed to the development of the normative and methodological framework for organizing the CPD of teachers. Andrițchi (2007) developed theoretical and methodological foundations for human resource management in pre-university education and investigated teachers' professional satisfaction. Cara (2006) explored the quality of teachers' professional development in the context of CPD standards. Afanas (2022) developed a methodological framework for CPD from the perspective of teacher professionalism, considering labour market requirements.

## The research problem and methodology

Summarizing the reviewed works, we observe that, first, there is a significant interest among researchers in identifying optimal models for the professional development of teachers. Second, the proposed models are not focused on leveraging ICT tools and technologies. Third, there is a need to develop an efficiency model for the CPD of teachers, especially in terms of *success rate*, *number of beneficiaries*, *training time*, *training expenses*, *failure rate*, and *dropout rates*, by harnessing the opportunities offered by ICT. Finally, the proposed model will incorporate the positive characteristics of the affirmed professional development models.

We denote by  $CPDT(x) \rightarrow y$  the model of continuous professional development of teachers supported by ICT, where  $x$  represents the trainers and  $y$  represents the trainees or course participants.

For the model  $CPDT(x) \rightarrow y$  to be efficient in terms of performance and for a relatively large number of trainees ( $y$ ), it should possess the following characteristics:

1. The delivery of the CPD program must be hierarchical. Thus, it should follow the next stages:
  - I. CPDT (program/course authors) → national trainers;
  - II. CPDT (national trainers) → local trainers;
  - III. CPDT (local trainers) → other teachers.This characteristic is illustrated by the *cascade model*, which involves, in the first stage, the creation of national trainers who also serve as validators for the trainees of the course. In the second stage, national trainers deliver the course to potential local trainers, who, after successful completion of the professional development program, have the role of teaching their colleagues (the third stage).
2. The model  $CPDT(x) \rightarrow y$  must support various modes of instructional delivery: face-to-face, blended (face-to-face & online), and exclusively online, with synchronous and asynchronous sessions.
3. In designing learning content and instructional technologies, the Backward and ADDIE instructional design approaches will be applied, supporting the CPD deficit model. It means that the needs of beneficiaries, as well as gaps or deficiencies in their existing skills or even the absence of certain professional abilities, will be taken into account.
4. To support the management of the training process, a content management platform and educational tools that do not involve additional ongoing expenses will be used. Such a system can be, for example, CLMS Moodle and/or Google Classroom.
5. The  $CPDT(x) \rightarrow y$  model must have a consistent modular structure for its content. These modules will be grouped into homogeneous units with each module having the same number of lessons, stages, etc.
6. We recommend following the learning content in a linear sequence. For example, the content can be organized into three ordered compartments: *General Resources* → *Modules* → *Final Assessment*.
7. The lessons within each module will be uniform and follow the staged ERR (Evocation, Realisation of Meaning, and Reflection) model (Fig. 1).

Figure 1. The ERR model

Session 2. Professional Development	
	Evocation (10 min)
	Constructing meaning (30-40 min)
	Reflection (10 min)
Session 3. Professional Development	
	Evocation (10 min)
	Constructing meaning (30-40 min)
	Reflection (10 min)

8. Each component of the lesson will be allocated/associated with a pre-planned amount of time.
9. In addition to CLMS, a wide variety of software will be used, including a platform for webinars, platforms for interactive and collaborative activities, synchronous/asynchronous communication tools. For example, in the case of Google Classroom, cloud solutions can be used, such as Google Docs, Google Forms, Google Sheets, Google Jamboard, Google Drawings, Genially, Mentimeter, Padlet, IdeaBoardz, Poll Everywhere, YouTube, free video editors, etc.
10. Various types of resources and educational technology tools will be used, such as PDF files (including interactive ones), interactive presentations (e.g., Genially), real-time interactive and collaborative presentations (e.g., Mentimeter), video resources for documentation and reflection, Google Classroom themes and materials, questionnaires, surveys, Google tests, virtual noticeboards (e.g., Padlet), design tools (e.g., Canva), resources for collecting rapid feedback (live surveys, quick tests, word clouds, e.g., Padlet), external resources (links to useful resources or extensions), products for interactive collaboration (e.g., IdeaBoardz, Google Jamboard, Google Docs, Google Sheets), communication tools like forums, etc.

These various types of learning resources provide a diverse range of formats and tools to enhance the learning experience. They promote interactivity, collaboration, and engagement among learners, allowing for a more dynamic and effective learning process. Additionally, the communication forum within Classroom facilitates discussions, information sharing, and collaboration among participants.

For the training stages of trainers – CPDT (program/course authors) → *national trainers* and CPDT (*national trainers*) → *local trainers* – it is recommended to simulate synchronous activities within the CPD program. For example, during the first two synchronous sessions of the course with future trainers, a team activity “Reciprocal Training in Planning, Delivering and Evaluating a Synchronous Course Session” can be organized as follows:

- There are formed  $N$  teams (where  $N$  is the number of course modules) each consisting of 7–8 members.
- Each team selects one module from the course.
- Each team selects 1–2 trainers, while the other team members act as trainees.
- The role of the trainer alternates between 2 team members, with assistance from the actual trainers.
- Team members evaluate how the sessions were planned and delivered by the trainers.
- Team members prepare a brief prospective presentation on the simulated activities, which they present to their colleagues later during the synchronous feedback sessions.
- During the simulation, team members have the opportunity to ask for assistance from the real trainers through the CLMS of the course.

## Validation of the proposed solution: results

The model CPDT( $x$ )  $\rightarrow y$  has been piloted and implemented during the years 2020–2022 for three CPD programs, whose co-authors are the owners of this article:

1. The CPD program “Digital Competencies for Teachers in Technical Vocational Education” was delivered between 2020 and 2022 and included 35 training sessions (both face-to-face and online). Over 400 teachers from the Republic of Moldova were trained. In the first stage, 17 teachers and managers from technical vocational education (Centers of Excellence, Colleges, Vocational Schools) were trained and became national trainers.

Moodle and Google Classroom were used as content management and educational tools platforms.

The first phase lasted 3 weeks. The proposed topics generated significant interest among the participants. The majority of participants were actively engaged in all training sessions. The manageable number of participants (up to 25) contributed to the successful implementation of both face-to-face and distance training sessions, achieving maximum interactivity.

To monitor and assess the progress of the participants, two questionnaire tests (Fig. 2 and Fig. 3) were conducted, consisting of questions (items) related to the digital competence (CD) of teachers in technical vocational education. Among the trainees, significant improvements in the level of digital competence were observed, including their familiarity with national and European documents related to digital competence: *DigComp* – the European Framework for Digital Competence in Citizens,

Figure 2. CPD program “Digital Competencies for Teachers in Technical Vocational Education”: initial profile of participants

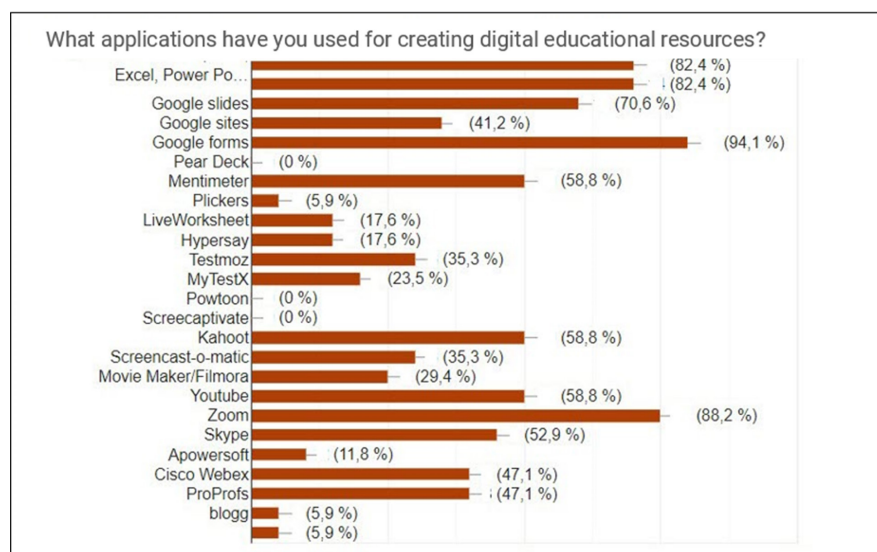
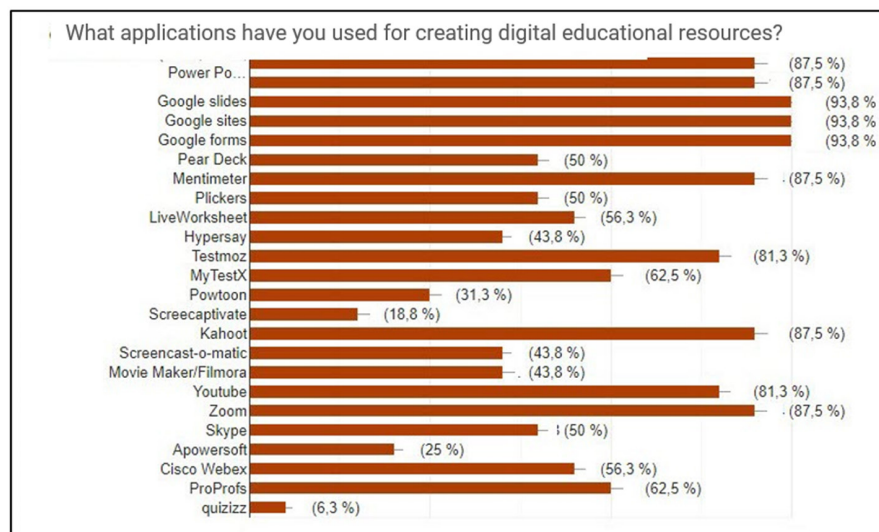




Figure 3. CPD program “Digital Competencies for Teachers in Technical Vocational Education”: final profile of participants



*DigCompEdu* – The European Framework for Digital Competence of Teachers, and the Digital Standards for Teachers in General Education in the Republic of Moldova. For example, a noticeable improvement was seen in the understanding of the digital competence domains outlined by *DigCompEdu*. At the beginning, only 17.6% were familiar with them, while by the end, this number had increased to 62.5%. Progress was also noted in participants' understanding of *licenses and copyright*. It should be mentioned that at the beginning of the program, none of the trainees had published any digital educational resources under the Creative Commons license. By the end of the training program (after 3 weeks), 37.5% of the participants had successfully published such resources, while others were in the final stages of creating and publishing such resources.

At the beginning of the training program, approximately 59% of the participants stated that they were not familiar with or had never used instructional design models in their professional activity. By the end of the training, it was observed that all trainees were familiar with instructional design based on such models. More exactly, 43.8% of participants applied the Backward Design model, about 44% applied the ADDIE model, and the rest applied the ASSURE and Gilly Salmon's models.

At the beginning of the training program, the majority of participants mentioned that they used only four tools for creating digital educational resources: MS Excel, PowerPoint, Google Forms, and Zoom. At the end of the training sessions, all participants reported having used the majority of the 25 tools studied and applied during the training sessions.

At the initial assessment, only 29.4% of the participants reported being members of four or more professional and digital communities. By the final assessment, their



number had increased to 62.5%, indicating a significant increase in participants' interest in accessing and delivering digital educational content.

Furthermore, throughout the training sessions, the participants increased their interest in and capacity to use classroom management systems. By the end of training sessions, 100% of them used Google Classroom, compared to 64.7% at the beginning. Moodle LMS was used by 68.8% by the end of the training, compared to 52.9% initially.

At the beginning of the program, most participants did not use synchronous communication tools with their students or colleagues or used them without fully harnessing their capabilities. The teacher-participants faced significant difficulties in conducting distance education, creating digital educational resources, and managing their student classes through digital platforms. By the end of the program, participants had managed to overcome these challenges. They were enthusiastic about discovering freely accessible applications for creating digital resources and organizing interactive activities. As a result, the majority of them were able to develop several educational digital products of medium complexity, including educational websites, video tutorials, interactive presentations, online tests, collaborative documents and more.

The examined topics within the program, along with the proposed tasks and their analysis, contributed to encouraging participants to use ICT for the digitization of education. This approach has motivated them to explore and experiment with tools beyond those studied, as well as to share their own experiences and best practices.

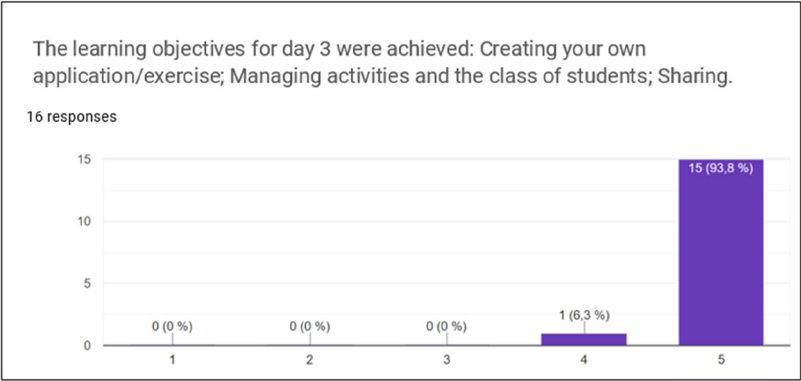
2. The CPD program "Developing Digital Open Educational Resource Competence for technical vocational education" was delivered online between 2021 and 2022, including 24 training sessions. In total, over 200 teachers from the Republic of Moldova were trained. During the first phase (April 1–April 17, 2021), 20 teachers from technical vocational education were trained. These teachers participated in the ShiftEdu project, "Digital Skills for Employment in the Modern Economy," implemented by CE ProDidactica with financial support from the Austrian Development Agency through the Austrian Development Cooperation Program funds. The content and objectives of the training activities were developed in accordance with the current needs of the technical vocational education system regarding education digitization, while also addressing the expectations of the trainees.

The training program was delivered remotely through the CLMS. The learning resources were also provided to participants through Google Classroom. Communication with participants was conducted via the Zoom platform.

In order to monitor and assess the progress of the learners, three e-questionnaires were conducted to gather feedback on participant satisfaction, suggestions, and grievances. The questionnaire results suggest that the learning objectives were achieved (Fig. 4), the instructional methods were appropriate and adapted to the current conditions, participants were sufficiently engaged in the learning process, and most of the learning goals were achieved.

3. The CPD program "Implementation of Professional competency standards for general education teachers" conducted as part of the partnership between the Ministry of Education of the Republic of Moldova and CE ProDidactica, was delivered online from 2021 to 2022 and included 10 training sessions: five synchronous sessions (each

Figure 4. The satisfaction of the learners regarding the learning objectives (CPD program “Developing Digital Open Educational Resource Competence for technical vocational education”)



lasting 1.5 hours), and five asynchronous activities, totalling six days of training. At the first stage (August 20–August 26, 2021), 35 managerial and teaching staff members were trained, representing both general education and local specialized departments, as well as university professors. In total, over 2500 individuals were trained. Throughout the training period, regardless of the session type, trainers actively assisted and supervised the individual and group activities of the trainees.

Interactive activities, active learning methods and guided self-learning were the core components of the training methodology. The topics covered and the activities conducted were adjusted to the training needs of the participants.

The training program and learning resources (interactive presentations, educational videos, reference materials, individual and group activity tasks, formative assessments, etc.) were delivered via Google Classroom. Google Meet was used to organize the synchronous sessions.

The level of understanding of ICT/Google Classroom standards and tools was medium, as confirmed by responses to baseline assessments, including the initial evaluation (Fig. 5).

The degree of involvement of the participants in simulation activities, debriefing, group learning activities, and guided discussions provides sufficient evidence to state that the group dynamics were positive and showed qualitative improvement.

Participants expressed their personal opinions, demonstrating interest in becoming national-level trainers within the project and in their overall professional development. Additionally, they demonstrated openness to exchanging ideas and were interested in communicating with the team of trainers, as well as with their colleagues and experienced trainers in the educational environment. They developed the ideas of their colleagues, presented their own experiences, and acknowledged that those who have only been involved in training at the district level still have much to learn and need to overcome certain psychological barriers.

At the final assessment, the majority of learners obtained over 75% of the maximum possible score, which is the minimum threshold for obtaining certification (Fig. 6).

Figure 5. The level of understanding of ICT standards and tools (initial evaluation, stage I, the CPD program “Implementation of Professional competency standards for general education teachers”)

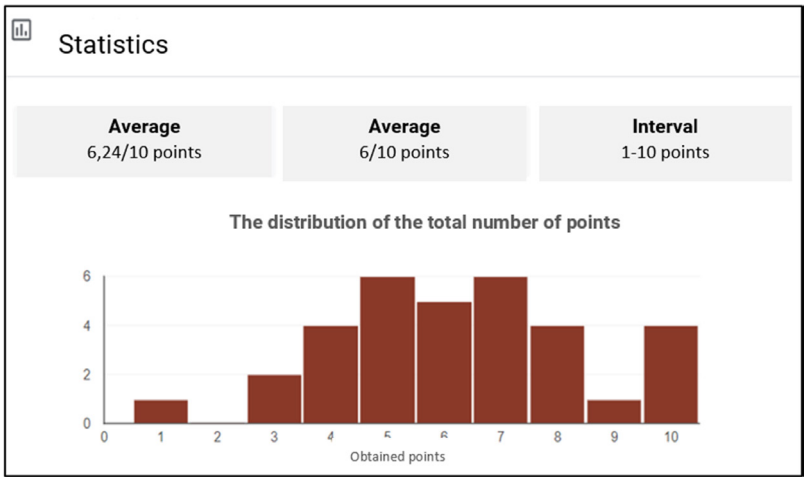
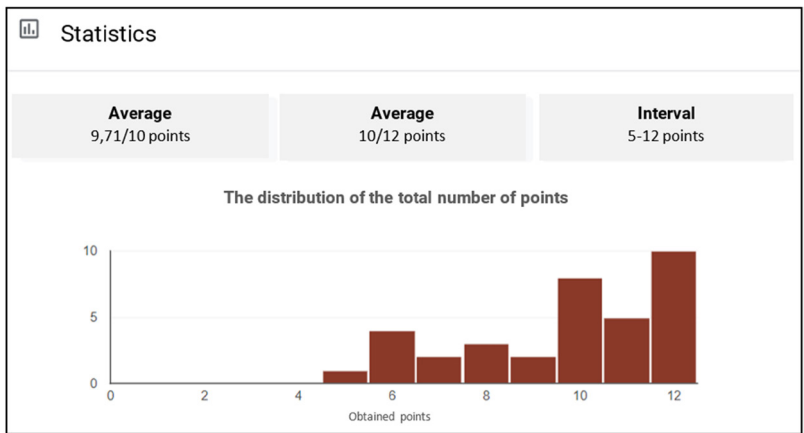


Figure 6. Progress rate of learners (final evaluation, stage I, the CPD program “Implementation of Professional competency standards for general education teachers”)



These results suggest that the instructional methods were adequate, the learners were sufficiently engaged in the instructional process, and most of the learning objectives were achieved.

We would like to mention that two difficulties arose during the implementation of the model. First, approximately 10% of the participants had insufficient digital skills at the beginning of the courses, necessitating additional consulting and clarifications during monitoring sessions. Second, for the Google Classroom platform, trainers at the next level should consider cloning the course, Google products (e.g., forms) and blitz quizzes (e.g., Mentimeter quizzes).

## Conclusions and recommendations

The piloting of the  $CPDT(x) \rightarrow y$  model through the delivery of three different CPD programs demonstrates that this model is functional, efficient, and contributes both to the achievement of the objectives of training programs and the achievement of soft-skills bonuses. Thus, we conclude that:

- The  $CPDT(x) \rightarrow y$  model has streamlined the CPD process.
- The values of the following parameters have increased: number of beneficiaries, success rate, the Digital Competence level, and soft skills level.
- The values of the following parameters have decreased: training time (compared to the traditional training model), failure rate, dropout rate, and overall training expenses.
- The results of the final evaluations suggest that the instructional methods of  $CPDT(x) \rightarrow y$  model were appropriate and the participants were sufficiently trained in the instructional process.
- Most of the learning objectives were achieved.
- The progress rate of the participants was positive: increased from 45–50% of the total number of participants (initial evaluation, achieving the minimum required score for passing) to at least 90% (final evaluation).

Moreover, the results of practical activities and evaluations demonstrate that the participants' training has improved their knowledge and skills in delivering digital content. They have deepened their professional knowledge and skills and have re-emphasized the need to apply them to increase the quality and efficiency of the educational process. The  $CPDT(x) \rightarrow y$  model encourages participants' sense of responsibility, openness to collaboration and interest in involvement in training and self-improvement.

At the same time, we recommend that trainers carefully design the agenda, content, and digital tools that they plan to use during synchronous sessions, taking into account the trainees' initial level of preparedness. For the essentialization of practical activities, we propose creating and utilizing educational videos with a focus on their didactic value, which should include essential guidance. We also suggest that the authors of the CPD program develop guidelines for potential program trainers (see, for example, Kennedy (2005) as a model).

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### Abstract

The challenges of recent years have perturbed the traditional format of the educational process, including the professional development of teachers. As the educational system is in a permanent process of modernization, reducing the pace of continuous professional training for teaching staff can have a long-lasting negative impact on this process. The article presents validated solutions to optimize the continuous training process of general education teachers. They describe information and communication technologies, innovative teaching methods, and forms of blended instructional delivery.

**Keywords:** CPD (Continuing Professional Development), education, teachers, training, digital competence

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