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Improving Quality of Science Teacher Training in European Cooperation - constructivist approach (IQST)

EUROPEAN DIMENSION IN INTEGRATED SCIENCE EDUCATION

(Description of the Units for Direct Teaching)

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Description of the Unit 1 (direct teaching)

Seminar	Activities
Number	1
Topic	**A Conception of Integrated Science Education**
Goals	To have a look at the evolution of the integrated teaching idea; To define the essential elements of integrated science education.
Time	1x45 minutes
Materials	Study material for the Module: European Dimension in Integrated Science Education - Unit 1
Strategy/ Method	Independent reading; Discussion – summary, main ideas; Group work. Study Case-study on page 3 and answer the questions (work in pairs).
Reflection/ Comments	What do we know about ISE? Does the elements of the integrated science teaching are clear? How ideas of the integrated teaching has been developed? Which modern concepts of ISE do you suggest?
Developed Competencies Of Constructivist Science Teacher	Competency to understand the evolution of the integrated teaching idea; Competency to understand the essential elements of integrated science education; Competency to understand importance of IST in constructivist teaching environment.

Description of the Unit 2 (direct teaching)

Seminar	Activities
Number	2
Topic	**Some Philosophic, Didactic and Social Aspects of Integrated Science Education**
Goals	To find out the impact of the well-known philosophical trends on education of the 20th century and to discover how those promoted the ideas of integrated science education. To learn how integrated science education affects the processes of students' socialization; To analyze and understand the main problems of natural science education in terms of pedagogy; To motivate the qualities of natural science education in terms of the constructive aspect of teaching/learning.
Time	2x45 minutes
Materials	Study material for the Module: European Dimension in Integrated Science Education - Unit 2
Strategy/ Method	Independent reading; Group work: discussion – Case Study and Questions on page 9 Brainstorming Discussion – summary, main ideas Individual work according tasks presented in Unit 2
Reflection/ Comments	Can I explain different aspects of integrated science education? Can I explain the qualities of science education in terms of the constructive aspect of teaching/learning?
Developed Competencies Of Constructivist Science Teacher	Competency to reveal the qualities and drawbacks of integrated science education; Competency to understand the impact of integrated science education on the processes of students' socialization; Competency to define the main didactic problems of integrated science education.

Description of the Unit 3 (direct teaching)

Seminar	Activities
Number	3
Topic	**The Main Tendencies of Integrated Science Education Development**
Goals	To analyze the reasons determining the need for integrated science education; To identify the basic terms describing the integration of sciences; To perceive integrating the content of subjects as the most efficient way of integration offering possibilities, advantages and links with the principles of constructivistic teaching/learning?
Time	2x45 minutes
Materials	Study material for the Module: European Dimension in Integrated Science Education - Unit 3
Strategy/ Method	Independent reading; Discussion – summary, main ideas; Group work - Case Study and Questions on page 14-15; Portfolio; Research projects - students research a topic in small groups and later present their findings to the whole group. Individual work according tasks presented in Unit 3
Reflection/ Comments	Are presented tendencies of integrated science education development clear? Can you predict some new directions of IST development?
Developed Competencies Of Constructivist Science Teacher	Competency to identify the basic terms describing the integration of sciences; Competency to identify the main tendencies of integrated science education development; Competency to predict possible ways of IST development in the future.

Description of the Unit 4 & 5 (direct teaching)

Seminar	Activities
Number	4 & 5
Topic	**Integrated Science Education in the Context of the Constructivism Theory.** **Integrated Science Teaching in Terms of the Constructivist Approach**
Goals	To perceive the idea of integrated science education in the context of constructivism as a theory of learning; To understand and name the specificities of integrated science education implemented following the principles of constructivistic teaching/learning; To manage to predict the possibilities of integrating the content of different subjects of science related to the specificities of students at different age stage as well as to material and human resources.
Time	2x45 minutes
Materials	Study material for the Module: European Dimension in Integrated Science Education - Unit 4 & 5
Strategy/ Method	Independent reading; Discussion – summary, main ideas; Group work - Case Study and Questions on page 20-21. Analyze the information presented on website at http://www.scienceonstage2.co.uk/ Individual work according tasks presented in Unit 4 & 5 Problem-solving Portfolio
Reflection/ Comments	What we want to know more about this topic? How can I connect IST and constructivist learning environments (CLEs? Is it really effective in teaching process?
Developed Competencies Of Constructivist Science Teacher	Competency to perceive the compatibility requirements between integrated science education and other types of curricula; Competency to facilitate discussion in group; Competency to perceive the idea of integrated science education in the context of constructivism as a theory of learning.

Description of the Unit 6 (direct teaching)

Seminar	Activities
Number	6
Topic	**The Models of Integrated Science Education**
Goals	To meet up with and carefully analyse one of the possible models of integrated science education emphasizing the classification of the subjects taught: Define the advantages of integrated science education; Understand the levels of integration in science education.
Time	2x45 minutes
Materials	Study material for the Module: European Dimension in Integrated Science Education - Unit 6
Strategy/ Method	Independent reading; Discussion – summary, main ideas; Group work: design a model of integrated science teaching. Discuss your project in your working group. Case Study and Questions on page 26-28 Portfolio; Individual work according tasks presented in Unit 6
Reflection/ Comments	Can I separate (distinguish) different models of IST? What are the main criteria? Did the group design the model that I liked?
Developed Competencies Of Constructivist Science Teacher	Competency to identify the models, levels and degree of integrated science education; Competency to define the advantages of integrated science education.

Description of the Unit 7 (direct teaching)

Seminar	Activities
Number	7
Topic	**The Integrated Science Education Curricula and its Designing Principles in Comprehensive School**
Goals	To perceive the integral and systemic nature of the content of science education; To analyze different types of science education curricula, to know the qualities, drawbacks and degrees of integrity of the curricula; To define the concepts of *educational content* and *educational curriculum* and to know their framing principles; To have knowledge of conditions ensuring the possibility of successful implementation of science education curriculum.
Time	2x45 minutes
Materials	Study material for the Module: European Dimension in Integrated Science Education - Unit 7
Strategy/ Method	Independent reading; Discussion – summary, main ideas. Discuss ten levels of curricula integration according Fogarty, 1991; Group work – design a sketch of IS curriculum. Discuss your project in your working group. Case Study and Questions on page 37-38; Presentation of group work; Portfolio; Individual work according tasks presented in Unit 7
Reflection/ Comments	Which strategies can I apply for curriculum preparation? Can I use different types of curricula in the teaching process?
Developed Competencies Of Constructivist Science Teacher	Competency to design the curricula of integrated science education (in the establishments of formal and non-formal education); Competency to design appropriate integrated science curriculum for secondary aged children utilizing appropriate goals, concepts, and evaluation; Competency to define the concepts of *educational content* and *educational curriculum* and to know their framing principles; Competency to analyze different types of science education curricula.

Description of the Unit 8 (direct teaching)

Seminar	Activities
Number	8
Topic	**The Science Education Tools and Ways of Producing them in the Collaboration Process**
Goals	To define the peculiarities of science education; To perceive that the efficiency of science education and the quality of education results are determined by a mutual collaboration between a teacher and a student; To know the tools and ways ensuring favourable conditions for a qualitative process of science education and to have knowledge of the factors determining a choice of science educations forms.
Time	2x45 minutes
Materials	Study material for the Module: European Dimension in Integrated Science Education - Unit 8
Strategy/ Method	Independent reading; Discussion – summary, main ideas; Group work - Case Study and Questions on page 44; Individual work according tasks presented in Unit 8 Brainstorming; Portfolio;
Reflection/ Comments	Which of the teaching methods will you suggest for the teaching of integrated science in secondary school level? How can I define the best conditions for a qualitative process of science education? How can I measure efficiency of a concrete method of teaching?
Developed Competencies Of Constructivist Science Teacher	Competency to choose adequate teaching methods and tools; Competency to define the peculiarities of science education; Competency to distinguish principles of application of different teaching methods in different situations and different stages of teaching process.

Description of the Unit 9 & 10 (direct teaching)

Seminar	Activities
Number	9 & 10
Topic	**A Constructivist Approach to Integrated Science Education: Teaching Would-be Teachers to do Science.** **Designing a Integrated Science Methods Course for Initial Science Teachers**
Goals	To perceive the specificities of work experienced by a teacher following the instructions of constructivistic teaching/learning; To perceive that the specificities of work experienced by a teacher following the instructions of constructivistic teaching/learning make the impact on the process of training pre-service teachers. Find relation between the above mentioned perception and individual experience. To analyze how teacher's competence in sciences as one of the constituents of professional competence is important for the process of science education; To know the main principles of training the teachers of sciences.
Time	2x45 minutes
Materials	Study material for the Module: European Dimension in Integrated Science Education - Unit 9 & 10
Strategy/ Method	Independent reading; Discussion – summary, main ideas; Group work - Case Study and Questions on page 50; Portfolio; Individual work according tasks presented in Unit 9 & 10
Reflection/ Comments	How is it possible to oppose to critics of constructivist approach in preparation of science teachers? How can I explain pros and cons of constructivist science teacher preparation? Why aren't teachers using how students learn as a guide to their teaching practices?
Developed Competencies Of Constructivist Science Teacher	Competency to perceive the specificities of work experienced by a teacher following the instructions of constructivistic teaching/learning; Competency to understand the main principles of training the teachers of sciences; Competency to provide opportunities for scientific discussion and debate among students.

Description of the Unit 11 & 12 (direct teaching)

Seminar	Activities
Number	11 & 12
Topic	**Contextual Teaching and Learning of Integrated Science in Lower and Upper Secondary Schools.** **The Specificities of Integrated Science Teaching in Lower and Upper Secondary School**
Goals	To perceive the specificity and significance of science education at lower and higher stages of secondary school. To find out why a positive emotional students' disposition in terms of science education is so important for the above mentioned stages of secondary school. To analyze teacher's role in the process of teaching an integrated course on sciences in the forms of lower and upper secondary school. To specify the integration levels of different branches of sciences.
Time	2x45 minutes
Materials	Study material for the Module: European Dimension in Integrated Science Education - Unit 11 & 12
Strategy/ Method	Independent reading; Discussion – summary, main ideas; Group work - Case Study and Questions on page 55-56; Brainstorming; Portfolio.
Reflection/ Comments	Why science learning is difficult? How can I explain this statement? How can I guarantee an effective constructivistic science teaching? How can I observe learning in my classroom?
Developed Competencies Of Constructivist Science Teacher	Competency to understand contextual teaching and learning of integrated science; Competency to demonstrate and understanding of the constructivist approach through effective questioning, assessment, and reporting techniques within the science curriculum; Competency to specify the integration levels of different branches of sciences.

Description of the Unit 13 (direct teaching)

Seminar	Activities
Number	13
Topic	**The Evaluation Strategies of Integrated Science Teaching /Learning**
Goals	To perceive and define an evaluation of integrated science self/education as a systemic process. To perceive the goal, object and methodology of the evaluation of integrated science self/education; To analyze the different strategies of the evaluation of integrated science self/education; To manage to choose an optimal strategy for evaluation considering the evaluated object.
Time	2x45 minutes
Materials	Study material for the Module: European Dimension in Integrated Science Education - Unit 13
Strategy/ Method	Independent reading; Discussion – summary, main ideas; Group work - Case Study and Questions on page 62; Portfolio;
Reflection/ Comments	Which evaluation strategies can I apply in teaching process? Can I formulate evaluation questions for learners? Can I use the students´ answer to improve my teaching? How can I improve the self-evaluation skills of my students? What teachers should know about evaluation strategies and techniques?
Developed Competencies Of Constructivist Science Teacher	Competency to choose an appropriate optimal evaluation strategy covering the fields of integrated science education and students` achievements; Competency to perceive and define an evaluation of integrated science self/education as a systemic process; Competency to design an appropriate evaluation plan for a specific science course and purpose; Competency to select and clearly describe the questions to be addressed in the evaluation.

Description of the Unit 14 (direct teaching)

Seminar	Activities
Number	14
Topic	**The Collaboration Peculiarities of Science Teachers**
Goals	To understand purposes of science teachers collaboration; To define the concepts of collaboration and cooperation; To characterize the main ways of collaboration.
Time	2x45 minutes
Materials	Study material for the Module: European Dimension in Integrated Science Education - Unit 14
Strategy/ Method	Independent reading; Discussion – summary, main ideas; Group work - Case Study and Questions on page 66; Portfolio; Brainstorming.
Reflection/ Comments	What is science teacher collaboration, and how does it relate to other current school practices? When science teachers say that they collaborate, are they meant many different things? How can I take part in co-teaching? Can collaborative technologies improve integrated science teaching? Does constructivistic approach improve collaboration among science teachers?
Developed Competencies Of Constructivist Science Teacher	Competency to choose the best ways of collaboration in concrete teaching situations; Competency to organize collaborative integrated science teaching process.