

Deliverable 3.3 Second annual report

In WP3 Implementation, WP leader P4, MLU, Germany

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Corrections by the consortium members until Dec. 16th, 2014

Language corrections by our English partner: Dec. 16th, 2014

Final version: Jan. 15th, 2015

Text of the proposal:

This report will be based on the work in the national groups and will inform on the current state of the art of educational innovation in the partner regions. It will also present comparative case studies on methods for exploiting project results as suggested by the different countries.

The first version will be given to an external expert and school partners in month 21. It will be reviewed by the end of month 22 and then optimised. The final version will be ready in month 24 and then translated as necessary.

1. Introduction

The aim of this report is to provide the public with an overview of the ways that improved teaching methods are implemented in STEM teaching in the partner countries.

Delegations of the national groups met at the second INSTEM conference in Halle, Germany, held on March 25-27th, 2014. The results of the national conferences were presented with posters; the main topics were debated in a plenary and World Café discussions. The results are available for the group members in a shared data-base. A report on the conference is available at this link: <http://instem.tibs.at/content/2nd-instem-conference>

2. Current state of the art of educational innovation in the partner regions

The national meetings took place between October 2013 and February 2014. They were organised by the INSTEM partner organisations and took place at universities, professional development centres or administrative buildings. They were attended by 12-70 persons each. Attendants came from a variety of backgrounds: teachers, teacher educators, teacher education researchers, school administrators, students, parents and people working in the private sector.

The main results were:

Overall:

1. Collaboration is demanded by all stakeholders.
2. The concept of IBSE/IBL is not clear throughout the partner regions.
3. European programmes are somehow “far away” from classroom practice and everyday teaching.

Teachers:

1. Teachers feel isolated when faced with implementing innovative teaching methods.
2. The results of European programmes are not easy to get: on the one hand it can feel like there is too much information, whilst on the other hand the information is not designed for easy use in the classroom.
3. Teachers’ voice has no well-defined way of influencing ‘Science Education’.
4. In many national meetings the struggle with assessment is an important issue.

Researchers / Administration / Teacher Educators:

1. National meetings did not raise many issues for these people. They did share concerns about (too) limited resources, problems with assessment and the demand for better STEM teaching.

Stakeholders from industry, media, universities and parents:

1. Only one national meeting had industrial representatives, parents and students present.
2. The demands/suggestions of these groups seem to be very diverse
3. These groups have no clear impression of what IBL is.

Every meeting searched for strategies to implement innovation into STEM teaching and learning. The Norwegian meeting explicitly asked the question, ‘how much we could learn from all the European projects’.

Nearly every meeting addressed the need for support, either from administration / school leadership, from the schools themselves or financially.

All teachers would prefer a strong link of IBL to the curriculum. In some cases, like Turkey with its newly implemented curriculum, it is nearly impossible to change the way of teaching as the curriculum is so proscriptive.

In all meetings assessment was addressed. It was a threat to innovation in England and Ireland, because more open IBL-teaching requires more open ended assessment tools. These are not implemented yet. There is a priority to find improvements in assessment tools.

3. Theoretical background: A short overview on effective implementation strategies in schools referring to academic papers

“To make change in education happen, three different strategies are essential:

1. The strategies of decision makers – they are the basis for important change in social systems. ‘Convincing the decision makers’ will be the key to beginning the process of change.
2. Rational-empirical strategies suppose people can be convinced by objective information and insights to certain situations, issues and relationships. These insights convince them on a rational level of the importance of change.
3. Normative-reductive strategies are focused on persons and organisations. They count on the effect of any change in attitude, norms, skills and social effects. These changes must be organised in conjunction with a change to the organisation itself.”

(Holtappels, p.46-47, translated by M. Lindner, original text see in Appendix III).

To be effective a combination of all three approaches is needed: the implementation of new standards and state assessments on the one side, higher autonomy of the schools on the other side and model programmes to support new developments. As far as results have shown, implementing a top-down strategy alone did not have results, even when aiming to change (parts of) the system only.

Innovation faces four major restrictions:

1. Barriers of values, when the actors prefer different values from those who intend to change something.
2. Barriers of power/influence, when the innovation is going to change the existing structure of power/influence.
3. Uncertainty of resources and expected outcomes.
4. Individual disposition of the actors: fear of incapability, of loss of routines, of uncertainty about their own skills.

These factors – combined with the complexity of the everyday classroom work and the school organisation, which is shared among all actors – makes it senseless to address one single teacher as an agent of change. The analysis implicates that all, or at least most, actors in a school should be included in any change process. An effective implementation could only be

planned and carried out by the whole school, or at least crucial parts of it. We know, e.g. that school leadership is required in order for successful implementation of innovation (Holtappels 2012).

Hall (1979) and Loucks & Hall (1979) have already pointed out, that innovation is on an individual level a process with various steps. These steps are more or less clearly identified and include an initial interest - after some time of fear of being unable to manage the process - with increasing expertise the wish to seek collaboration and after reaching certainty the will to further develop the whole concept. To undergo these “stages” takes time, and very often it takes more than 2 or 3 years. This makes it so important to give enough time for innovation in schools. Unfulfilled expectations create frustrations on both sides, on the side of the innovators as well as on the side of the actors and might then be a hindrance to new approaches.

Since Fullan’s papers on Educational Change (1982, 1991) we know that an effective implementation of innovation into schools needs to target the culture of the school. Schools are self-reflecting systems; they are reflecting their everyday work on their own. Innovation can only influence such systems, when the system or important parts of it believe in or are convinced of the success of that particular innovation. If a school is cultivating innovative work, it is obviously much easier to implement new ways of teaching. This could be fostered by internal and external motivation (pressure and attraction), but it has to target the reflective processes of the actors. This means innovative schools provide a forum to discuss innovation. This could be organised in Professional Learning Communities (Hall & Hord 2001, Seashore et al. 1995, Leithwood 2000, see also Annex II).

4. Analysis of the national workshops

Applying these more theoretical factors to the results of the national workshops, we could frequently see a match between these factors and the questions mentioned by the participants of the national workshops.

The lack of support is in many cases the result of a mismatch between the innovative pressure of any administration, of any science researcher or of any innovative idea and the day to day demands of life in a school. This reality is usually filled with routine activities and does not provide time for innovation. Most partner schools are yet to implement a culture of innovation. This makes it likely that the teachers in our national workshops may suffer from a lack of support when attempting to introduce new ways of working.

On the level of administrators joining our national workshops a lack of decision making/influence may be apparent. The meetings in Ankara (Turkey) and Dublin (Ireland) were attended by secretaries of state, so the people with administrative power were on a quite “high” level. In the case of Ireland, where also members of the board responsible for the national assessments attended the meeting, it is quite likely that changes to place IBSE into the curriculum will occur. Unfortunately in Turkey the curriculum had recently changed to a more backward orientated way of teaching science.

The results of the Austrian workshop very much support the wish to collaborate among teachers at school, in professional groups, professional development training and on internet discussion groups. They also raised the suggestion of a more realistic time frame to introduce IBSE teaching.

The Italian workshop addressed the lack of impact of European projects. The participants see a lack of coherence between the programmes and a lack of exchange of results, as well as a lack of evaluation. They also recommend the results being integrated into teachers personal development. In order to get an effective implementation strategy a twofold-method was suggested: collaboration between external experts and teachers in the classroom and self-reflection of teachers with those people working outside the classroom. A negative fact that teachers pointed out, was that the link between administration and school is not based on communication that informs and improves teaching, but rather creates difficulties for the implementation of new teaching approaches. To foster a renewed classroom practice the collaboration with external partners was recommended.

In the Norwegian workshop all topics mentioned in chapter 3 were addressed. It was – like in Italy – underlined, that European projects generate important knowledge, but only a few people profited from the results. A way to spread the knowledge could be the training of teacher trainers who then will be responsible to support life-long-learning of teachers.

The Greek teachers raised the same questions on IBSE, resources and usability of European projects as the other teachers. Their special demand was on material in Greek, deposited in a repository. Another way to inform teachers could be via the printing of posters. Beside the resources there is also a demand for some autonomy to adapt the material to the classroom. The Romanian teachers put forward remarkably similar points.

Two workshops were run in England. The first was primarily focused on stakeholders and those with political influence, and the second focused more on engagement with teachers and students. Teachers and students were keen to engage with IBL in STEM, and those who had explored IBSE approaches were very positive, but felt that for approaches to be successful, some structure and guidance is needed and the importance of positive teacher-student relationships was highlighted. However, the constraints of curriculum content and assessment processes remained areas of concern for implementation of the exciting IBSE ideas shared in the workshops. In England the idea of peer learning was mentioned: the guidance of a more experienced teacher for a newcomer. This could be also done as peer learning in the same age group.

The German workshop highlighted the importance of a network in STEM teaching. This network is also responsible to enlarge the influence into the school administration, but also to support the members by applying for external funds.

The Irish national meeting brought together a wide network of stakeholders including students, parents, teachers and teacher educators as well as the Minister of Education and Skills and leading representatives from industry. The key message from this meeting was that effective communication strategies need to be adopted to engage all of the stakeholders/stakeholder networks to support innovation in STEM.

In particular for effective communication with teachers:

- Resources need to be clear, succinct and easy to follow
- Resources need to be adapted to suit the local curriculum
- Workshops should be hosted and information provided on how project resources should be used.

This highlights that the outcomes of European project need to be distilled into useable, relevant and concise pieces of information and shared through existing teacher and other national networks to maximise dissemination and valorisation of project results.

In the case of the Romanian five national workshops the diversity of participants was quite high: preschool and kindergarten educators, primary school teachers, middle school Physics and Chemistry teachers, high school teachers (Physics), teachers from vocational schools (Mechanics, Electric/ Electronic), school inspectors in charge with private education, school and kindergarten managers, school inspectors for Physics and Chemistry, guests from foreign countries.

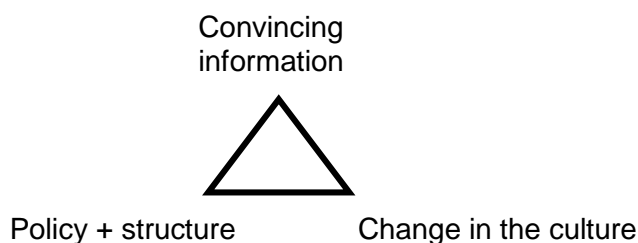
These participants were concerned about...

- the opportunities offered by the participation to European projects in the context of their limited skills to foreign languages
- their questions and doubts about the way inquiry teaching methods have to be implemented in the classroom as far as inquiry is not part of the Romanian science curriculum
- their interest to make the science teaching more attractive to students
 - a better knowledge of science related pedagogy
 - assistance in preparing and running projects
 - knowledge of the scientific content and good management of students during group work
 - understanding the way IBT can be applied to various subjects
 - participation to practical technical sessions
 - by involving them in various applied projects
 - organising group work
 - by organising science contests
- lack in financial resources to support IBTL

They showed interest in the development of a national network of practice.

5. Overall recommendation

The implementation of change in an educational system in a sustainable way needs three dimensions



To implement change, actors first of all have to be aware of these dimensions. The single teacher is overwhelmed by a lack of collaboration, or by the “glass ceiling” if administration does not wish to support their activities. Evidence is most convincing, when relayed face to face. I would recommend any web-deposits are more effective as an information source as long as the future users are introduced to it by someone they know. And, change culture in organisation (school, teacher education, school administration) is not thinkable without learning communities.

All these factors are process-orientated, which means that implementation takes time. Change processes are not available in a shorter time than 3-5 years. Sustainable strategies will take this into account. Change processes need – beside the time – a place where they can be organised and this means, a place in the weekly schedule of a school or regular meetings in any other organisation (administration, professional development organisation) and a room for meetings. Of course, financial support is crucial to support meetings, travel and other material resources.

Appendix I

Data on national workshops

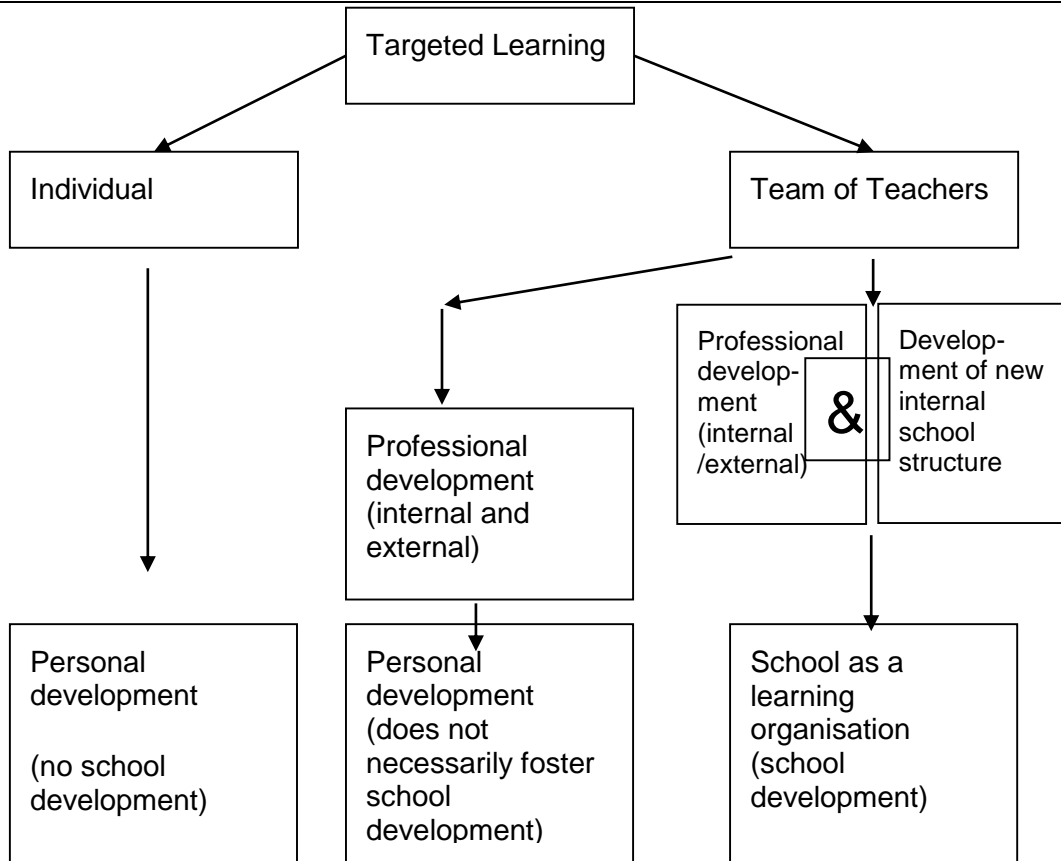
No.	Short name	Country	Place	Date (dd/mm/yy)	Participants	T	TE	SA	PM	O
P2	NTNU	Norway	Univ. Trondheim	20/01/14	25	2	18	4	1	
P3	LFU	Austria	Technical Museum, Vienna	12/11/13	16	7	5		4	
P4	MLU	Germany	Univ. Halle	22/11/13	59	29	17	1	12	
P5	UOL	England	Royal Soc. Chem. London	01/10/13						
P6	UNINA	Italy	Naples	12/12/13	14	6	6	1	1	
P7	DCU	Ireland	Dep. of Education and Skills, Dublin	13/11/13	40	5	9	1	5	20 1)
P8	UNIEXE	England	Univ. Exeter	11/11/13	20	5	6		3	6 students
P9	HUT	Turkey	Ankara	22/11/13	17	4	8	2	3	
P10	INFLPR	Romania	5 locations	Nov.-Dec.13	130	109	6	10	5	2)
P11	FORTH	Greece	Vamos High school (western Crete)	04/12/13	38	35			3	
			Heraklion	11/01/14	29	26			3	

T Teacher	TE Teacher educator/researcher	SA School administration	PM Program manager	O Others as explained by 1) and 2)
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- 1) plus Teacher Union, Industry, Parents, Students
- 2) Kindergarten-Teams, Teachers of all levels

Appendix II

Model for effective implementation



Translated from: Höfer, C. (2006). Unterrichtsentwicklung als Schulentwicklung. In H. Buchen & H.-G. Rolff (Hrsg.), Professionswissen.- Schulleitung (752-788).

Appendix III

Citation of the translated text

“Für den Wandel von Bildungsinstitutionen können im Wesentlichen drei Strategien des Wandels (vgl. Chin und Benne 1969; Dalin 1986, S. 24 ff.; Türk 1989) unterschieden werden:

- Machtstrategien gehen davon aus, dass Macht und Zwangsmittel Grundlage für bedeutsame Veränderungen in sozialen Systemen sind.
- Rational-empirische Strategien unterstellen, dass sich Menschen von objektiven Informationen und Erkenntnissen über bestimmte Situationen, Sachverhalte und Zusammenhänge rational für die Notwendigkeit von Veränderungen überzeugen lassen.
- Normativ-reedukative Strategien sind personen- und organisationsbezogen; sie setzen auf die Wirkung einer Änderung von Haltungen, Normen, Relationen und Fertigkeiten, müssen aber freilich einher gehen mit organisationsbezogenen Änderungen in der Organisation selbst.“

(Holtappels, p.46-47)

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