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Exploitation activities related to the FAMT&L project

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1. Introduction

The exploitation activity for the project *FAMT&L – Formative Assessment in Mathematics for Teaching and Learning* (538971-LLP-1-2013-1-IT-COMENIUS-CMP) funded by the Lifelong Learning Program of the European Commission started with the preparation of a work plan, modified "in progress" during the time of the project. It presented the exploitation plan for the 3-years FAMT&L project and it has been a reference document, which described the strategy and the planned tools for the exploitation of the project results. It also showed the different directions of the exploitation and gave an overview of the expected project results and the key stakeholders in the project. In order to achieve the best possible results different hypothesis of exploitation have been analyzed. The exploitation plan took all project partners into account and it was also linked to their outcomes.

The ambition of FAMT&L has been the development of a training model based on the use of videos and tailored thanks to the results of surveys among both teachers and students. This preliminary work and the analysis done has brought to the organization of pilot courses and to the making of a web repository for the video materials. The priority of the project was to promote the training of teachers in order to develop the basic skills of students in mathematics, a field of scientific education which is particularly important to ensure the right to citizenship for the new generations.

Teacher training, in FAMT&L, focuses on a crucial element of innovation for the effectiveness of school systems: conceptions and practices of (math) teachers about learning assessment of students and the possibilities given by using formative assessment (FA).

The exploitation focuses on development and enhancement of teacher's competence. The special aim of the exploitation, involving all stakeholders, is to develop ideas able to reduce the gap between the ideals of a democratic school in the involved Countries and the present level of the use of assessment practices (our ideal is to have a school system which is able to use FA to have most of the pupils reaching "good levels" of knowledge, apt to help them to be responsible citizens). To apply and use the results of the FAMT&L project in practice – both during the time of the project and in the future – should enhance the ability of the teachers to fight such gap.

Any project can be successful only if all participating parties are working in close cooperation; our plan, part of *Work package 8 - Exploitation* has been collecting the outcomes of the project and advise how these could be exploited. In this chapter we describe how all the exploitation strategy developed.

2. Objectives and exploitation strategy

To achieve the above-described goals, the exploitation strategy was to identifiy important organizations, fairs, meetings, workshops and events to which the FAMT&L project shall contribute and participate (in addition to other tools for dissemination of information and results better defined in the dissemination strategy). The plan has been to make use of

our dissemination activities as a complement to reach relevant stakeholders and stimulate dialogue on the topics of the project. The plan defined the modality for the realization of briefings with policy and decision-makers in the educational field at national level in order to create synergies that will guarantee a successful exploitation of the project's results.

The exploitation strategy planned to:
- continuously interact with new and already involved stakeholders in order to define an on-going strategy for the exploitation of results;
- define a tailored exploitation plan that will make use of dissemination activities as a complement to reach relevant stakeholders, stimulate dialogue on the topics addressed in the project and modify the education policy in the direction of efficacy and effectiveness;
- implement the sustainability plan encouraging continuity after the co-financing by the EU will end.

The exploitation plan was made of several objectives and required a methodology.

The exploitation objectives were:

- To develop a network of researchers and teachers that, working together, would improve, both theoretically and practically, their knowledge and skills about FA.

- To implement and to keep active an e-learning platform that could be used by both teachers and researchers as a video educational document repository, usable and sharable with all colleagues, also in the future.

- To find partners (teachers, researchers and other target groups) who would apply and use the results of the FAMT&L project in their practice.

- To spread the training model of FA in mathematics (in synergy with the use of the platform) to groups of school teachers of the different partner countries (and others).

- To ensure that all the knowledge created and all the practices of formative assessments elaborated within the FAMT&L project would also be used in future

To bring different strategic actions closer together has increased the likelihood of a solid impact for the FAMT&L project outcomes and results. In order to generate the required impact and visibility all activities had to be well coordinated: Thus the exploitation plan ran parallel to the phases of the work program and adjusted itself to the main activity of each phase.

3. Methodology

3.1 The essential steps

- Elaboration of an Agreement of Cooperation with schools

In order to strengthen the relation and collaboration between Universities and Schools for

the application of the teachers' training model, an **Agreement of Cooperation** has been realized and proposed to the schools involved with the project. The agreement set up the basis for the common work on the project.

- Collecting and studying data via questionnaires
To have a significant view of the awareness about FA among teachers and students, we prepared and distributed questionnaires to teachers and students of the cooperating schools. Their analysis confirmed the need of better actions to improve the use of FA in the teaching of Mathematics.

- Short videos and Pilot Courses
Short videos for the exploitation of projects results have been realized, in particular about experiences analyzed in WP2 and WP3 and the activities carried out in WP4.
This is the key action of our project: promoting teaching and learning about FA via video analysis. The training model has been implemented in **Pilot Courses** organized by all the nodes of our projects. Moreover short videos and other materials that are stored in our **web repository** could be used also in the future and can already be used in the process of training future teachers (as university students in mathematics or education).

- Quality check
"**Critical fiends**" have been present in several phases of the work, in order to monitor the project and collaborate to its Quality Plan.

- Briefings with policy and decision-makers in the educational field at the national level
Our consortium has been creating synergies in order to guarantee a successful exploitation of the project's results through briefings with policy and decision-makers and educational agencies at all national levels and integrating FAMT&L's and other institutions' initiatives.

- The Final Conference
The Final Conference of the project, in Bologna, has gathered national agencies, schools, teachers and graduate students; the aim was to have it not only as a mean to illustrate the previous work done, but also to promote a **knowledge network** with participants from many sectors (teachers, trainers, students, professionals, etc.).

3.2 The two dimensions of our activities

The exploitation's events and activities have been based on two dimensions:

1) Horizontal dimension:
Within the FAMT&L network the state-of-the art of the work has been continuously discussed among all project partners (to define priorities, impact criteria and use of the projects achievements in accordance with the project's objectives). The Exploitation Plan and the dissemination activities have been tools to reach relevant stakeholders and stimulate dialogue on the topics addressed in the project.

2) Vertical dimension:
There are scholars at Universities in different countries teaching and researching about

the use of FA in teaching; they have been contacted and invited to a dialogue to ensure continuity in the knowledge of the state of the art for the whole network; in this way new methods and results can be easily exchanged to build up a basin of shared scientific knowledge from which to draw upon information and experiences.

4. Highlights of project's results

The main issue of the project was to promote dissemination of good practices of formative assessment in the teaching of mathematics in low secondary school.

The promotion of a new method of training for teachers is a concrete result which has been pursued mainly through FAMT&L website and network, but also with interviews and articles, seminars and with participation at conferences.

4.1 Publications

In particular, the work of our researchers has produced several publications and presentations (see http://www.famt-l.eu/publications/):

– Paraskevi Michael – Chrysanthou, Athanasios Gagatsis & Ira Vannini. *Formative assessment in mathematics: A theoretical model.* Acta Didactica Universitatis Comenianae Mathematics, issue 14, 2014

- Paraskevi Michael – Chrysanthou *Η διαμορφωτική αξιολόγηση στη διδασκαλία και μάθηση των μαθηματικών* (Formative assessment in Mathematics for teaching and learning) XII Pedagógiai Értékelési Konferencia, 2014

– Laurent Jeannin, Iuliana Rossi, Athanasios Gagatsis, Paraskevi Michael, Ira Vannini, Giorgio Bolondi, Federica Ferretti, Laura Tartufoli, Silvia Sbaragli, Miriam Salvisberg, Rob Velder. *Quelle évaluation formative en mathématique au sein de ces 5 pays : Italie, Chypre, Suisse, Hollande et France : Projet Européen FAMT&L.* ADMEE, 2015 (PPT presentation)

- Federica Ferretti, Stefania Lovece *La valutazione formativa per la didattica della matematica nell'ambito del progetto FAMT&L. Le concezioni degli studenti di scuola media nei confronti degli strumenti di verifica utilizzati in classe*, in Ricerche di Pedagogia e didattica, Vol 10/2015 No. 2, pp.39-68

– Paraskevi Michael – Chrysanthou, Stefania Lovece & Ira Vannini. *Exploring teachers' beliefs on formative assessment in mathematics teaching and learning in Cyprus and Italy* Conference – EAPRL 2015
– Stefania Lovece, Ira Vannini & Paraskevi Michael-Chrysanthou. *Methodologies and tools for the video analysis of formative assessment practices in classroom (with students aged from 11 to 16)* Conference – EAPRL 2015

– Giorgio Bolondi, Federica Ferretti, Stefania Lovece and Ira Vannini (University of Bologna), Elena Franchini, Miriam Salvisberg and Silvia Sbaragli (DFA-SUPSI of Locarno) *The formative assessment in mathematics education. First results of an international*

project. National Conference "Encounters with Mathematics n. 29", Castel San Pietro Terme, Bologna (6-7-8 November 2015)

– Bolondi, G., Ferretti, F., Gimigliano, A.; Lovece, S.; Vannini, I. *The Use of Videos in the Training of Math Teachers: Formative Assessment in Math Teaching and Learning*, in: Integrating video into pre-service and in-service teacher training, Hershey PA, IGI Global, in corso di stampa, pp. 128 – 145

– Vannini, I., *La Valutazione Formativa in classe: formare la professionalità degli insegnanti di matematica attraverso la videoanalisi. Un percorso di ricerca all'interno di un progetto internazionale.* Presentation at International conference: "Video digitali e formazione egli insegnanti". Cagliari (Italy) 1 luglio 2016.

– Lovece, S. *The use of video in a teacher training course to promote the correct use of formative assessment for improving Mathematics teaching and learning*, in: Educating the Best Teachers: a Challenge for Teacher Education Proceedings of the 41st Annual ATEE Conference, Brussels, Belgium, ATEE (Association for Teacher Education in Europe) 2106, pp. 106 – 114.

– Gagatsis, A., Michael – Chrysanthou, P., Christodoulou, T., & Elia, I. (2016). *Formative Assessment in The Teaching And Learning of Mathematics in Cyprus*. Nicosia: University of Cyprus.

– Dozio, E., Franchini, E., Salvisberg, M., & Sbaragli, S. (2015). *Le convinzioni di docenti e studenti sulla valutazione formativa in matematica.* Scuola ticinese. 3, 27-30.

– Laurent, J., Salvisberg, M., Vannini, I., Sbaragli, S. *Méthodologies et outils pour l'analyse vidéo de pratiques d'évaluation formative en classe. Un projet de recherche internationale*, ADMEE, 2016, Lisbone.

– Michael-Chrysanthou, P., Christodoulou, T., Elia, I., & Gagatsis, A. (2016). *Multiple semiotic means in the use of formative assessment in secondary school mathematics*. La matematica e la sua didattica. 24(1-2), 125-144.

4.2 Participations in conferences and meetings:

Researcher from our network participated to the following meetings:

- XII Pedagógiai Értékelési Konferencia – 2014 Paraskevi Michael – Chrysanthou. *Η διαμορφωτική αξιολόγηση στη διδασκαλία και μάθηση των μαθηματικών* (Formative assessment in Mathematics for teaching and learning)

- EAPRIL 2014 (Paraskevi Michael – Chrysanthou, Athanasios Gagatsis ***Students' beliefs for formative assessment in Mathematics teaching and Learning***

- ADMEE, 2015 (Laurent Jeannin, Iuliana Rossi, Athanasios Gagatsis, Paraskevi Michael, Ira Vannini, Giorgio Bolondi, Federica Ferretti, Laura Tartufoli, Silvia Sbaragli, Miriam Salvisberg, Rob Velder). ***Quelle évaluation formative en mathématique au sein de ces 5***

pays : Italie,Chypre, Suisse, Hollande et France : Projet Européen FAMT&L.

- National Conference "Encounters with Mathematics n. 29". Castel San Pietro Terme, Bologna (6-7-8 November 2015).

The following meetings were essential steps of our project:

- Project meeting in France, (September 2014). Discussions about how to conduct the analysis of videos. Decisions about the grid for analysis, web platform.

- Project meeting in Holland, (February 2015). Definition of the grid for the video analysis and study of data from questionnaires.

- Project meeting in Cyprus, (September 2015). Conclusion of analysis of data from questionnaires, summary of the results and discussion about the use of them for designing our training courses. Presentation of next phases of the Project and outstanding issue.

- Project meeting in Switzerland (April 2016); with the presence of academic and scientific experts as *critical friends* and for the evaluation of the state of the art of activities and preparation of the Europe Final International conference.

- Final Conference,in Italy; it was the occasion to present the final results, create new opportunities for exchanging ideas and experiences and decide about the future of what has been realized.

Notice that every event (conference, seminars, meetings, etc.) organized within the project has been reported on our site (http://www.famt-l.eu).

4.2 Activities towards key stakeholders

The SUPSI (Switzerland) activities.

Collaboration with DECS (Dipartimento educazione cultura e sport), which has also co-funded some FAMT&L activities).
Meetings with Experts in mathematics for middle schools from DECS to explain the project.
Meetings with responsible and colleagues for training in DFA /SUPSI to explain the project and find solutions to make a pilot training course for future teachers.

The UCY (Cyprus) activities

During the project's realization the group has contacted several national agencies.
-The University of Cyprus (UCY), where students and professors have been informed about the actions (i.e. organization of a seminar about formative assessment and the FAMT&L project) of the project. In the UCY there are different faculties that deal with formative assessment and cooperation with them have promoted more the FAMT&L project.
- Cyprus Mathematical Society (CMS) is another agency which promoted the FAMT&L competition and the training courses. Through the CMS a 2 hours Symposium has been

organized about the aim and the actions of the project and it was held within the actions of the 18th Cyprus Conference on Mathematics Education and Science. The purpose of this Symposium was to promote our training model and invite teachers to participate.
- Olympion Private School Cyprus is another agency, where the actions of the project were presented and the training model was promoted.
- Cyprus Pedagogical Association (CPA) is probably the oldest Pancyprian pedagogical research association. As part of its activities CPA organizes a biannual conference in order to provide opportunities to researchers, students and educators in Cyprus to present their educational research work. With this organization the FAMT&L actions and some of the questionnaires' results has been published in a conference and the collaboration will continue by publications with this organization and in its website.
- The Cooperation with the Ministry of Education (inspectors of Mathematics) has also given to the group access in schools where the FAMT&L project, its objectives and its results has been promoted, focusing on the training model (and this activity is still going on).
- Cooperation with Greek Universities, mainly with the National and Kapodistrian University of Athens. The group has organized and still will organize seminars in Greece, in which the actions of the project and its results can be presented.
- The Hellenic Mathematical Society (HMS) is a learned society which promotes the study of mathematics in Greece. This agency organizes an annual conference in order to provide opportunities to researchers, students and educators to present their educational research work. With this organization we have published materials about the FAMT&L actions and some of the questionnaires' results and we aim to continue the publications with this organization and in its website.
- Cooperation with Greek Universities, especially with the 'National and Kapodistrian University of Athens', the 'University of Rhode Island' (Department of Education and Mathematics-professor Avgerinos Evgenios) and the 'University of Macedonia' (Thessaloniki-teacher Anastasiadou Sofia). We will continue to organize seminars in Greece, in which the actions of the project and its results will be presented.

The UNIBO (Italy) activities

In the years of the project we had many contacts with several kind of possible stake-holders: schools, researchers, institutions, publishing houses. The interest about the outcomes of our project has been high, and we have worked and still are working to seek collaborations with regard to two objectives:

1. to keep the web repository active, to enlarge its contents (videos and video analysis) and to give it a new institutional position.
2. to continue the research about the effectiveness of our model of formation via video-analysis (to check its influence in changing evaluation practices and ideas).

As for point 1), Unibo is working to make the sustainability of the repository possible and is exploring the ways for a collaboration with several agents:
- UNIBO itself (find funds and personnel to manage the web repository);
- INDIRE (National Institute for Documentation, Innovation and Educational Research), the first research agency of the Italian Cabinet of Education which has shown interest to be involved in keeping and using the web repository;

- Publishing houses which have a sector dedicated to teachers' formation. Such actors could be involved in the publication of manuals for video analysis based on the materials of our web repository and (maybe) keep samples of it in their websites.
Our aim is to guarantee that in the future our web repository will be hosted on a platform which is adequate for teachers formation and such that its use for training activities will kept and developed.

As for point 2), contacts, exchanges and agreements are on going with several actors to keep a research network active and developing.

The UCP (France) activities

1. Collaboration with the Department of Education, exspecially for the organization of formal and informal meeting with researchers and teachers. Cooperation also with some professors and researchers of Mathematics Education which provide a scientific supervision of the use of tool and techniques of formative assessment in mathematics.

2. Contact and exchanges with several school and, in particular, with mathematics teachers to explain the project and to delineate teachers' formative needs.

3. Cooperation with the Ministry of Education (inspectors of Mathematics) to collaborate for FAMT&L Project achievement objectives and its exploitation.

The inHolland (Nederland) activities

The following table describes the contacts and activities of the inHolland group.

NAME OF AGENCIES	DESCRIPTION
Beta-partners	Network meetings with other universities and High Schools with purpose: • Exchange knowledge • In-service training • Think-tank
SLO, VO-raad, Plexs	SLO: supporting organization for schools for development of curriculum design. VO-raad: council for high school boards PLEXS: council for examination Starting as a think-tank (initiated by ministry of education) to research current use of formative assessment and how to organize professionalization of school boards, examination-administration and teachers So, actually three agencies, working both together and also apart on this subject
Schoolinfo	Supports schools in implementing strategies for differentiated and personalized learning in a network of various partners.

	Organizes conferences, seminars and develops in-service training in professional learning communities.
Ministerie van Onderwijs	Ministry of Education, working with the project group on formative assessment.
Samenwerking Amsterdamse Lerarenopleidingen SAL)	Cooperation between the Institutes for Teacher Education (SAL): University of Amsterdam, Free University, InHolland University of Applied sciences, Amsterdam University of Applied sciences, IPABO Teacher Training College.
ADEF Assessment	General Consultation between Directories of Educational Faculties.

Table 1: InHolland activities.

4.3 Development of strategies

To keep the project results active and exploit its success by all participants and the network of their associated researcher and institutions, the following strategic tools have been planned and implemented:

- Formation of a Scientific Committee with participants from each of the nodes to keep track of the activities related to the repository (request of access, both individual and from agencies) and to set up rules for the use of the video material also in future.
- Signing of an agreement among the groups that made the project in order to ensure continuity to the research and development work.
- Elaboration of a Costs Plan, to maintain the repository active and to develop it.
- Contact educational agencies in each country to involve them in the project.
- Contact private operators to involve them in the project (mainly publishing houses).

5. Benefits of exploitation

To ensure that the knowledge created within the FAMT&L project will also be used in future is one of the aims of the exploitation. The expected benefits of the exploitation can be various:

5.1 Scientific exploitation

The project's results have been made known to scholars who do research in the field, the collected information and database of the project results are being disseminated in conferences, workshops, panel discussions and scientific publications. Furthermore, the results have been integrated into courses taught at universities.

Dissemination of innovative educational approaches

The FAMT&L project's results in their entirety have been and still will be published and disseminated by the FAMT&L website, newspaper articles, scientific journals, focused events, workshops and conferences, in particular by publicizing the platform with video materials and innovative models of teacher training.

5.2 Planning and outcomes

The following table gives an overview of the project planning and its outcomes:

Outcome	Target group	Objectives	Indicators for measurement of success
Exploitation Plan (Planning Document)	Partners	To keep track of the state of the art of our work and to exchange info.	At least one person for each node has been involved in the on-going draft of the document..
Agreement of co--operation with schools	Partners and stakeholders	Have a standard frame of work for cooperation with schools for all our nodes.	Number of schools for the associated partners: 5 Italy, 2 Cyprus, 1 France, 2 Switzerland, 2 Netherlands
Short videos (Videos)	Partners and stakeholders	Use as main tool for the elaboration of training strategies for FA. Gathered in our repository.	Number of videos: 126. UNIBO (90) - UCY (16) - SUPSI (11)- UCP (9) Many students and teachers involved.
Briefings with policy and decision makers, educational agency and operators at national level (exploitation events)	Partners and stakeholders	Spread awareness about FA and its relevance; improve funding possibilities and spaces for training.	See section 4.2
Training meetings with teachers	Partners and stakeholders	Pilot courses have been the main tool to introduce teachers to video analysis as a mean to improve their use of FA techniques,	Pilot courses for teachers have been hold by the members of the project with different formats (6 to 30 hours modules, more than 70 teachers involved). They have been successful, as proven by the results of the relative questionnaires.
Seminars about FA and the project.	Partners and stakeholders	Introduce teachers and university students to FA and results of the project.	Several seminars with good number of participants (university researchers and students, in service and pre-service teachers).

Table 2: Exploitation outcomes

6. Sustainability

It is part of the ambition of the *FAMT&L* project to make a stable contribution to the

development of strategies that enhance the use, awareness and development of FA in the teaching of mathematics.
One of the main goals of the project is keeping and enlarging our **web repository** that should be one of the reference points in Europe for the use of videos in FA training. The project members should also aim at creating a sustainable network and at writing state of the art reports, to facilitate the circulation of information.
Other activities can be implemented on an "as needed" basis, but at least the basic function as "observer" and "knowledge hub", should be safeguarded and made sustainable also after M36 of the project.
Unibo is working to make the sustainability of the repository possible; what is mainly needed is to have a good maintenance of the repository, to elaborate good rules and means for the access to the materials, to allow development processes.
For these objectives, the FAMT&L project's staff has elaborated an agreement for the adequate use of the repository in the five countries which has been undersigned by the project's groups; such an agreement will provide a constant scientific supervision of this tool and a coherent use of it for the formation of teachers about formative assessment.
At present, the repository is intensively used for training courses for in-service teachers and for university courses for future teachers. Actually, University students in Mathematics and Education, as future teachers, are a particularly relevant target group for our action.

The other main objective of the project was to keep a **research network** active and developing, via contacts, exchanges and agreements with several actors.
The following subjects have been involved:
- The research group in "didattica della matematica" at the University of Turin,
- the international web WiTEC,
- INVALSI (National Institute for the Educational Evaluation of Instruction and Training).
- University of South Australia (research group in the teaching of Mathematics).
- An international research group named *Video 4 teachers* , which, also following our work, has been formed at the University of Cagliari (see (http://sites.unica.it/video4teachers