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MIS "Docente Europeo:Move'in Science2"

Progress Report 1 Public Part

Project information

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Executive Summary

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As an introduction to the report, the Executive Summary should briefly describe what has been accomplished. The following core content is recommended.

Our project proposal is build on the need to develop competences and knowledge in the educational field of the **Initial teacher educational of secondary school teachers of science and technology areas with specific reference to the Pedagogical Content Knowledge methodology.**

The general aim of the project is to weigh on initial teacher education and, secondly, on in service teaching, of the scientific and technological areas so **to make more attractive the perspective of scientific careers on the so called "hard subjects" for new generations** and improve their preparation and motivation. Many studies revealed how the level of explanation of some determined subjects and the consequent level of learning requested to prospective teachers has nothing to do with the processes of explanation/learning necessary to be activated within classrooms.

Specifically, the project aims at:
o creating a working group at European level composed by trainers of prospective teachers (Trainee Teachers/Future Teachers), teachers of science and technology areas, developing an educational approach based on Pedagogical Content Knowledge (PCK). It means that, as Schulman described, to go beyond the disciplinary knowledge (content) of subjects (SMK Subject matter Knowledge) and the pedagogical knowledge (PK), to go to the pedagogical content knowledge (PCK).

Our project wants to intervene within science teacher education, by implementing a research path and elaboration of materials **within the perspective of the PCK methodology.**
o testing of training paths for prospective teachers of the partner institutions, by means of a seminar-like methodology, and of research groups involving at the same working table teacher trainers, prospective teachers and in service teachers (target group);
o Elaborating, publishing and diffusing of an **handbook** including pedagogical materials for the PCK development, published on line;
o Realising experimentation and exchange paths of the PCK development among prospective teachers of science and technology areas through **mobility** actions abroad.

The project wants to contribute to reinforce the International co-operation among education institutions and **to enhance the mobility of Science and technology prospective teachers**, improving initial teacher education for secondary school and allowing for a better and more motivated teaching/learning in Science and Technology areas. In line with those aims, the project envisages also the dissemination of the project outcomes through the publication of a Comenius seminar.

Project tasks are distributed to partners according to their specific experience and competences, in fact, it is in the natural scope of Universities to deal with research and training on didactics. In addition, the school/university link is institutionally provided and the "Scientific" committee supervision is caring of the involvement of targets groups both during the preparation of the material and for the future practical training - "testing" - of the theoretical models in classroom both for the local student teachers and those involved in the mobility. The transversal activities are in charge of the coordinating institution which is connecting the partnership – internal communication – and is developing the dissemination and exploitation strategies – external communication.

Project information and contacts available at: www.mis.unipa.it

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1.Project Objectives

The project aims at:

o creating a working group at European level composed by trainers of prospective teachers (Trainee Teachers/Future Teachers), teachers of science and technology areas, using an educational approach based on Pedagogical Content Knowledge (PCK) development within institutions dealing with initial teacher education (secondary school level).
o testing of training paths for prospective teachers of the partner institutions by means of a seminar-like methodology, and of research groups involving at the same working table teacher trainers, prospective teachers and in service teachers.
o Elaborating, publishing and diffusing of an handbook including pedagogical materials for the PCK development, published on line;
o Realising experimentation and exchange paths of the PCK development among prospective teachers of science and technology areas through **mobility** actions abroad.

Direct beneficiaries: prospective teachers in initial education participating actively to the project activities (**seminars, handbook and mobility** – both in out going and hosting activities).
Indirect beneficiaries: trainers of prospective teachers and in service teachers.
Long term beneficiaries: secondary school pupils

The structure of the project is thought in order to allow a real elaboration of teaching methodologies at a European level, through a method based on the exchange and on the joint participation of all the involved subjects. Our challenge is to construct a system where knowledge can be widened by putting together, making them responsible, all the levels of Educational and training in the area of the scientific subjects: prospective teachers (future teachers/ trainee teachers), trainers of prospective teachers, in service teachers united by the common aim of improving the quality of teaching these subject and make the study more attractive for new generations. As an ex.: in the field of physics teaching, it is well documented, that the procedural learning trainers of prospective teachers typically use at the university level is not adequate for teaching at the secondary school level and in addition does not take into account the pedagogical proposals inviting to rethink educational methodologies and contents. This contradiction shows the need to develop specific competences for science teachers able to lead to a metareflection on the subject content relative to teaching that content.

The mobility phase of the prospective teachers selected by the involved countries, is meant for increasing teachers' consciousness about the relevance of referring to an International space when they think of their training and teaching to pupils. Pupils, inf act, represented as workers should be seen as **future European scientists.** Therefore, the European dimension of teaching is stimulated not only by the possibility to cooperate with colleagues of different Countries but also by the activities of practical training they will run in classrooms of a different Country, where they will assess realistically, if the model elaborated at a local level can be exported in different contexts, considering a wider perspective of European recognition of titles.

Sharing materials and outcomes, the development of methodology, exchange both at an international level are supported by the creation of the project handbook and the following promotion of a **Comenius / Grundtvig course**. The elaborated methodology is improved by the progress of the activities thanks to open discussion and further development with the contribution of international participants/audience.

Project Approach

The reference paradigm of our project is the **Pedagogical Content Knowledg**e, first introduced by Lee S. Shulman. He thought that the knowledge of the subject is a necessary element but not sufficient for being a good teacher: in fact it does not guarantee the capacity to teach it always in a accessible way to pupil/student. In many other professions, trainees can profit from experiences and abilities of the previous generations. In the teaching profession this rarely happens, and what is generally transferred does not include the most precious element of the acquainted knowledge of the expert teacher: the pedagogical content knowledge (PCK).

PCK represents a teacher's ability to convey the relevant constructs of the content knowledge in a manner that makes it accessible to their students (Zeidler, 2002).

Other researchers (Magnusson, Krajcik, & Borko, 1999) have identified the process of construction of PCK as a transformation process "of several types of knowledge for teaching"; these include subject matter knowledge, pedagogical knowledge (classroom management, educational aims, etc.), and knowledge about context (school, students). The effects produced by the different teachers' conceptions of subject matter as well as of the learning/teaching models on the dynamics of the transformation process is a point that Shulman has not addressed; this involves a research approach integrating pedagogical/cognitive aspects with deep analysis of subject matter structure. Recent research papers address this point in different fields of science (Loughran, Milroy, Berry, Gunstone, & Mulhall, 2001; van Driel, De Jong, & Verloop, 2002) and point out the need of connecting in a more substantial way research results with the fields of teachers' education, class-practice and work of practitioners.

The work developed during the first year has **focused on these aspects by elaborating didactical outputs** including concrete examples explaining determined arguments representing the the different scientific disciplinary areas. Partners have produced outputs - "pattern cards/examples of good practice" and "workshops" in physics, maths, informatics.

The tools chosen for assessing the efficacy of the product derive from its experimentation, from **the impact on pupils and the pupils' performance measured by teachers, from the level of transferability of this methodology in other contexts**. In addition, the partnership involved a **critical friend in order to give external and punctual advice on the progress of the project**. In particular by using a participative methodology while constructing a path where the critical elements to adjust and the good points to be improved are the result of a collective work.
On this stage of the project the critical friend has been using qualitative tools: focus group constituting the "story telling" of the project, analysis of the open answer questionnaire, analysis and interpretation of the collected data. The evaluation of the project progress aims at finding out whether the project means are consistent with the following criteria: relevance, efficiency, effectiveness, impact, sustainability and coherence. The detailed and deep analysis of the prepared material within the project team is a very useful means of internal quality control. On the basis of all these evaluation methods, it is possible to draw a conclusion that outputs of the project are transferable. The prepared material is pedagogically efficient and effective, as it is convenient to use it not only when further pursuing the project goals in the national pedagogic context but also aiming at a better pedagogical quality.

The experimentation of the pedagogical models through the mobility in the partner Countries will represent an important feedback for the final realisation of the publication; the results will allow for in itinere adjustment of the final product and therefore its diffusion (second year of the project).

The innovation of the project is represented by the fact that teacher training is realised within a European dimension. **The international meetings and the mobility are an important and innovative element of the preparation of the prospective teachers.**

Mobility is a key training activity because both the consciousness of the European citizenship and the didactical-disciplinary views can be improved.

In addition, the elaboration of the handbook and the mobility refers to an innovative activity of importing within the prospective Teachers preparation courses a **seminar-like methodology involving actively trainers of prospective teachers, the prospective teachers and in-service teachers.** These seminars have been giving the possibility to motivate and actively involve participants recognising to all equal opportunities and reducing the distance between the two levels. On the other hand, the international meeting have been meaning the possibility to transfer within the international working group the results of the local outputs, allowing the scientific committee to deepen the knowledge of innovative methodology experienced by the colleagues and re-elaborate outputs, assess the methodological and strategical aspect relative to their own materials and construct an action model which outlines the element of European innovation and the possible local paths of synergy.

The innovative view of the project is in line with the research developed by EURIDYCE "*Science Teaching at School in Europe. Policies and Research"* specifically referring to the PCK.

The project results will be exploited by enlarging as much as possible the network of subjects willing to learn the PCK methodologies and products developed by the partnership and the possible usage within school. To this purpose a Comenius / Grundtvig seminar will be organised, open to participants – in service teachers and trainers of prospective teachers – coming from all over Europe.

2.Project Outcomes & Results

The final project publication will be an **handbook** in which the methodologies relative to the PCK (pedagogical content knowledge) will be put into practice in the field of Science and Technology. This can be considered as a sort of “guide” useful for teaching. The **handbook** will the collection of the outputs produced so far by the partnership; as the publication will be on line this would mean also that the collection of “cases” can be extended also to the participants of the Comenius / Grundtvig seminar and to the prospective teachers that will be enrolled by the partners of the project in the following years.

Specifically, this process has been developed by producing and cross-experimenting among the international Partners some examples of “Good Practice”, as we think that in a project devoted to harmonize science teacher education activities across Europe, it is of great importance to project together and actually test these activities in diverse contexts.

All of the partners are currently involved within this project as they are Universities and/ or Centres dealing directly with initial teacher education of prospective teachers of secondary school level of the science and technology areas.

The project methodology includes two working levels – International and local. The International Scientific committee is composed by a representative of each partner institution. the International Scientific committee defines the theoretical framework of reference, the methodology, timetable and the structure of the final product. International meetings have been used to report on progresses of the local working groups.

Locally, the research working group is composed by 1)at least 2 trainers of the prospective teachers at the University level in the field of science and technology education – different subjects; 2)at least 2 in service teachers in the field of science and technology of the secondary school level - different subjects; 3)at least 10 future teachers of secondary school level specialising in teaching/learning of Science and t technology areas – different subjects

During the International meetings results of local experimentation have been also confronted and discussed, in order to infer how Prospective Teachers’ Pedagogical Content Knowledge can be developed by pedagogically reconstructing a given subject matter to be taught.

Specifically:
ITALY: SISSIS University - Palermo,: **physics, maths, informatics**
SLOVAK REP.: Comenius University - Bratislava: **physics, maths, informatics**
GERMANY: Bochum University: **physics, maths, informatics**
ROMANIA: Andrei Saguna University - Costanta: **Informatics**
LITHUANIA: Modern Didactics Centre - Vilnius: **physics**
BELGIUM: Arteveldehogeschool - University College Artevelde- Ghent: **physics, maths, informatics**

The shape of the examples of teaching good practice is in the form of “Pattern Cards”, pedagogical tools thought in order to enable partners to select the “Good Practices” which have been tested by each partner institution at local level (including the following information: Title; Justification of the proposition; Competence(s) to be developed by pre/in-service science teachers; didactical aims; Timing; Material (equipment, lesson plan, textbook, website,…); Assignments for the Trainee Teachers; Organization of the class (group, individual,…); Academic staff involved; Bibliography).

A subsequent revision of the general scheme included the following information so that punctual suggestion and advise can be addressed to the authors: Partner Name; Title; Contact E-mail. In addition, a deeper and detailed description of the different phases and information to be developed for each workshop: “Overview of workshops” (Nr; Workshop name Time (hr); Location) and detailed description of the “workshop”: Lesson plan;

Experimental/didactical Activities of the workshop; extra info; Time (min). And the same for the description of the: “Experimental/didactical Activities Sheet I.1” and the number of prospective teachers involved: Name; Content knowledge objectives; PCK objectives; Time necessary; Special conditions; Materials; Activities; Possible Results

The production of outputs is still in progress and partners are working on the second revision of their material after the International meeting held in Ghent (BE) in October and before the following one to be held in Constanta Romania. Actual revision needs: to introduce space for previous knowledge mandatory for a fruitful development of the pedagogical activity;to separate the PCK competencies in “General PCK competencies” and “Specific PCK competencies”. The first are to be taken from a list, proposed by SISSIS in the view of a standardization of the products; the second are chosen by each partner, with reference to the specific activity to project; to introduce a reference to Pedagogical Competencies to be developed in the activity; to add space to special conditions required by the activity and possible obstacles that the teacher/students can find; to add space for links to book, papers, internet sites and references that the teacher can find useful to the activity development.

Again the Belgian team offered to apply the proposed modifications to the form of the schema:”Experimental/Didactical Activities Sheet I.2”: Name; Mandatory previous knowledge; General PCK objectives; Specific PCK objectives; Content knowledge objectives; Pedagogical knowledge; Time necessary; Min.-Max. number of TT; Materials; Special conditions and possible obstacles; Activities; Possible results; References; other materials.

This “beta” version of the Pattern Card (complete at least at 70%) is ready in order to allow other partners to chose a second “Good Practice” proposal to experiment; each partner will implement two “Examples of good practice”, one developed locally, and a second from a partner Institution, in order to make possible the experimentation of all proposals across partners. During the Costanza meeting, in January 2009, all proposals will be discussed in their final form (to be presented within December 2008).

When finalised the project outputs and the final handbook will be published in the project web site: www.mis.unipa.it.

3.Partnerships

Our project is based on the need to refer to the Education and training space beyond the natural National borders, not only geographically speaking but metaphorically, if we think about the didactical traditions of every single member state of the European Union, the disciplinary programs, the scientific research and so on...

In this sense this project is relevant as it is structured internationally.

The institutions are all dealing with the initial teacher training of future secondary school teachers/student teachers. This educational structures apply implicit research-based methodology in didactics, this is why the PCK methodological and didactical approach has been welcomed.
These institutions also share a common need to improve their initial teacher training system and try to intervene, indirectly on pupil motivation towards Scientific subjects at a EU level. Most of the partners have had previous collaborations both in bi-lateral or transnational cooperation activities. This element responds to the need of exchanging different level of expertise in this specific filed of education as well as reaching high standards of European project management and cooperation. To this purpose, transversal activities have been guided by the co-ordinating institution dealing with the internal and external communication, the dissemination and exploitation strategies, the financial and administrative procedures jointly with the Applicant.

Finally, this partnership represent a good balance between territorial representation.

Partners and participants of the working groups are strongly convinced that transnational cooperation activities and specifically, the mobility is a means for constructing a common European identity.
Mobility, that is to say the project international meeting and the mobility of the prospective teachers, is an important means of development at personal, professional and educational level for individuals, the European “citizens”. This means also the growth of the cultural sphere when we refer to sending and hosting communities. The impact will be important as already the composition of the working groups include different levels of education: University and school.

It is obvious that the project participants have not yet been absolutely uniform in realising the project objectives and preparing or organising activities. But the diversity observed can be viewed manifoldly. It is possible to state that such diversity provides an additional stimulus for project participants to examine the activities of the project colleagues and the material prepared even in greater detail and to look for opportunities to improve their understanding about the experience of the training of teachers of natural sciences at European higher schools.

4.Plans for the Future

IV INTERNATIONAL MEETING RO 21-24 Jan 2009: "PREPARATION OF THE MOBILITY: INCOMING & OUTGOING FLOWS"

Preparation of the monitoring tool: "Quality mobility standars":

- Preparation to the mobility (cultural, education, pedagogical, logistic information).
- Final selection of mobility beneficiaries and final distribution to the hosting partners
- Cultural course
- Presentation of the quality standard criteria of the outgoing and incoming mobility activities
- Presentation of a specific evaluation plan for the mobility activity
- Preparation of a short course of induction to the mobility, involving both departing students and those who will be dealing with the hosting activities with incoming students (specific attention will be dedicated to the the life long learning and comenius general aims)
- Preparation of all the necessary logistic issues to the incoming (accommodation, foods, transports ecc.)
- From the "beta" to the final version of the "workshops"
- Choose of the second "example of good practice"
- Mobility Financial arrangements

"MOBILITY" 09 March to 04 April 2009

It will be organized during the same period so that each partner will host, at the same time, about 10 prospective teachers. The programme will include:

- Welcome and ice breaking activities (the international group will be supported by the local student hosting group; specific attention will be dedicated to the linguistic needs and exchange).
- Round of individual presentation by the international students of one' s proper didactical model.
- Division in to areas subgroups for adjustments to didactical models in cooperation with university teachers and researchers, and school teachers.
- Specific matching school teacher / student teacher and relative tutoring
- Practical teaching training in classrooms
- School visits
- Monitoring and evaluating
- Certifications: ECTS – EUROPASS MOBILITY
- During the weekend cultural visits and journeys will accordingly be organized

MOBILITY FOLLOW UP - LOCAL WORKSHOPS

- Presentation of the international experience by the mobility students to the rest of the local group.
- Presentation of the results of the pck model testing

V International Meeting – MAY 2009

- Presentation of the mobility evaluation.
- Organization of the final publication of the hand book.
- Final revision of text using carousel methodology.
- Presentation of monitoring data.
- Dissemination plan: second phase.
- Organization of local conference open to educational staff.

PUBLICATION

- Final revision of the handbook by individual authors and working groups.
- Gathering of produced material by the coordinating institution.
- Editing.
- Final revision of English.
- Final publication and delivery.

EXPLOITATION STRATEGY

- Connection and confrontation of the project results with the existing Science networks and other projects.
- Group discussion will be prompted so to reach new possible ways for strengthening links between the project results and further national or international programs and initiatives.
- Organisation of the **Comenius/Grundtvig course:** publication on the **Comenius/Grundtvig** catalogue (participant deadline 10/2009).
- Distribution of the publication and individual articles to specialised press and sectoral sites.
- Realisation of the local conferences addressed to professionals of education and training. Local educational authorities, policy makers,civil societies representative will be invited to take part and to discuss on the results of the project and the possible long term impact.
- Possible and real continuation of the PCK model use will be specifically discussed in round tables or conference workshop sections as a means for improving teacher preparation and consequently improve pupil and student motivation to study science and technology subjects.

FINAL VI INTERNATIONAL MEETING: "PROJECT EVALUATION - FINAL REPORT"

- Evaluation and final report on the activities realised, the materials produced and the project expenses.
- Collection planning of the dissemination sheets/data / materials by each partner.
- Collection planning of financial and administrative documents.

COURSE MARKETING

- Realization of informative leaflet to be distributed to possible Comenius participants.
- Implementation of science and technology network targeted campaign.
- Joint distribution of project publication together with invitation letter for Comenius course.

The process of dissemination and exploitation will be developed after the end of the project guaranteeing a successful impact on the envisaged long term target groups and jointly will create sustainability of the training activities proposed by the consortium.

FINAL REPORT

- Collection and control of the correct production of financial and administrative documents.
- Collected all a long this workpackages.
- Gathering of products and materials realized by the consortium for the final report.
- Finalising of the project evaluating plan by the critical friend

- Final Report will be finalised after the end of the project with the joint work of the coordinating institution and the applicant.

5.Contribution to EU policies

Our project proposal is based on the outcomes of previous activities run by the different partners to research, training and International co-operation projects which most of time included also mobility experience abroad (study visits, research grants, training or professional experiences abroad etc..).

In this sense the project content will strongly address to further establish networks experimenting this field of action. This means that project outcomes will be also used and diffused in connection with further measures of the LLL specifically, Policy Co-operation and Innovation in Lifelong Learning (Key Activity 1) and Dissemination and Exploitation of Results of Actions Supported under the Programme and Previous Related Programmes, and Exchange of Good Practice (Key Activity 4), not to mention the strong connection with the Seventh Framework Programme (2007 to 2013): Building the Europe of Knowledge and specifically, The People Programme which tend to mobilise significant financial resources that can be used to improve the career prospects of researchers in Europe and attract more high-quality young researchers.

Training and mobility could be improved so that European researchers can realise their full potential.

Extra Heading/Section Enter your text here