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From personification to self-management of teachers' professional development: Paradigm, content, and design of educational programs

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Abstract

Education for a complex world requires a paradigm of continuous professional development for teachers (CPDT). However, its implementation is complicated by the misalignment between the goals and objectives of CPDT and the content, resources, and tools, as well as the approaches and mechanisms for analyzing CPDT's effectiveness. This study aims to solve this problem by organizing personalized CPDT (PCPDT) for educators to master metacognitive self-development strategies in relevant professional development courses (RPD courses). This study, conducted at the National Center for Professional Development (Kazakhstan), identifies scientific and methodological foundations for developing educational programs for PCPDT in RPD courses. The theoretical significance of the study findings is related to the conceptualization of PCPDT in terms of pedagogical design and the PCPDT resources for the educational ecosystem of professional development. The practical significance of the findings is linked to the transformation of professional development for educators to foster their self-development trajectory. Self-directed professional development stimulates evolutionary, stable, and continuous improvement in learners' educational practices and academic achievements.

Keywords: Continuous Professional Development of Teachers, Facilitation, Personalization, Educational program, Relevant professional development courses, Self-development strategies.

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1. Introduction

Education in a complex world requires a paradigm of Continuous Professional Development for teachers (CPDT). Through CPDT, we understand the process of personal and operational transformation in teachers, primarily at the cognitive level, in their readiness and ability to efficiently improve educational practice through self-development strategies, which require the integration of formal, non-formal, and informal education.

Our understanding of CPDT entails its organic integration into teachers' daily activities, which, in turn, poses the risk of loss of meaning and prospects for professional development amid increasingly complex tasks. Preserving the meaning and values of CPDT associated with self-care and sustainable advancement in the teaching profession can be supported by PCPDT educational programs (EP). The PCPDT EP implements targeted learning, which is based on teachers' challenges and needs and their professional development level to address the deficit of conscious professional competencies necessary for improving educational practice.

The demand for programs defines the aim of this study, which is to develop a scientific and methodological foundation for PCPDT EP. The tasks that constructively align with this goal are: 1) to clarify the content of PCPDT, 2) to structure the EP content for teachers' motivated learning, and 3) to determine the organizational form for implementing the PCPDT content.

The research goals and tasks are subordinated to the hypothesis that if teachers engage with the PCPDT content through specialized EP, they will be motivated to achieve effective professional development. This is because the personalization of CPDT facilitates the alignment of professional development goals and objectives with content, optimizes resources and tools to implement the managed self-development approaches, and influences professional development processes on teaching practices and students' academic achievements.

2. Literature Review

The literature review helped identify key development directions and issues in CPDT. This review focuses on chronological and thematic approaches to assess the topic's evolution and highlight key research directions, incorporating both international and local works to ensure a comprehensive understanding of the issue.

The review primarily analyzes studies from the last five years; however, to provide a well-rounded understanding of developmental trends and identify problems, earlier works are also included.

To ensure systematic and holistic analysis the following *key research questions* were identified:

What approaches and strategies contribute to the effectiveness of PCPDT EP?

What personalization mechanisms are the most effective at meeting individual needs?

Which technological tools support the development of pedagogical strategies and improvement of practices within PCPDT programs?

The need for implementing CPDT in a rapidly changing world was actively discussed in the 1980s [1-3]. Subsequent literature highlighted the creation of learning organizations Senge [4] the transformative potential of continuous professional development Mezirow [5] and the consequent educational systems' transformation [6]. With society's technological and sociocultural development, researchers have begun to propose technical solutions for CPDT Hargreaves [7] create and maintain communities of practice Wenger, et al. [8] and develop CPDT programs [9].

Researchers have also linked contemporary trends in CPDT to the self-management of professional development as a tool for improving learning through the integration of methodological training systems, including in the digital environment [10-13]. However, over time, the research focus has narrowed and become more detailed. This is because the overall issues of CPDT have been well studied, and the emphasis has shifted to address specific specialized tasks relevant to regions or the needs of teaching collectives.

We are particularly interested in how researchers personalize the CPDT EP. Studies by Yurtseven Avci, et al. [14]; Ahmad Zaky El Islami, et al. [15]; Chinda and Hinkelman [16]; Fairman, et al. [17], and Ávalos [18] have focused on creating professional EP to help teachers master new pedagogical strategies and apply them in practice. The importance of leadership Shepard, et al. [19] and technology Ramírez-Montoya, et al. [20] is emphasized in developing tailored EP as a tool for CPDT.

Cordingley, et al. [21]; Avidov-Ungar [22], and Minh [23] highlighted the need to develop personalized EP to adapt their content to teachers' individual needs and achieve specific professional development goals, while the findings of Niyazova, et al. [24] demonstrate that the implementation of internal monitoring systems using digital technologies ensures the

continuous adjustment and optimization of educational content, which, in turn, creates a solid foundation for effective self-management of teachers' own professional growth.

Researchers have proposed the following mechanisms for personalization to enhance the effectiveness of EP:

(1) In practice: a) emphasize subject knowledge and methods of student mastery, b) encourage developing an action plan, c) support self-monitoring, and d) encourage reusing techniques to achieve sustainable results [25];

(2) To stimulate teachers' motivation: a) formulate and clarify learning objectives and b) provide support and incentives for success [26];

(3) Methods of knowledge accumulation in specialized and methodological areas: a) independently manage academic load and b) assess individual teaching styles and analyze prior experiences [27, 28];

(4) To expand the range of teaching methods: a) create models for the learning process, b) implement monitoring and feedback systems, and c) train educators in the use of modern educational methodologies [29, 30].

Other studies focusing on tools for CPDT have cited self-development and self-regulation strategies [31-36]. Facilitation of professional development and the creation of collaborative environments [37-42]. Development of pedagogical referendum programs Yespolova, et al. [43]. digital resources as an opportunity to support the exchange of experience and adaptation of educational materials [44].

The review confirms that the effectiveness of professional development programs depends significantly on the integration of technology, teachers' active planning of their training, and the development of tailored content considering individual needs, aligning with our research position and the tools for implementation. Special attention is given to the personalization of the professional development process, which allows teachers to control their academic load and adapt their training to their personal and professional goals. Support for self-monitoring, self-regulation, and the inclusion of modern educational methods contribute to improving motivation and professional skills among teachers. These findings align with the tools we propose for implementing PCPDT EP, highlighting the relevance and practical value of the modern educational process.

3. Materials and Methods

The authors' professional roles at the National Center for Professional Development of Teachers 'Orleu', along with their experience working in commissions for the comprehensive summarization of certified teachers' activities, have allowed for the direct internal observation of the following trends: 1) CPDT at teachers' workplaces is episodic, disorganized, and not always managed by the teachers themselves; 2) there is no conscious integration of teachers' needs and challenges with CPDT, which is limited to traditional professional development in the form of mandatory courses that must be attended at least once every 3 years, as required in Kazakhstan; 3) teachers rarely adopt technological approaches for organizing their own CPDT, resulting in unimpactful outcomes that do not improve teaching practices and students' academic achievements; and 4) the goals and mechanisms of teacher certification are not realized in accordance with CPDT.

These trends were clarified and underwent qualitative-quantitative analysis during in-depth and expert interviews with Murzalinova, et al. [45] resulting in the concept of an 'RPD Course' using modeling methods. An RPD course represents an organizational form of personalized professional training for teachers, promoting the formation of new knowledge, skills, and expertise, as well as the enhancement of existing professional knowledge through self-development strategies.

The foundation of this concept is the idea of self-development, which underlies CPDT, gives it personal meaning, and is supported by qualitative research Sadeghi Tabar, et al. [35] that highlights the following expertise required for professional self-development: professional meaning-making, professional assessment, professional goal orientation, professional knowledge, professional skills, professional communication, professional ethics, and professional behavior. Values of self-development are considered the triggers of these competencies.

Moreover, in line with the findings of Xi and Xianyin [46] collective teacher confidence, enhanced by active knowledge sharing, promotes guided and targeted professional development, allowing teachers to confidently start and move forward according to a predetermined strategy, minimizing stress from unexpected changes.

The self-development strategy in an RPD course is a system of actions designed by the teacher to achieve the CPDT goals related to transitioning to the desired quality of development and improving professional work.

The PCPDT EP content is based on 13 self-development strategies (SDS) identified in accordance with the Rules and Conditions for the Certification of Teachers in the Ministry of Education of the Republic of Kazakhstan [47]. Each SDS characterizes the professional expertise required by certified teachers and is associated with CPDT. Specifically, six basic SDS pertain to the area of 'Quality of Teaching in the Educational Process', two basic SDS relate to the area of 'Personalization/Individualization/Differentiation of Learning', four key SDS concern the area of 'Professional Development, Growth, and Mastery of Teachers', and one prospective SDS pertains to the area of 'Strategic Management and Leadership of Teachers'.

The two basic SDS form the foundation of CPDT, the key SDS ensures its sustainability and the prospective SDS is related to the transformation of CPDT. The transformation of CPDT refers to an upgrade in the meaning, goals, and motives of teachers' professional development aimed at improving educational practices (both their own and that of their colleagues) and contributing to the professional community at large.

The relationship between SDS and the expertise required for certified teachers is based on the understanding that certification is an effective mechanism for professional development, demanded by the challenges of a complex society, regulated by changes in the professional environment, and managed by the teachers themselves.

To clarify the designed content, a survey titled 'My Ranked Choice of SDS' was conducted among teachers from three regions of Kazakhstan: Akmolinsk, Pavlodar, and North Kazakhstan. The total number of respondents was 1,278, including 442 teachers (34.59%) from urban schools and 836 teachers (65.41%) from rural schools.

The respondents' teaching experience was as follows: up to 5 years, 216 individuals (16.9%); 5–15 years, 389 individuals (30.44%); 15–25 years, 316 individuals (24.73%); and over 25 years, 357 individuals (27.93%). Qualitatively, their teaching experience ranged from being a beginner to having considerable experience.

Regarding the qualification categories: 375 individuals (29.3%) had no category; 349 individuals were Moderator teachers (27.3%); 357 individuals were Expert teachers (27.9%); 187 individuals were Researcher teachers (14.6%); and 10 individuals were Master teachers (0.8%). As can be seen, some teachers were without a category. 55.2% of teachers belonged to the first two categories in the existing hierarchy, and 15.4% of teachers belonged to the two highest categories in the existing hierarchy.

Respondents were asked to rank each SDS (on a scale from 1 to 6), indicating the significance of mastering it for personal professional development: 1) needs to be mastered as quickly as possible (expeditiously), 2) needs to be mastered soon—within six months, 3) needs to be mastered in the medium term—within 1–2 years, 4) needs to be mastered in the long term—within 3–5 years, 5) can be mastered in the future when there is a need, and 6) mastery is not required.

The initial hypothesis for the survey was as follows: If a teacher shapes their CPDT trajectory through a special SDS, then their advancement in professional development becomes sequential and effective, as the CPDT processes are stimulated by internal (individual needs) and external (certification requirements) motives, supported by specialized organizations and realized through the PCPDT EP content.

4. Results

An overview of the perceived need to master the six basic SDS is presented in Table 1.

Table 1.
Demand for Mastery of Basic SDS in 'Quality of Teaching of the Educational Process'.

Categories of the Respondents	Percentage of respondents (%) who selected the ranking: requires (does not require) mastery					
	1 - Expeditious	2 - Within six months	3 - Within 1-2 years	4 - Within 3–5 years	5 - When the need arises	6 - Mastery not required
SDS 1. Lesson planning						
Teacher (without category)	15.5	18.1	19.5	14.1	21.1	11.7
Teacher-Moderator	15.8	19.2	17.8	15.2	20.9	11.2
Teacher-Expert	9.0	20.4	23.0	17.6	16.0	14.0
Teacher-Researcher	12.3	18.7	20.9	12.3	21.4	14.4
Teacher-Master	10.0	0.0	40.0	30.0	10.0	10.0
Total for SDS 1	13.2	19	20.3	15.3	19.6	12.6
SDS 2. Application of teaching improvement resources						
Teacher	15.2	20.5	19.7	15.7	17.1	11.7
Teacher-Moderator	12.0	23.8	20.1	15.8	20.3	8.0
Teacher-Expert	8.4	24.9	21.3	17.9	18.5	9.0
Teacher-Researcher	12.3	26.2	16.6	16.6	19.8	8.6
Teacher-Master	10.0	40.0	20.0	10.0	10.0	10.0
Total for SDS 2	12	23.6	19.8	16.4	18.7	9.5
SDS 3. Support of a safe and conducive educational (development-focused) environment						
Teacher	12.8	18.7	24.8	13.6	17.9	12.3
Teacher-Moderator	9.5	21.5	20.6	18.6	19.8	10.0
Teacher-Expert	7.0	22.7	21.0	16.5	23.5	9.2
Teacher-Researcher	12.8	20.9	23.0	12.8	20.3	10.2
Teacher-Master	10.0	20.0	20.0	30.0	0.0	20.0
Total for SDS 3	10.3	20.9	22.3	15.8	20.2	10.6
SDS 4. Observation of the lesson						
Teacher	13.6	16.5	18.9	17.6	17.6	15.7
Teacher-Moderator	10.9	20.1	18.6	17.5	23.2	9.7
Teacher-Expert	9.2	22.1	20.4	16.8	18.8	12.6
Teacher-Researcher	9.6	27.3	14.4	12.3	24.1	12.3
Teacher-Master	20.0	20.0	10.0	30.0	10.0	10.0
Total for SDS 4	11.1	20.7	18.5	16.7	20.3	12.7
SDS 5. Research of the lesson						
Teacher	14.9	21.1	18.4	15.2	17.6	12.8
Teacher-Moderator	11.7	18.3	19.2	18.3	22.1	10.3

Categories of the Respondents	Percentage of respondents (%) who selected the ranking: requires (does not require) mastery					
	1 - Expeditious	2 - Within six months	3 - Within 1-2 years	4 - Within 3–5 years	5 - When the need arises	6 - Mastery not required
Teacher-Expert	10.9	21.3	21.3	16.0	19.0	11.5
Teacher-Researcher	12.8	26.7	15.5	15.5	20.3	9.1
Teacher-Master	20.0	20.0	0.0	30.0	20.0	10.0
Total for SDS 5	12.7	21.2	18.9	16.4	19.6	11.2
SDS 6. Identifying and addressing gaps in subject knowledge and teaching methodology						
Teacher	15.2	19.5	17.9	15.2	20.8	11.5
Teacher-Moderator	12.6	18.9	21.2	20.1	17.8	9.5
Teacher-Expert	8.7	20.7	20.4	17.4	23.2	9.5
Teacher-Researcher	14.4	16.6	18.2	17.6	21.9	11.2
Teacher-Master	10.0	20.0	20.0	10.0	30.0	10.0
Total for SDS 6	12.5	19.2	19.6	17.4	20.9	10.3

The data in Table 1 allow us to conclude the following:

(1) Mastering lesson planning, observing and researching lesson planning, attracting resources for improving teaching, and creating a development-focused environment were in demand, as noted by 20.3% to 23.6% of respondents over the past six months to one or two years. Most respondents (20.9%) indicated that they prefer postponing the strategy to identify and address gaps in subject knowledge and teaching methodologies until a future need arises.

(2) The need for mastery in the current (operational), near- and medium-term perspectives includes the application of teaching improvement resources (55.4%), support for the developing environment (53.5%), research on the lesson (52.8%), lesson planning (52.5%), addressing gaps in subject knowledge and teaching methodology (51.3%), and lesson observation (50.3%).

(3) On average, across all six base SDS, 11.15% of respondents noted that mastery is not required and 19.88% preferred mastery in the future when a need arises.

Table 2 indicates the perceived need for the basic SDS in 'Personalization/ Individualization/Differentiation of Learning'.

Table 2.
Demand for Mastery of Basic SDS in Personalization/ Individualization/ Differentiation of Learning.

Categories of the Respondents	Percentage of respondents (%) who selected the ranking: requires (does not require) mastery					
	1- expeditious	2 – within six months	3 – within 1–2 years	4 - within 3–5 years	5 - when the need arises	6 - mastery not required
SDS 7. Preparation of students for participation in subject Olympiads and competitions						
Teacher (without a category)	15.7	22.9	17.9	14.4	16.3	12.8
Teacher-Moderator	15.2	19.5	20.1	16.3	18.3	10.6
Teacher-Expert	16.5	23.8	20.7	12.6	16.2	10.1
Teacher-Researcher	16.0	23.5	20.3	15.0	16.0	9.1
Teacher-Master	20.0	20.0	10.0	30.0	0.0	20.0
Total for SDS 7	15.9	22.3	19.6	14.6	16.7	11.0
SDS 8. Assessment of academic progress and other achievements of students						
Teacher	13.1	18.7	20.8	16.3	19.2	12.0
Teacher-Moderator	10.3	18.3	22.3	18.9	19.5	10.6
Teacher-Expert	9.8	22.1	22.4	16.8	19.0	9.8
Teacher-Researcher	11.8	21.9	19.3	16.0	21.9	9.1
Teacher-Master	20.0	20.0	20.0	10.0	10.0	20.0
Total for SDS 8	11.3	20.0	21.4	17.1	19.6	10.6

The data in Table 2 allow us to establish:

(1) Between 10% and 30% of respondents (depending on their qualification category) need to master SDS 6 and 7 in the current period, as well as from six months to 3–5 years; 27.7% and 30.2% associate mastering these competencies with an uncertain future need or choose 'mastery not required', respectively.

(2) The preparation of students for participation in Olympiads and competitions was most frequently chosen by 22.9% of teachers without a category within six months; 20.1% and 19.5% of moderator teachers within 1–2 years and six months,

respectively; 23.8% and 20.7% of expert teachers within six months and 1–2 years, respectively; and 23.5% and 20.3% of researchers within six months and 1–2 years, respectively. Eighty percent of master teachers chose a mastery period ranging from immediate to 3–5 years, whereas 20% indicated that mastery was not required.

(3) The assessment of students' academic and other achievements was most frequently chosen by 20% of master teachers as urgent; 22.1% and 22.4% of expert teachers within six months and 1–2 years, respectively; and 18.9% of moderator teachers within 3–5 years, whereas 10.6% of teachers declined its need for mastery.

The results of the selection of the four key competencies associated with self-realization in a professional community are presented in Table 3.

Table 3.

Demand for Mastery of Key SDS in the Area of 'Professional Development, Growth and Mastery of Teachers'.

Categories of the Respondents	Percentage of respondents (%) who selected the ranking: requires (does not require) mastery					
	1 - Expeditious	2 - Within six months	3 - Within 1–2 years	4 - Within 3–5 years	5 - When the need arises	6 - Mastery not required
SDS 1. Self-preparation for participation in professional competitions, including the Republican competition 'Best Teacher' Ministry of Education of the Republic of Kazakhstan [48].						
Teacher (without a category)	13.9	17.3	21.1	16.8	20.5	10.4
Teacher-Moderator	12.0	18.3	21.2	20.6	17.2	10.6
Teacher-Expert	13.7	21.0	23.2	15.1	18.2	8.7
Teacher-Researcher	15.0	20.9	19.8	16.0	18.7	9.6
Teacher-Master	20.0	20.0	20.0	20.0	10.0	10.0
Total for SDS 1	13.5	19.2	21.5	17.3	18.6	9.9
SDS 2. Methodological support for one's own practice and the practice of colleagues.						
Teacher	13.3	19.2	18.9	18.4	20.3	9.9
Teacher-Moderator	10.9	20.1	20.3	21.2	20.1	7.4
Teacher-Expert	8.1	25.8	23.5	17.4	18.8	6.4
Teacher-Researcher	16.0	18.7	23.0	16.0	18.2	8.0
Teacher-Master	20.0	10.0	30.0	20.0	10.0	10.0
Total for SDS 2	11.7	21.1	21.3	18.5	19.4	8.0
SDS 3. Development and testing of original educational and methodological complexes, programs and other methodological materials						
Teacher	12.5	15.5	24.0	18.7	18.9	10.4
Teacher-Moderator	14.6	17.8	20.1	19.5	20.1	8.0
Teacher-Expert	12.0	21.0	24.4	18.5	17.1	7.0
Teacher-Researcher	15.0	27.8	19.8	13.4	18.7	5.3
Teacher-Master	30.0	20.0	0.0	30.0	10.0	10.0
Total for SDS 3	13.5	19.5	22.2	18.2	18.6	8.1
SDS 4. Identification and dissemination of achievements within the professional community.						
Teacher	11.7	16.0	23.7	17.6	18.4	12.5
Teacher-Moderator	8.0	21.8	22.6	21.8	18.1	7.7
Teacher-Expert	9.5	21.3	26.1	16.8	18.8	7.6
Teacher-Researcher	12.3	27.3	19.3	18.2	16.6	6.4
Teacher-Master	20.0	30.0	10.0	20.0	10.0	10.0
Total for SDS 4	10.3	20.8	23.3	18.6	18.1	8.9

The data in Table 3 correlate more significantly across the four key SDS, indicating the following:

(1) The highest indicators for mastering each key competency were related to optimal periods of self-realization. Within 1–2 years, 21.5%, 21.3%, 22.2%, and 23.3% of teachers chose this timeframe for SDS 1, 2, 3, and 4, respectively; "as soon as possible" was chosen by 19.2%, 21.1%, 19.5%, and 20.8% of teachers for SDS 1, 2, 3, and 4, respectively.

(2) The 3rd or 4th position in ranking was occupied by choosing the mastery period 'within 3–5 years': SDS 1 with 17.3% (4th position), SDS 2 with 18.5% (4th), SDS 3 with 18.2% (4th), and SDS 4 with 18.6% (3rd).

(3) Meanwhile, for each of the four SDS defining teachers' professional development, growth, and mastery, a significant proportion of respondents indicated a lack of an immediate need for their mastery or asserted that 'mastery is not required': SDS 1 with 28.5%, SDS 2 with 27.4%, SDS 3 with 26.7%, and SDS 4 with 27%.

Considering the prospective SDS areas, Strategic Management and Leadership lays the foundation for future career and educational growth. Its connection to basic and key SDS is explained by Frater [49]:

The vision and intention of excellence are more likely to be realized if a clear path for professional development is woven into the planning process, highlights individual strengths, is linked to specific areas for development, and creates the potential for exchange and cascading learning through positive professional and substantive dialogue.

It is this vision and intention of excellence that we consider a trigger for educational initiatives, innovations and professional development. The ranking results for the prospective SDS areas are presented in Table 4.

Table 4.
Demand for Mastering the Prospective SDS in 'Strategic Management and Leadership'.

Categories of the Respondents	Percentage of respondents (%) who selected the ranking: requires (does not require) mastery					
	1 - Expeditious	2 - Within six months	3 - Within 1–2 years	3 - Within 1–2 years	5 - When the need arises	6 - Mastery not required
SDS 1. Management of educational initiatives, innovations, and professional development.						
Teacher (without a category)	12.5	14.4	23.5	16.0	22.7	10.9
Teacher-Moderator	10.6	17.2	22.9	20.3	20.1	8.9
Teacher-Expert	9.8	18.5	22.4	19.9	22.7	6.7
Teacher-Researcher	12.3	19.3	25.1	15.5	20.3	7.5
Teacher-Master	20.0	20.0	10.0	30.0	10.0	10.0
Total for SDS 1	11.3	17.1	23.2	18.3	21.5	8.7

The ranking data for the prospective SDS shows:

(1) Most respondents among teachers without categories (23.5%), moderator teachers (22.9%), and researcher teachers (25.1%) considered it necessary to master this strategy within 1–2 years; meanwhile, 80% of master teachers recognized the need for mastery as soon as possible (20%), within six months (20%), within 1–2 years (10%), or within 3–5 years (30%).

(2) Approximately 30.2% denied that an immediate need to master the prospective SDS exists or asserted that 'mastery is not required,' reflecting the limitations of professional development.

The survey results show that the respondents' preferences in choosing an SDS and the timelines for their mastery are quite diverse and depend, to an extent, on the initial level of professional development, which correlates with their qualification categories.

These results, along with the hypothesis, facilitated the continuation of the study toward structuring the PCPDT content and its forms of implementation through advanced RPD courses.

5. Discussion

The PCPDT content has been structured through a set of five developed EPs under the title, 'Improvement through Development' for RPD.

Personalization is reflected in the target category under the general topic of the EP—'Strategies and Practices of Personalized Professional Development Planning'—in accordance with the competencies: 1) teacher, 2) moderator teacher, 3) expert teacher, 4) research teacher, and 5) master teacher. Sadeghi Tabar, et al. [35] proposed adapting content to the specific professional deficiencies and preferences of participants within personalized learning. However, unlike in our study, they did not introduce professional competence levels that would allow for a more nuanced assessment and development of teachers' professional skills at various stages of their careers.

Each EP within the PCPDT framework has a modular structure, including a diagnostic module, a module on 'Conceptual, Normative and Legal Foundations of Continuous Professional Development for Teachers' and Modules 2–5 (13 SDS).

Personalization consisted of each individual choosing seven SDS from a total of 13 in the RPD course. The options are listed in Table 5.

Table 5.
Formation of an Individual Trajectory of Professional Development Based on the Choice of 7 SDS from the Proposed Range.

RPD course Participants	Module 2 - Quality of Teaching of the Educational Process.	Module 3 - Personalization / Individualization / Differentiation of Learning.	Module 4 - Professional Development, Growth, and Mastery of the Teacher.	Module 5 - Strategic Management and Leadership of the Teacher.
Teachers	4–5	1–2	0–1	0–1
Teacher-Moderator	There are no restrictions in choosing SDS, provided that the total volume of study comprises 80 hours from the proposed modules and topics.			
Teacher-Expert	3–4	2	1–2	0–1
Teacher-Researcher	2–3	2–3	1–2	0–1
Teacher-Master	1–2	1–2	2–4	1

Phil [50] offered participants a choice of strategies for developing a personal and professional development plan that reflects their beliefs during the teaching process. The trajectory we propose for PCPD goes beyond the narrow confines of teaching, encompassing methodological support for one's own practice and that of colleagues; the development and testing of original educational and methodological complexes, programs, and other instructional materials; and strategic management and leadership for teachers.

The purposeful, systematic, and guaranteed mastery of SDS through the personalized CPDT trajectory corresponds to a set of educational and professional tasks for each strategy—a unit of content for teachers' professional development—aligned with the skills required for professional work. These skills promote high-level professional pedagogical competence. Alongside these tasks are criteria for evaluating the effectiveness of their implementation and a list of recommended methodological products that connect educational and practical tasks. At the same time, the balanced complexity of the tasks of the CPDT allows for the harmonious development of professional skills, promoting practical application and deep assimilation of the content [51].

The diagnostic module facilitates optimal strategy selection. This allows participants to self-assess their current level of mastery of CPDT strategies on a 10-point scale for achievement and difficulty. After scoring all the strategies, the system calculates the total score and classifies the level of professional development. Each level—beginner, basic, intermediate, advanced, and exemplary—is characterized by a set of evaluation criteria.

In addition to the self-assessment, the participants wrote a motivational letter titled, 'Why I Chose This Course.' The letter served as a feedback tool, enabling participants to present their current and desired states of professional growth while helping trainers and facilitators tailor support for each participant.

At the final diagnosis stage, the participants assessed themselves using a 10-point scale for achievements and challenges, which corroborated with the assessments by the trainer and facilitator. This determines the established level of PCPD, facilitating the creation of a progress bar and analysis of movement from the current profile to a professional self-development biography. A similar approach of including a diagnostic element was presented by Saleem, et al. [52] who identified educational needs and adapted courses accordingly. However, the authors did not propose a detailed scale, but rather focused on initial understanding across four dimensions—learning, mentoring, continuous assessment and professional development days—without classifying teachers' competency levels. Our approach provides more precise and individualized feedback for course participants.

RPD courses are sensitive to the specific needs, expectations, and career aspirations of participants, anticipating coordinated interactions between the teacher-facilitator and the participants. This interaction fosters a collaborative environment in which teachers receive constructive feedback and develop practical skills through joint activities [38, 39].

The content of the mutual activities of the facilitators and course participants moving from goals to expected outcomes is shown in Figure 1.

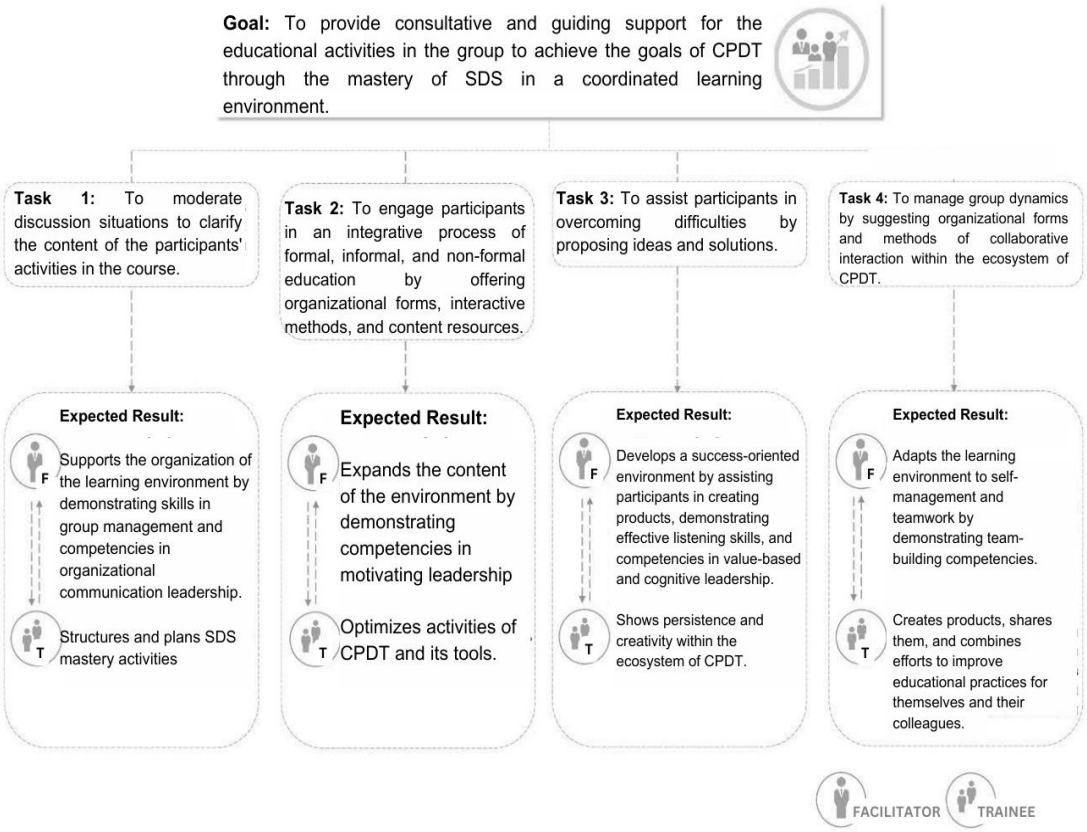

Figure 1.
Content of Interaction between Facilitators and Course Participants through Facilitated Session.

The facilitator fosters collaborative interaction, which supports personal and team responsibility, creativity, pedagogical tolerance within the team and exchange of ideas, practices and products.

Approaches to facilitate the development of EP are widespread. For instance, Perry and Booth [53] emphasized three aspects of facilitation practice: content, pedagogy, and realization. However, their study did not include diagnostic self-

assessment and evaluation, indicating that facilitators' effectiveness depends on their ability to adapt content and methods in response to program participants' immediate reactions and needs. This is less purposeful, as facilitators must constantly respond to changing conditions, regardless of each participant's initial competency level.

Copur-Gencturk, et al. [41] highlighted facilitation and proposed virtual facilitation based on artificial intelligence, which allows teachers to instantly adapt their actions in real-time. Our research aims to personalize content not only through technological solutions but also through a deep understanding of teachers' professional and individual needs, expectations, and challenges, and through collaboration with real facilitators—recognized leaders in their subject and educational areas.

The content of the CPDT EP included diagnostics (5% of the total course duration of 80 academic hours), seminars (1.25% of academic time), practical sessions with a trainer (55%), facilitated sessions (26.25%) and defense of original methodological products (12.5%).

The experimentally justified density of academic time accounts for the CPDT EP design encompassing a differentiated selection of teaching methods and activities based on the target group of participants. Thus, technological support for the sessions is aligned with the overall strategy: 1) creativity (for teachers without a qualification category), 2) competence (for moderators), 3) professionalism (for expert teachers), 4) mastery (for researcher teachers) and leadership (for master teachers).

A holistic pedagogical design of the CPDT EP is presented in our methodological recommendations [54].

The dialectics of PCPDT lie in the specificity and diversity of the content for the application of specific development strategies by teachers in various activities. Therefore, the availability and variety of resources provided in RPD courses are necessary to form a CPDT ecosystem.

Websites, software, online courses, practitioner communities, educational conferences, videos, books, journals and peer-reviewed articles, interactive games, and the original products of trainers and facilitators are preferred:

- Are based on factual data from teachers' educational and research practices;
- Represent a variety of approaches and methods for solving educational problems;
- The selected text in Word contains opportunities for reflection, benchmarking, discussion, collaboration, exchange of experiences, and pedagogical strategies, as well as comparing and assessing existing and proposed educational practices.
- Can be applied in interdisciplinary contexts and meta-learning;
- Offer specific strategies for specific subjects and goals in the format of life-wide and life-deep learning models.
- Focus on instrumental knowledge and practical skills of the teachers.
- Implement the strategy 'do with us, do as we do, do better than us,' featuring ideas for optimal change, as well as goals for career and academic growth;
- Are forward-looking models of learning for the future and provide a compelling rationale for their implementation in present-day practice.

In personalizing the development of original methodological products, formative assessment involves participants presenting their working materials, whereas summative assessment entails the final defense of one of the products.

Here are examples of differentiation for such products:

- SDS 1 'Lesson Planning': Technological lesson map (for teachers), research program for lesson planning (for moderators), original algorithm for lesson planning (for experts), methodological recommendations for lesson planning (for researchers), and relevant research papers (for master's students and for those planning to pursue a master's degree or PhD).
- SDS 8 'Assessing the Progress of Academic and Other Achievements of Learners': annotation of the best research on the individualization of learning (for teachers), presentation abstracts for a pedagogical council 'Assessing the Progress of Academic Achievements of Learners: Challenges and Risks, Achievements and Prospects' (for moderators), academic review 'Helping Teachers Organize Monitoring of Learner Achievements' (for experts), recommendations for the teaching community on using the results of monitoring learner development (for researchers), and workshop scenario 'Assessment for Learner Progress: Observed Practice' (for masters).

The practice of defending original products as an element of the EP is widespread at the JSC NCPC Orleu, the largest provider of professional development. As a summative assignment, teachers present an educational project or demo lesson. A critically important distinction in our research regarding the development and defense of original materials is the broader range of materials offered for development, along with a clear connection between the proposed materials and the professional standard 'Teacher' in the Ministry of Education of the Republic of Kazakhstan [55]. This supports the integration of national educational values and priorities into pedagogical practice.

Experimental testing of the RPD course (for five CPDT EP covering 150 teachers) demonstrated a significant progress bar dynamic, as illustrated in Figure 2.

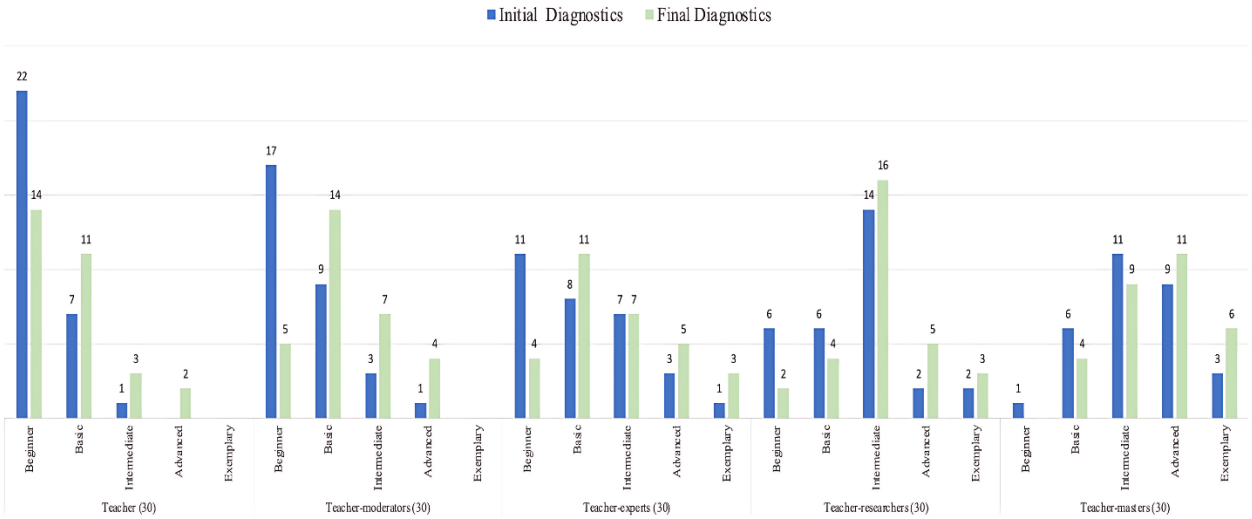

Figure 2.
Dynamics of the Progress Bar Based on the Results of Initial and Final Diagnostics of the RPD Course Participants.

The growth dynamics of the CPDT level indicate the validity of the personalized content, which considers the individual commitment of the teacher to its mastery and implements packaging, delivery, and unpacking through the CPDT EP and RPD course.

6. Conclusion

The following hypotheses were confirmed: When teachers acquire self-development strategies through PCPDT EP and in a specially organized process of the RPD course, their professional self-development biography is formed, as the personalization content and training design stimulate the motives for sustainable growth and self-management among teachers.

The results of the research allowed us to summarize the following conclusions:

- The shift from qualification improvement to CPDT is linked to the need for subject learning, where teachers' objective interests are driven by their concern for their professional development.
- Personalized CPDT content adapts the mastery of self-development strategies to achieve targeted and precise growth in professional-pedagogical expertise, utilizing the opportunities of pedagogical design and creating an ecosystem of motivated and sustainable development.
- The design of personalized CPDT focuses on learning self-development strategies within the context of professional-pedagogical conditions through the integration of teachers' experiences with their own achievements and challenges, as well as the application of this experience in the workplace.
- CPDT EPs implemented in the context of RPD courses contribute to the emergence of self-managing teachers who define further development goals, set the pace and educational-professional learning tasks, integrate tools of formal, informal, and non-formal education, and use and create relevant educational resources.

The prospects of this research are linked to organizing personalized post-course support, allowing teachers to influence their colleagues' CPDT and manage the academic achievements of their students.

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