



THE INSTITUTE OF EDUCATIONAL SCIENCES

**CURRICULUM
FOR THE CONTINUOUS TRAINING
OF PHYSICS TEACHERS**

CHIȘINĂU – 2011

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PRELIMINARY

Curriculum of the continuous training of Physics teachers represents a normative act which orients and monitors the conditions of didactic staff proficiency training activities, expressed by professional contents and competences.

This curriculum refers to teachers of Physics and is designed through the perspective of transition from the objective-centered curriculum to the competence-centered curriculum.

Social changes require new approaches for student's personality formation, and to meet them the teacher continuously exploits new strategies and techniques in action.

The teacher is a participant of a permanent modernization which contributes to his initial training reactivation, review of new knowledge and psycho-pedagogical specialty skills which are appropriate to new social requirements.

The curriculum for the continuous training of Physics teachers realizes a transition from a curriculum centered on specific educational objectives of the continuous training framework programmes to the one centered on professional competences, which requires from teachers to constantly analyze their identity to determine gaps. This thing creates premises for a fair reflection of their activity; thus, updating continuously their professional competence.

I. CONCEPTUAL REFERENCES

Curriculum of the continuous training of Physics teachers aims to develop professional skills in Physics didactics through the perspective of students' school competence formation, of the educational values promotion in shaping the students' personality, and of the quality insurance in pre-university education.

The continuous professional training in education centrally places a students' personality on their way of discovery and personal formation. Their success to become a value for themselves and for the society depends on professional competence of the teacher.

The focus on developing competences in the educational system imposes a serious approach to the formation of professional competence of the teacher, since only a competent teacher will form a certain set of students' skills in pre-university education.

The concept of pedagogical competence represents a minimum professional standard a teacher must reach to ease the functional connections between the demands of society and the possibilities to be achieved by contemporary educational system.

In this context, the professional competence is the ability to apply, transfer and combine knowledge and skills in various work situations and environments to perform the activities required by the work place, all being realized on the quality level specified in the occupational standard.

Thus, the current curriculum emphasizes the development of 5 professional competences of the didactic staff like:

- Epistemological Competence;
- Communicative Competence;
- Managerial Competence;
- Investigational Competence;
- Metacognitive Competence.

Epistemological Competence is structured into three components: specialty component; psychopedagogical component and cultural component.

Specialty competence represents the entity of specific knowledge, skills and abilities.

Psycho-pedagogical competence represents a unit of knowledge, skills and abilities specific to psycho-pedagogical field which will determine the efficient application of knowledge theory in Physics;

Cultural competence constitutes a set of varied knowledge from different domains of knowledge necessary to solve different situations, being a real possibility to form and develop students' cultural background.

Managerial Competence aims taking the appropriate decisions in order to realize the objectives set and to obtain the effective results. The teacher leads the training/development of the students' personality through professional and other extracurricular activities and redirects human resources and didactic materials for effective implementation of the educational process objectives.

Communicative Competence concerns the teacher's mastery to develop educational messages depending on the psychological and pedagogical field peculiarities. In teaching activity communication is both an art and a professional tool necessary to build constructive relationships with students, parents and didactic staff.

Investigational Competence generally allows teachers to capitalize pedagogical research towards regulation and self-regulation of the educational process; and especially, to make various investigations in order to improve the educational process.

Metacognitive Competence. "Metacognition" means the assembly of knowledge that the individual has about the functioning of his/her own cognition; and the controlling processes which direct cognitive activities during their execution. A fundamental aspect of this competence is self-knowledge, meaning a better knowledge of self, of the strategies used in different situations, of strong and weak points to become more flexible in diverse circumstances. This could be achieved by training monitoring, control and regulation processes.

The teacher's specific professional competences are developed based on two modules which, in general, refer to psycho-pedagogy, and, in particular, to specialty. This curriculum is described to satisfy the permanent and continuous formative needs of teachers, leading towards a balanced development of trainees' personality by referring to fundamental educational values (moral, scientific, technological, social and political).

II. Key / Transverse Competences

1. Learning-to-learn competences ;
2. Communication in the mother tongue/ official language;
3. Communication in a foreign language;
4. Action-strategic competences;
5. Self-knowledge and self- achievement competences;
6. Interpersonal, civic and moral competences;
7. Mathematical literacy and basic competences in science and technology;
8. Digital competence in information and communication technologies (ICT);
9. Cultural and intercultural competences (to receive and create new values);
10. Entrepreneurship competences.

III. Specific Professional Competences:

- *Epistemological Competence.*
- *Managerial Competence.*
- *Communicative Competence.*
- *Inverstgational Competence.*
- *Metacognitive Competence.*

IV. MANAGEMENT OF TRAINING CURRICULUM

Nr. d/o	Modules	Number of hours		
		Theoretical	Practical	Total
1.	Module A: <i>Psycho-predagogy of Interactive Education.</i>	12	24	36
2.	Module B: <i>Axiology and Praxiology of Specialty Subject.</i>	34	70	104
3.	Module C: <i>ICT Use and Implementation of Educational Software.</i>	2	8	10
4.	Total	48	102	150

V. PROCESS, CONTENTS AND TRAINING ACTIVITIES ACQUISITIONS.

Nr. d/o	Process Acquisitions	Contents	Trainig Activities
Module A: <i>Psycho-pedagogy</i>			
1.	Psycho-pedagogical skills towards school competence concept, depending on students' age.	<ul style="list-style-type: none"> • Student-centered Education Paradigm (SCE). Designing teaching approach through the perspective of SCE. School Competence concept and the concept of the School 	Case Study, SWOT, Hot Line, T-Graph, Research.

		Competence Standard.	
2.	Skills to organize educational activities during class mastering lessons.	<ul style="list-style-type: none"> • Praxiology of class mastery activity. 	Debates, Problem Solving
3.	Skills to organize educational process in the classroom.	<ul style="list-style-type: none"> • Correlation of students' psychological needs with educational process. Psychological age crisis and growing students' personality. Mativation as a premisis and an effect of learning. 	Listing, Analytical Reflection, Debates
4.	Intellectual acquisitions for written work elaboration in psycho-pedagogy.	<ul style="list-style-type: none"> • Implementing the inclusive principle in pre-university education. • Verification and admission of written work in psychology. 	Investigation, Reflective Journal.
Module B: Axiology and Praxiology of Specialty Subject			
5.	Intellectual acquisitions for continuos school curriculum development.	<ul style="list-style-type: none"> • Trends in development of Physics education development in the Republic of Moldova. • Modernization of competence-centered Physics curriculum for secondary and high-school level 	Debates, Problem Solving, Reflections, SWOT.
6.	Psycho-pedagogical skills towards the concept of scientific knowledge competence.	<ul style="list-style-type: none"> • Correlation of competences, subcompetences, objectives, contents, learning activities and evaluation in Physics school curriculum. 	Mini-Lecture, Algorhythmic Method, Analytic Reflection.
7.	Didactic planning skills in the context of scientific knowledge competence formation.	<ul style="list-style-type: none"> • Scientific knowledge competence: definitions, characteristics, stages of development. 	Investigation, Context Analysis, Mini-lecture.
8.	Skills to design competence-focused didactic plans.	<ul style="list-style-type: none"> • Methodology of didactic planning to form school competences. Didactic plan and its structure. Modern Physics lesson. 	Training, Investigation, Case Study
9.	Intellectual acquisitions to form inter- and	<ul style="list-style-type: none"> • Intra- and interdisciplinary integration in Biology through the context of school 	Mini-Lecture, „Think-Pair-Share”

	transdisciplinary concepts in Biology classes.	competences formation. • Methodology of basic Physics concepts development in gymnasium and lyceum.	Technique
10.	Pragmatic acquisitions for formative and summative evaluation test designing, focused on school competence formation.	• Students' results evaluation for Physics: competence standards, principles, types, methods. • Formative and summative evaluation through the perspective of Physics competence formation.	Free Association Method, „Think-Pair-Share” Technique, Clustering, Problem Solving.
11.	Pragmatic acquisitions for school competence formation methodology.	• Active and interactive didactic strategies and technologies. • Student-centered teaching-learning-evaluation strategies and competence formation strategies in Physics.	Training, Debates, Listing.
12.	Practical acquisitions for experiment realization in Biology	• Experiment Physics: -Mechanics; -Thermodynamics; -Electrodynamics; -Optics; -Modern physics.	Experiment, Lab Work, Demonstration, Problem Solving.
13.	Acquisitions for solving problems in physics from all domain (gymnasium, lyceum)	• Specific elements in Physics problem resolving. • Studying Physics in gymnasium and lyceum: the problems of continuity.	Group Work, Case Study, Modelling.
		Pedagogical Practice	
14.	Skills of educational process organization in the context of competence formation during Physics classes.	• Teaching experience: achievements and perspectives. • Specialty Course Work checking and admission.	Reflections, Self-Evaluation.
15.		• Methodical Counseling.	
Module C: ICT use and implementation of educational software			
16.	Skills on applying Computer- Assisted Instruction.	• Power Point Presentation Editor • Computer -Assisted Instruction.	Computer-Assisted Instruction

VI. METHODOLOGICAL SUGGESTIONS

Curriculum for continuous training of Physics teachers aims methodological activities to develop teacher's professional competence. The most effective methods of working with trainees are: training, lecture, seminars, methodological counseling. Within these activities there could be used some other strategies like: experiment, problem solving, investigation, SWOT, etc.

Formative tasks should follow a constructive approach to involve introspection and self-regulation of knowledge from trainee's own experience. It calls for active method application in which the participants discover new things by themselves, critically analyze, and argue their own decisions; thus, encouraging cognitive and actional autonomy. The key of professional competence development is the introspection and cognitive or metacognitive self-control which allows the internal mediation of professional training; this way, removing lapses in knowledge and acquiring new professional heritage. Acquired knowledge is personalized, engaging teachers in new learning experiences to formulate and check the new hypothesis, which are verbalized and negotiated within a group.

The architecture of teachers' professional competence formation includes:

- updating previous acquisitions;
- ordering by classification and differential analysis;
- internalization by example, exploration, synthesis, rationalization;
- generalization by creation and project making.

In this context, the trainer is a moderator in trainees' organization and guidance, offering assistance on request.

VII. SUGGESTIONS FOR ASSESSMENT

The assessment of trainees is done by professional qualifications and credits. Among the methods of evaluation are: portfolio, questionnaire, test, project, self-evaluation, etc. Focusing on professional competence development it is important for teachers to monitor their activity, to be able to reflect on their performance, be receptive to everything new, and to find ways to progress and self-training.

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