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Second Chance Schools: A science teacher-training workshop for designing scientific literacy curricula

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Ευρωπαϊκή Ένωση
ΕΠΙΧΕΙΡΗΣΙΑΚΟ ΠΡΟΓΡΑΜΜΑ ΕΚΠΑΙΔΕΥΣΗ ΚΑΙ ΔΙΑ ΒΙΟΥ ΜΑΘΗΣΗ
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ΕΙΔΙΚΗ ΥΠΗΡΕΣΙΑ ΔΙΑΧΕΙΡΙΣΗΣ
Με τη συγχρηματοδότηση της Ελλάδας και της Ευρωπαϊκής Ένωσης

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SECOND CHANCE SCHOOLS (SCSs)

- The main goal was to promote new literacies and competences associated with real-life situations and workplaces as an effort to combat the social exclusion of adults who have not finished their compulsory education.

- Adults from socially vulnerable populations.

- The teachers themselves should be responsible for the design and the development of the curriculum concerning their subject.

(IDEKE, 2003)

SCIENTIFIC LITERACY & CURRICUM DISIGNING

- Scientific literacy should be conceptualized broadly enough for local school districts and individual classroom teachers to pursue the goals that are most suitable for their particular situations along with the content and methodologies that are most appropriate for them and their students.

(DeBoer, 2000)

- Scientific knowledge should be presented in the context of issues that the individual encounters in everyday life.

(Layton, 1986; Roth & Lee, 2004)

THE AIM OF THE STUDY

- This study presents a training **workshop** aimed at changing SCSs' science teachers' approach to curriculum design, from theory-laden curricula to curricula focusing on real-context science-related situations relevant to students' personal, vocational and social experiences.

THE MAIN FEATURES OF THE WORKSHOP

- A **paradigm shift** is required in the way that science teachers view the nature of science, the aims of science education and their role within the delivery of the curriculum.

  => the workshop should encourage conceptual change through reflection on cognitive conflict.

  (Bartholomew, Osborne & Ratcliffe, 2004; Day & Bryce, 2011)

  (Pintó, 2005)

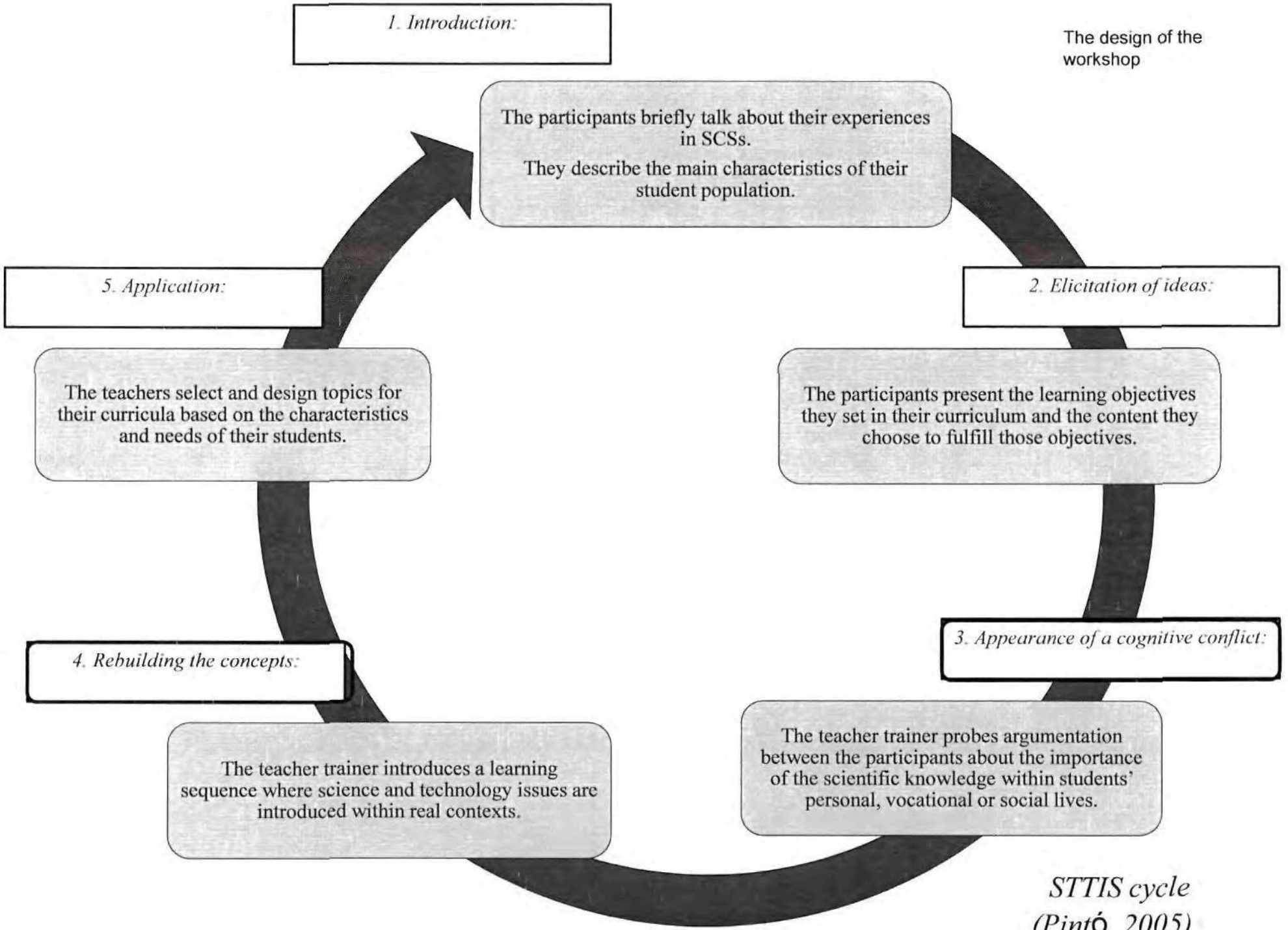
- Science teachers fear that contexts reduce the amount of subject matter, and that they lack the skills and knowledge to teach context-based science issues properly.

  => the workshop should empower science teachers' confidence by providing practical guidelines/methods for the educational practice.

  (Stolk, De Jong & Bulte, 2011)

  (Pintó, 2005)

The design of the workshop



STTIS cycle (Pintó, 2005)

The main guidelines

Introduce *all topics* through some problems or issues meaningful to students' lives. Think about situations that relate to students' personal, vocational and social experiences.

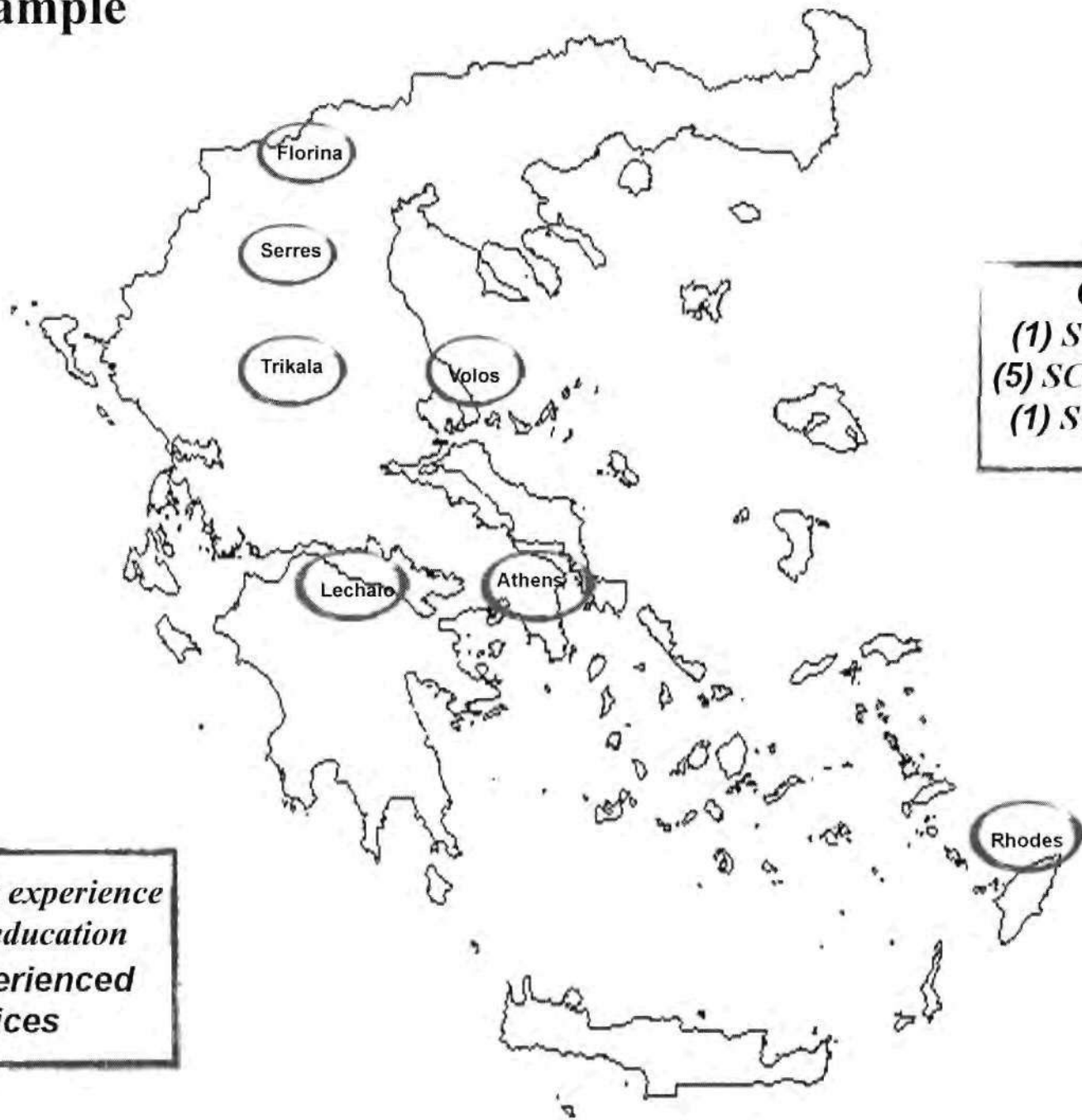
THE PRODUCTS OF THE WORKSHOP

- Based on the proposed sequence, the science teachers were intended to choose and design science two topics related to the students' experiences and needs.

  ✓ (1) context-based topic individually

  ✓ (1) context-based topic in small groups

The sample



Context
(1) SCS in Athens
(5) SCSs in province
(1) SCS in prison

Academic background

(3) Physics
(3) Geology
(1) Biology

Teaching experience in adult education
(3) Experienced
(4) Novices

THE METHOD OF ANALYSIS

Two methods of analysis:

1. Content analysis of the video-taped workshop, in order to investigate the science teachers' difficulties in changing perceptions and practices.

1. The topics that the science teachers developed were evaluated by two experts in science education with respect to the degree of integration of key aspects of the training.

SCIENCE TEACHERS' PERCEPTIONS AND PRACTICES BEFORE THE WORKSHOP

The results

- 5 science teachers designed curricula oriented towards the content of science.
  - They focus on the acquisition of knowledge of scientific concepts and principles and scientific skill development.

    Ed: "To acquire the alphabet of science."

- 2 science teachers designed curricula aiming at providing familiarity with science-related daily life situations.
  - They address mainly topics of general interest.
  - They incorporate only a few topics related to students' personal or vocational experiences.

    Ed: "To acquire knowledge useful in daily life. To be able to recall it and use it when necessary."

SCIENCE TEACHERS' DIFFICULTIES

- Science teachers with many years of teaching experience in formal education had great difficulties.

  - Difficulties in understanding that science knowledge gets its meanings in certain contexts that relate to their students' lives.

Ed: "My choice to teach concepts or phenomena such as the nuclear fusion or free electrons in the metals may seem exaggerated, but this knowledge is prerequisite in order to present daily life phenomena such as the solar system and the stars, electricity etc. Such phenomena impress the students, hence they ask for them."

Tr: "Why do you think that the knowledge of the free electrons is important for the specific population's lives? Will it help them, for instance, to cope with situations they encounter in their daily lives (e.g. a short circuit)?"

Ed: "The interpretations involved are significant to everybody since they introduce you to the microcosm which offers a set of explanations for daily life issues or situations."

SCIENCE TEACHERS' DIFFICULTIES

- Science teachers with many years of teaching experience in formal education had great difficulties.
  - Difficulties in selecting context-based topics for their curricula. Their visions was "inwards science and its applications".

    Atmospheric pressure => **Winds** (in a SCS on an island)

    Acids, bases => **Antacids** (for prisoners who complaint about stomach aches)

  - Difficulties in implementing a non-traditional method.

Ed: "Even if we accept the value of the proposed approach in the specific educational context, even then I believe that we are not able to effectively implement it in the educational practice. All these years we've learned to think and teach in a completely different way and this can not be changed."

SCIENCE TEACHERS' DIFFICULTIES

The results

- The science teacher who did not have any teaching experience (thus she lacks the content knowledge in other science areas apart from her own academic field of knowledge), failed to make the critical shift (Landslides).

Ed: "I have to spend several hours in considering issues relevant to my students' lives and ways to develop them under according to the proposed method. For the time being I am not sure if I am able to implement a method that focuses on the students' contexts and experiences because such contexts do not rely on the specific subject matter to which I am familiar with."

SCIENCE TEACHERS' DIFFICULTIES

- All science teachers had difficulties on the process of transforming the scientific knowledge into knowledge compatible with their students' lives.

Ed_1: "We have to decide up to what level we should analyze the term of alcohol. For example, do you think that we should refer to its molecular formula?"

Ed_2: "No. I believe that this knowledge is not useful to the context of our students' lives."

Ed_1: "Though later, when we refer to the process of converting grapes into wine, how will we describe the reaction of the alcoholic fermentation?"

Ed_2: "From my point of view, we just need to explain that this is a process that relates to the action of a yeast which appears when we crush the grapes."

SCIENCE TEACHERS' PRACTICES AFTER THE WORKSHOP

- The participants were able to develop context-based topics related to students' living experiences and needs.
  - Immigration, Racism and Theory of Evolution
  - Winds
  - Growing Herbs
  - Wine and alcohol
  - Olive oil
  - Antacid drugs
  - Sexually Transmitted Diseases

- They addressed issues that involved meaningful interconnections between science and society.

Sexually Transmitted Diseases (STDs). Presentation of a media report that refers to prostitutes responsibilities for the transmission of AIDS to clients, many of whom were family men.