



THE INSTITUTE OF EDUCATIONAL SCIENCES

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

**CHIȘINĂU – 2011**

**54(073.3)**  
**C 95**

The work was approved for publishing  
by the Scientific and Didactic Council of the Institute of Education Sciences

**This document was created and published by the financial support of  
SALiS project**

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**Descrierea CIP a Camerei Naționale a Cărții**

**Curriculum** for the continuous training of Chemistry teachers / contributed: Ion Botgros, Ludmila Franțuzan. – Ch. : Print Caro, 2011. – 12 p.

Bibliogr.: p. 9. – Apare cu sprijinul financiar al SALiS. – 70 ex.

ISBN 978-9975-56-027-6.

54(073.3)

C 95

**ISBN 978-9975-56-027-6.**

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## PRELIMINARY

Curriculum of the continuous training of Chemistry 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 Chemistry 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/her initial training reactivation, review of new knowledge and psycho-pedagogical specialty skills which are appropriate to new social requirements.

Curriculum for the Continuous Training of Chemistry 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, continuously updating their professional competence.

### I. CONCEPTUAL REFERENCES

Curriculum of the continuous training of Chemistry teachers aims to develop professional skills in Chemistry 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 the 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 at the quality level which is 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 Chemistry;

*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 into the 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 necessary professional tool 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 the monitoring, controlling and regulation processes.

Teacher's specific professional competences are developed based on two modules which refer to psycho-pedagogy, in general; and specialty, in particular. 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.	<b>Total</b>	<b>48</b>	<b>102</b>	<b>150</b>

## V. PROCESS, CONTENTS AND TRAINING ACTIVITIES ACQUISITIONS

Nr. d/o	Process Acquisitions	Contents	Trainig Activities
<b>Module A: Psycho-pedagogy</b>			
1.	Psycho-pedagogical skills towards school competence concept, depending on students' age.	<ul style="list-style-type: none"> <li>• Student-centered Education Paradigm (SCE). Designing teaching approach through the perspective of SCE. School Competence concept and the concept of the School</li> </ul>	Training, Brainstorming, Euristic Conversation, Case Study.

		Competence Standard.	
2.	Skills to organize educational activities during class mastering lessons.	<ul style="list-style-type: none"> <li>• Praxiology of class mastery activity.</li> </ul>	Problem Solving, Case Study
3.	Skills to organize educational process in the classroom.	<ul style="list-style-type: none"> <li>• Correlation of students' psychological needs with educational process. Psychological age crisis and growing students' personality. Mativation as a premiss and an effect of learning.</li> </ul>	Brainstorming, Euristic Conversation, Problem Solving.
4.	Intellectual acquisitions for written work elaboration in psycho-pedagogy.	<ul style="list-style-type: none"> <li>• Implementing the inclusive principle in pre-university education.</li> <li>• Verification and admission of written work in psychology.</li> </ul>	Investigation, Euristic Conversation, Reflective Journal.
<b>Module B: Axiology and Praxiology of Specialty Subject</b>			
5.	Intellectual acquisitions for continuous school curriculum development.	<ul style="list-style-type: none"> <li>• Trends in development of Chemistry education development in the Republic of Moldova.</li> </ul>	Workshop, Problem Solving, Debate
6.	Intellectual acquisitions for continuous school curriculum development.	<ul style="list-style-type: none"> <li>• Modernization of competence-centered Chemistry curriculum for secondary and high-school level.</li> </ul>	Workshop, Analytical Reflection, Algorithmic Method
7.	Psycho-pedagogical skills towards the concept of scientific knowledge competence.	<ul style="list-style-type: none"> <li>• Correlation of competences, subcompetences, objectives, contents, learning activities and evaluation in Chemistry school curriculum.</li> </ul>	Euristic Conversation, GPP Methods.
8.	Pragmatic acquisitions for school competence formation methodology.	<ul style="list-style-type: none"> <li>• Student-centered teaching-learning-evaluation strategies and competence formation strategies in Chemistry.</li> </ul>	Brainstorming, Euristic Conversation, BBB Method, GPP Method.
9.	Pragmatic acquisitions for school competence formation methodology.	<ul style="list-style-type: none"> <li>• Technology of didactic activity.</li> <li>• Learning through cooperation.</li> <li>• Active and interactive teaching-learning methods.</li> </ul>	SWOT, Starbursting, Focus-group Method, GPP Methods.

10.	Intellectual acquisitions to form inter- and transdisciplinary concepts in Chemistry classes.	<ul style="list-style-type: none"> <li>Intra- and interdisciplinary integration in Chemistry through the context of school competences formation.</li> </ul>	Euristic Conversation, GPP Methods.
11.	Didactic principles application skills in Chemistry classes.	<ul style="list-style-type: none"> <li>Modern Chemistry Lesson.</li> </ul>	Guided Discussions, Case Study, Power Point Presentations.
12.	Psycho-pedagogical skills for the concept of Scientific Knowledge Competence.	<ul style="list-style-type: none"> <li>Integration of cognitive, affective and psychomotor domains into the context of developing students' competences in Chemistry.</li> </ul>	<i>Philips-66</i> Method, SWOT, Starbursting, Mini-lecture.
13.	Intellectual skills for students' concept training and creativity development.	<ul style="list-style-type: none"> <li>Creative development of students in Chemistry classes.</li> </ul>	SWOT, Starbursting, Focus-group Method, Clustering.
14.	Pragmatic acquisitions for formative and summative evaluation test designing, focused on school competence formation.	<ul style="list-style-type: none"> <li>Strategies of school result evaluation, standards of competence, principles, types, methods in Chemistry classes.</li> </ul>	Round Table, <i>Philips-66</i> Method.
15.	Skills to solve Chemistry problems from all domains (gymnasium and lyceum).	<ul style="list-style-type: none"> <li>Methodology of solving Chemistry problems.</li> </ul>	GPP Methods, Modelling, Exercise.
16.	Practical acquisitions for Chemistry experiment realization.	<ul style="list-style-type: none"> <li>Methodology of practical work realization in Organic Chemistry.</li> </ul>	Algorithmic Method, Modelling, Experiment, Lab Work.
17.	Practical acquisitions for experiment	<ul style="list-style-type: none"> <li>Methodology of practical work realization in Analytical Chemistry.</li> </ul>	Algorithmic Method, Modelling,

	realization in Chemistry.		Experiment, Lab Work.
		<b>Pedagogical Practice</b>	
18.	Skills of educational process organization in the context of competence formation during Chemistry classes.	<ul style="list-style-type: none"> <li>• Teaching experience: achievements and perspectives.</li> <li>• Course evaluation.</li> <li>• Specialty Course Work checking and admission.</li> </ul>	Round Table, Reflections, Self-Evaluation.
19.		<ul style="list-style-type: none"> <li>• Methodical Counseling.</li> </ul>	
<b>Module C: ICT use and implementation of educational software</b>			
20.	Skills on applying Computer- Assisted Instruction.	<ul style="list-style-type: none"> <li>• Power Point Presentation Editor</li> <li>• Computer -Assisted Instruction.</li> </ul>	Computer-Assisted Instruction

## VI. METHODOLOGICAL SUGGESTIONS

Curriculum for continuous training of Chemistry 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 methods application in which the participants discover new things by themselves, critically analyze, and argument 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; thus, 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: the 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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