

## **Core Research Area: *Improve Formal Practices of Education***

Research project proposals produced by the experts of the 4<sup>th</sup> STELLAR Delphi round

### **207. Improve Practices of Formal Education**

**Group: Researcher**

#### **Project title**

How to develop more subject-relevant pedagogy?

#### **Project description**

1. Why a subject is difficult to learn?
2. What are the factors that affect student learning difficulties of the subject?
3. how to address student learning difficulties with the use of technologies?

#### **Project partners**

researchers in the areas of the learning sciences, subject experts, and practitioners

#### **Project justification**

After all, students are learning by school subjects

### **208. Improve Practices of Formal Education**

**Group: Researcher**

#### **Project title**

coherence of the use of ICT in science education

#### **Project description**

The aim of the project is to establish the main conditions for a meaningful integration of ICT devices in science teaching. The kinds of conditions can be different: epistemological, representational, motivational, linked to the teacher. The coherence of the evaluation procedures with an ICT-based teaching could also be investigated.

#### **Project partners**

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#### **Project justification**

A constant outcome of research about the use of ICT is that it is very often separated from the other parts and procedures of teaching. I consider it weakens the interest of using ICT in science classrooms. Important expenses are made by the society to allow schools to use computers in teaching, and a large part of the potentialities are underused through this lack of integration.

### **209. Improve Practices of Formal Education**

**Group: Researcher**

#### **Project title**

Best practices for the use of TEL

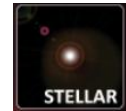
#### **Project description**

- Which scenarios, methods and technologies do actually work?
- What are the context factors that make a specific best practice a success?
- How to disseminate best practices to educators?
- How to adapt general best practices to the specific needs of a situation?

#### **Project partners**

Knowledge Media Research Center, Tuebingen  
London Knowledge Lab  
Catholic University Eichstaett  
University of Piraeus  
University of Applied Sciences Utrecht

**STELLAR Delphi Study - research project proposals by the experts of the 4<sup>th</sup> STELLAR Delphi round for the Core Research Area *Improve Practices of Formal Education***



## **Project justification**

TEL offers a vast number of new pedagogical scenarios and methods, particularly in combination with social media (e.g. the sorting of brainstorming items collected via Twitter, content sharing, distribution of work results), digital resources and software tools (e.g. podcast production, video analysis, interactive presentation). However, not everything that can be done technically is pedagogical sound as well. This research therefore looks for the opportunities and the limitations in order to show how digital tools integrate smoothly into educational settings that foster individual and collaborative learning. In the evolution of classrooms digital tools play a significant role in engaging students, sharing ideas, exploring concepts, experimentation, and applying agile teaching methods. To embed new ways of learning and teaching appropriately in everyday teaching, tools have to be flexible to adapt to the particular needs of an educational context. Therefore, e-learning patterns seem to be an adequate approach to capture good practices because patterns do not only describe the proven solutions but the appropriate contexts as well. A pattern explicitly shows the added value as well as the limitations, i.e. to which contexts the solution fits. Furthermore, patterns explain why a certain practice or method works in terms of forces. The understanding of forces, i.e. what has led to a specific solution, helps to implement and adjust successful learning designs to new situations. Building on past experiences and sharing the knowledge of good practice avoids reinventing the wheel. Generalizing from single best practices empirically observed in the classroom, patterns describe the invariant of successful solutions without losing the flexibility. To make the evolution of the classroom a success, obstacles and their handling need to be explored as well as the skills required.

## **210. Improve Practices of Formal Education**

**Group: Researcher**

### **Project title**

Using games to learn the hard school stuff

### **Project description**

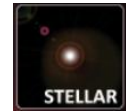
Games have a lot of great properties for learning, but nobody has done a great job of using them to teach or assess hard school topics that have indisputable importance (e.g., algebra). We will do so, which will change the face of education forever. How will we do this, what theories will we prove, and how will we prove the theories and value? Guess, you'll get to read about it in a journal article some day.

### **Project partners**

Professional graphics designers, consultation to game designers, partners who can make a business plan so it does not end up as yet another government "starter" project that disappears when the funding ends. (Going to scale requires continual maintenance of code, servers, etc. There needs to be a business plan early on.

### **Project justification**

Games are fun, interactive, and collect copious amounts of data. If they can succeed at teaching hard things and assessing processes of learning, then we will have made great headway in improving education. Doing it well will require a good deal of money.



**211. Improve Practices of Formal Education**

**Group: Researcher**

**Project title**

Teaching Algebra to Capitalize on Basic Brain Function

**Project description**

How can teaching algebra, or maths courses in general, use basic brain function to maximize long-term memory with recall and understanding?

A solution to the major problem of students not being able to recall or understand mathematics taught (many times after a somewhat short period and most certainly after one or two years), as confirmed by the vast amount of remediation that is prevalent in many countries, is for the curriculum and pedagogy to utilize basic brain processes such as associations, visualizations, meaning, and pattern generalizing.

**Project partners**

None, as I am now retired, but I could likely find a college or university to participate.

**Project justification**

Maths remediation rates in the USA are 60% of high school graduates entering a two-year college program, and about 25% of high school graduates entering a four-year college program.

**212. Improve Practices of Formal Education**

**Group: Researcher**

**Project title**

How to improve the alignment between teaching and assessment: Political, societal, educational and technological challenges

**Project description**

That's a time consuming task; please understand that I can't answer this question in a questionnaire which should last not more than half an hour

**Project partners**

partners should be researchers from different disciplines mentioned in the title

**Project justification**

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**213. Improve Practices of Formal Education**

**Group: Researcher**

**Project title**

The effects of technology on deep focused learning processes in classroom practises

**Project description**

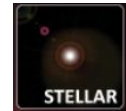
Do technology make us smarter? Or are there other means of learning that are superior to technology?

**Project partners**

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**Project justification**

We see the beginning of a knowledge divide between east and west in the east's favour (PISA test also done in Shanghai). Is the answer to this challenge more technology or more of something else?



#### **214. Improve Practices of Formal Education**

**Group: Researcher**

##### **Project title**

Technology to support vocational education students

##### **Project description**

The project relates to three key challenges in vocational education and training (VET): early school leaving, the need for enhanced cooperation between vocational training and the trade branches, and the need to strengthen students' skills in areas that the trade needs. To meet these challenges the project will propose a research design where information and communication technologies (ICTs) play a key role.

How can information and communication technologies be used in innovative ways to connect vocational educational activities and work practice?

How do students in vocational education construct understanding at school and in their work internship?

##### **Project partners**

Three vocational colleges (teachers and students), Trade and union representatives

##### **Project justification**

Early school leaving is a major problem and there are few studies focusing on the actual learning activities - this is also true for studies about the use of ICT

#### **215. Improve Practices of Formal Education**

**Group: Researcher**

##### **Project title**

The use of educational technology by 'non-technical' teachers in higher education: how can it be done

##### **Project description**

Until 2020 I would like to look at some technologies that have been developed far enough to be easily usable (e.g. concept mapping, web lectures, electronic voting) by university teachers who are not experts in educational technology, and investigate how they can be used and what their effects are in real practice. I would like to perform research that not only shows that there is an effect, but which also gives practitioners advice on when in which circumstances to choose which technology for which purpose.

##### **Project partners**

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##### **Project justification**

This research is important in closing the gap between educational research and educational practice. It is also scientifically relevant, as it provides results that cannot be obtained in another way. Finally, the research will be important for the further development of research methods in practice-based educational research, especially it will contribute to finding ways to combine quantitative and qualitative research.

#### **216. Improve Practices of Formal Education**

**Group: Researcher**

##### **Project title**

Creating flexible learning environments

##### **Project description**

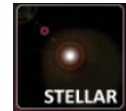
What factors influence effective and efficient flexibilisation of learning?

##### **Project partners**

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##### **Project justification**

Educationally relevant



## **217. Improve Practices of Formal Education**

**Group: Researcher**

### **Project title**

Digital technology and classroom teaching strategies

### **Project description**

How do teachers over time develop successful strategies for applying advanced software during classroom work?

What working procedures and rules of classroom engagement do emerge in the classroom when applying advanced digital technology?

How do teachers and students make sense of advanced digital technology in terms of learning about a given school subject?

How do teachers and students define digital technology into formal working procedures and learning goals?

How do teachers adapt and adjust centrally defined curricular goals on technology use to local classroom challenges and conditions?

### **Project partners**

The ideal project is multinational involving several highly competent research partners allowing wide ranging comparative research. University of Bristol, Grenoble and University of Gothenburg as well as London Knowledge Lab are very competent and interesting research partners.

### **Project justification**

The above stated focus emphasizes the competence of applying technology in practical teaching. It will, at least in my dreams, develop a more systematic knowledge basis on the uses of technology and their impact on student engagement and learning in the classroom which today is more or less based on individual teacher's intuitive assumptions about what works or not in the classroom.

## **218. Improve Practices of Formal Education**

**Group: Researcher**

### **Project title**

Mobile learning in higher education

### **Project description**

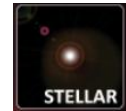
How mobile TEL impact on physical space needs in higher education?

### **Project partners**

UNSW

### **Project justification**

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## **219. Improve Practices of Formal Education**

**Group: Researcher**

### **Project title**

The challenges of a globalised education.

### **Project description**

What happens in formal education nowadays is increasingly shaped by global forces and pressures. Supra-national organisations like the OECD, UNESCO and the World Bank, as well as powerful conglomerates like Microsoft and Cisco, are actively attempting to influence national policies and school-based teaching and learning practices. International surveys and assessments like PISA are now established benchmarks against which the quality of an education system is judged. More and more policy makers around the world acknowledge the importance of such international comparisons and this is reflected in new or updated priorities indirectly being passed on to schools and teachers. So far, the national and international debate has concentrated on policy decisions. What is missing is an insight into the implications that such dramatic changes have for schools at a local level. How are individual schools (head-teachers, teachers and students) as well as the communities surrounding schools (parents and other stakeholders) coping with such influences? How could we help schools develop awareness and identify strategies that allow them to successfully negotiate, at a local and practical level, the needs and the pressures of an increasingly globalised education? How could we use technology creatively to help teachers and students critically understand, adapt to or possibly resist such influences?

### **Project partners**

Institute of Education - London

### **Project justification**

Great societal relevance. Resonating with real, dramatic shifts which are already unfolding.

## **220. Improve Practices of Formal Education**

**Group: Researcher**

### **Project title**

Digital fabrication in mathematics and science education

### **Project description**

In what ways does implementation of engineering standards in the existing mathematics and science curriculum promote student engagement, innovative thinking and improved dispositions toward science and mathematics?

### **Project partners**

State University

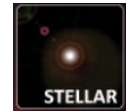
Digital Fabrication company

City School District

Software developer

### **Project justification**

Students learn by doing, yet there is little evidence that this actually takes place in schools, especially in science and math. Students are expected to learn mathematics and science principles, yet there are few, if any, opportunities for them to apply these principles in authentic and tangible ways. Digital fabrication, the process of transforming digitally designed concepts into tangible objects, is one way to address this deficiency in the formal school setting. Students not only apply science and math concepts to "real world" problems, but they also apply them to the actual creation of real objects. They see their ideas come to life.



**221. Improve Practices of Formal Education**

**Group: Researcher**

**Project title**

Teaching Students 21st Century Skills: What Should Education Look Like Today.

**Project description**

What does our current approach to education look like (theories and method)?

What do students want from education (do they want to learn, do they just want a piece of paper, do they want generic skills)?

What do employers want from education (students with knowledge, students with IT skills, students with people skills)?

**Project partners**

University of Nottingham

University of Hong Kong

**Project justification**

New technologies have fundamentally changed the way that we are in the world and they effect us in every area of our lives. At the same time the world itself has fundamentally changed. We live in with a global economy that demands new attributes and skills. It is not clear that the education system has changed to meet the requirements of students or employers. This research project would generate findings that could inform an approach to teaching and learning to meet student and employer needs.

**222. Improve Practices of Formal Education**

**Group: Researcher**

**Project title**

Transforming beginning science educator lesson planning through an educative, cyber-enhanced instructional design environment

**Project description**

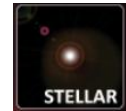
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**Project partners**

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**Project justification**

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## **223. Improve Practices of Formal Education**

**Group: Researcher**

### **Project title**

Matching learners' needs, curriculum requirements, learning activity types, and educational tools & resources

### **Project description**

Three+ decades of media effects research have demonstrated what Clark (1983) asserted long ago: educational technologies do not impact learning in themselves. Improved student learning results from appropriate 'matches' among students' curriculum-based learning needs and preferences, the nature of the learning activities in which they engage, and the tools and resources (digital and non-digital) that support those learning activities. Which technologically supported curriculum-based learning activity types are most effective for which types of student learning needs and preferences? This project will develop, test, refine, and apply a strategy for testing the efficacy of technologically supported learning activity types within specific curriculum content areas and for students with particular learning needs and preferences. The testing strategy will then be applied in multiple content areas to address multiple learners' needs. In the end, the results from many such similarly structured studies can be used by teachers when they are planning curriculum-based, student-centered instruction.

### **Project partners**

Multiple educational researchers with expertise in curriculum-focused technology integration  
Multiple school districts

### **Project justification**

Technology integration research can no longer focus upon educational technologies' 'effects,' since it is HOW the technologies are used pedagogically, in terms of curriculum, and relative to learners' needs and preferences that determine the success or failure of a particular technological use. Though the effort described above is massive, and can only be established and initiated in the next 9 years, it can be done collaboratively and cooperatively across institutions and countries, to the benefit of all.

## **224. Improve Practices of Formal Education**

**Group: Researcher**

### **Project title**

Online ethics for future educators

### **Project description**

Where are the knowledge gaps about online ethics among preservice teachers? Does an instruction about online morality result in behavior modification among preservice teachers? Are there differences between inservice and preservice teachers?  
Do teachers view an instruction about online morality useful?

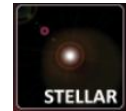
### **Project partners**

Slippery Rock University of Pennsylvania

### **Project justification**

Social networking tools such as MySpace and Facebook are extremely popular among college students. Although teacher candidates may use social networking on a daily basis, not all of them balance out their freedom of speech and moral behaviors expected of educators. Possible consequences may be denial of teaching certificate, lost job opportunities, or dismissal from employment. Teacher educators can mitigate such damages by sharing moral expectations by teachers from students, parents, and school districts. For example, they may also show perspective teachers how to create a positive, ethically appropriate online portfolio.





## **225. Improve Practices of Formal Education**

**Group: Researcher**

### **Project title**

Using mobile devices to empower students

### **Project description**

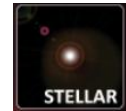
How does the use of mobile devices enhance student learning? Does making school more like real-life make learning more motivating to students? Can students better investigate real-life problems with the freedom to use mobile devices and use these problems as a scaffold to teach curriculum content on a just-in-time basis?

### **Project partners**

Samsung  
Google  
Apple  
NC State University  
University of North Texas

### **Project justification**

We need to make schooling relevant to children. At the same time, we need a creative and competent work force. Can content be taught so that students are using the tools they normally have at home?



## **226. Improve Practices of Formal Education**

**Group: Researcher**

### **Project title**

Evaluate ASSISTments in a school-level randomized controlled design.

### **Project description**

Can we drastically increase student learning gains by applying a well designed comprehensive classroom support system called ASSISTments? Here is a real abstract I just submitted that could keep me busy to 2020

In this REESE Empirical Research proposal, we address the REESE Research Strand of STEM Learning in Formal Settings and are proposing a large-scale school-level randomized controlled study to determine if ASSISTments succeeds at raising student learning and determine some of the reasons why.

According to the National Assessment of Educational Progress (NEAP) only 32% of American public school students are at or above a “proficient” level in mathematics. No Child Left Behind (NCLB) has unsuccessfully attempted to increase these scores through incentives, sanctions, and mandates placed on schools. Education Commissioner Arne Duncan has stated that mandates alone cannot change student achievement. In order to target learning deficits, teachers must use data in an effective manner. Sadly, few educators are doing so. Leaders and teachers need support and better technology to make it easier to learn how to utilize data more successfully.

Since 2002, Maine has provided laptops for every middle school student in the state through the Maine Learning Technology Initiative (MLTI) program. While this initiative has reported specific benefits to students in some ways, math scores in Maine have remained flat, most likely caused by the fact that few districts had money to buy math software to give students problem solving support with immediate feedback. We propose a partnership between stakeholders that will give educators the tools, the time, and the training to incorporate scaffolded instruction and data-driven decision making into their daily practice. This project brings together (1) university researchers, (2) 32 schools, mostly high-need middle schools, (3) the creators of a NSF-funded web-based cognitive diagnostic assessment tool called ASSISTments, (4) the Maine Department of Education, (5) the University of Maine that trains pre-service teachers and (6) leaders from associations of math teachers, principals and educators in educational technology. Over the first four years of the grant, we will work with schools, affecting approximately 120 teachers and 12,000 students per year. The teachers will be funded to work in professional learning communities with Math Data Trainers for 200 contact hours over the course of two years. During this time, they will learn methods and techniques to effectively use the ASSISTments tools to increase student learning. Specifically, this sustained support will: (1) help inform teachers of specific elements of student learning progressions, (2) provide automated intelligent feedback on class work and nightly homework, (3) allow teachers to implement computer-supported mastery learning programs and (4) include parents in the project via a web-based tool that more directly connects them to their child’s teacher. In the final year of the grant we will provide the tool and use the lessons learned to provide large-scale training to all schools in the control group and other schools in Maine. We will also host a writer’s workshop to write a book (with online resources), about the work of the project so the model can be easily adopted by other states.

The Intellectual Merit of the proposal will come from the large scale school-level randomized controlled experiment that will evaluate whether there is a causal relationship between a school being assigned to receive the intervention, and increased student achievement.

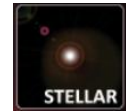
The Broader Impacts include a direct educational benefit to students in low-income, rural, and underperforming schools. Finally, this grant will make Maine a model for the nation demonstrating how low-performing schools can help themselves improve through effective and efficient use of technology.

### **Project partners**

Carnegie Mellon, Worcester Polytechnic Institute, University of Maine

### **Project justification**

We need to show we can put the technology to work.



## **227. Improve Practices of Formal Education**

**Group: Researcher**

### **Project title**

Music composition in the technology-rich music classroom

### **Project description**

How can current and emerging technologies be used most effectively to enable and realise pupil composition in the classroom?

How do emerging technologies enable new possibilities in music composition?

Investigating the balance between formality and informality in learning design in the music classroom where technology is used as the main compositional tool.

### **Project partners**

Universities, secondary schools (ages 11-18), sixth-form colleges (ages 16-19) and Further Education colleges.

### **Project justification**

Music forms a large part of many people's lives; understanding the symbiotic relationship between emerging technologies and musical outcomes is important because it helps to understand not only how to make the best use of the technology but also can uncover much about the nature of creativity in the broader sense. Furthermore, it can reveal how the originally envisaged musical uses of technological tools are often transcended when used in new and unexpected ways.

## **228. Improve Practices of Formal Education**

**Group: Researcher**

### **Project title**

Preparing Teachers to Be Designers of Students Learning

### **Project description**

1. How do teachers come to understand themselves as designers?
2. What knowledge do teachers need to become expert designers?
3. What does teaching expertise mean in a technology-enhanced learning environment?

### **Project partners**

Public schools

University colleges of education

Subject matter experts

### **Project justification**

Every society needs a consistent, available, equitable way in which they bring their young into the society and prepare those children and adolescents to have the necessary platform for creative and powerful participation in society. Formal education whether in schools as they exist today or in some modified form must be attended to!

## **229. Improve Practices of Formal Education**

**Group: Researcher**

### **Project title**

Valuing local knowledge: School digital libraries and the production of digital educational resources

### **Project description**

How can digital media be used to value the products of formal education?

This project aims at the creation of a 'school digital libraries' to foster the critical sharing of resources produced by school actors to other schools and the general population.

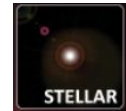
### **Project partners**

University partners in Brazil, USA, and Europe (existing partnerships); schools in Brazil (existing partners)

### **Project justification**

Schools (teachers, students, administrators) produce a vast amount of valuable information, which is usually kept within school walls or distributed in a haphazard and uncritical fashion (blogs, school sites). Student projects and teacher-resources in the format of text, audio and video can become valuable educational resources, both to other schools and also society at large. By their sheer

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capillarity and quality-standards, school actors can help register local culture and language; provide open educational resources that are highly contextualized; and lead to a general valuation of the production of school actors.

### **230. Improve Practices of Formal Education**

**Group: Researcher**

#### **Project title**

Technology, research and teacher professionalization

#### **Project description**

Does knowledge of research methodology affect teaching practice?

Does reading educational research have an impact on teaching practice?

What research to teachers read?

Do teachers make qualitative judgements about the research they read? If so, on what basis?

Does participation in action research change teachers attitudes about research, professional development, learning and technology?

What action research projects would teachers most like to take part in?

Is research on educational technology a good introduction to educational research in general?

Does teacher writing about their research or experience influence their practice or professional development?

What technology tools are most likely to be adopted by teachers?

What determines teachers' choices of technologies to use in their classrooms?

The list could go on for pages. The idea is that education is at a critical point in which the combination of new technologies, teacher capacity to use research and teachers' willingness to engage in both action research and technological innovation has the potential to create a "Golden Age of Education" with new knowledge and new practices emerging after the fashion of 20th century health research, technology, and practice.

Schools, teachers' professional organizations, teacher educators, government policy and funding

#### **Project partners**

bodies. There is also lots of room for private-public-partnerships, but I would be concerned about private interests' focus on marketing and commercialization (ahead of benefits for learners).

#### **Project justification**

Interesting--this seems self evident to me. The confluence of growth in knowledge, ubiquitous access to information, the need for disciplined learning and interpretation of this information, the influence of schools and teachers on both individual and social development, new understandings about neuroscience and cognition, the rapidity of technological change, and other factors seems to demand a revolution in the way we handle information and learning and that seems to require either a radically changed teaching profession or the development of alternatives to formal schooling. I prefer the former.

### **231. Improve Practices of Formal Education**

**Group: Researcher**

#### **Project title**

Principle-focussed Instruction

#### **Project description**

How can instruction be structured to (1) induce a learner focus on underlying domain principles in order to foster meaningful learning and (2) induce a generalization disposition in the learner towards trying to understanding content on the basis of underlying principles.

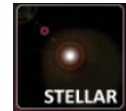
#### **Project partners**

Educators from different content areas (e.g. mathematics educator) and computer scientist with a focus on individualized systems.

#### **Project justification**

Up to now lacking students' lacking understanding, failures of transfers and deficits in long-term retention are in part explained by a neglect to focus on principles.

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### **232. Improve Practices of Formal Education**

**Group: Researcher**

#### **Project title**

Embedding educational technology in the classroom

#### **Project description**

- how can we use technology to enhance educational practice? For which tasks/types of knowledge is ICT good for, for which it isn't?
- how to design ICT to foster learning in all subject areas for a wide range of learners (focusing on those with low entry abilities)?
- what is the role of teachers when using ICT in the classroom?
- what kind of knowledge / skills do teachers and pupils need to benefit from ICT?
- how can embed ICT in a smooth/seamless way by blending technology-based and non-technology instruction? (develop new didactical concepts that considers both technology and other forms of learning and gives advise as to the question of when to use which)

#### **Project partners**

teacher education institutions, partners from educational sciences

#### **Project justification**

societal need for improved education and a systematic use of technology in the classroom that is tailored to the school's/teacher's daily needs and learning objectives

### **233. Improve Practices of Formal Education**

**Group: Researcher**

#### **Project title**

E-Science for continual improvement in educational research and practice

#### **Project description**

The idea would be to continue and expand the core strategies of the Pittsburgh Science of Learning Center (see [learnlab.org](http://learnlab.org)), particularly the ideas of LearnLab (support for researcher-instructor collaborations around course-embedded empirical and experimental research), in vivo experimentation, educational data mining of ed tech data, advanced tools for authoring interactive educational experiences including tutors, CSCL, virtual labs, etc.

#### **Project partners**

All who would like to be involved!

#### **Project justification**

Create a more rigorous and relevant science that enhances educational practice while driving insights into learning and the creation of innovative technologies.

### **234. Improve Practices of Formal Education**

**Group: Researcher**

#### **Project title**

Example Design

#### **Project description**

How to create examples to help students learn flexible problem solving procedures in the particular domain.

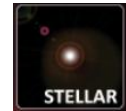
#### **Project partners**

Content experts, educational researchers.

People prefer to learn from examples so it is important to create examples to help people be able to do

#### **Project justification**

more than just repeat steps.



## **235. Improve Practices of Formal Education**

**Group: Researcher**

### **Project title**

TEL for teachers professional development (physics and mathematics at secondary level)

### **Project description**

The future of TEL depends also on its diffusion in Formal Education. Until 2020 the secondary school teachers will play a crucial role in the implementation and diffusion of TEL-based activities. Programs for professional development of university teachers are quite uncommon, while there are many for secondary school teachers. The synergy of competences from TEL and university researchers and experienced school teachers should allow to address these dimensions of the "Improve Practices of Formal Education" Area: innovative developments in TEL tools/materials for teachers professional development; improvement of quality of scientific education; contribution to reduce the school drop-outs; better links between secondary and tertiary education. The research themes are:

- 1) design and experimentation of a model for teachers' professional development aimed at fostering TEL skills for teaching/learning physics and mathematics in secondary school
- 2) abstraction of general criteria and guidelines valuable at EU level
- 3) production, experimentation, validation and distribution of TEL-based tools and materials (in all national languages of the participant countries)

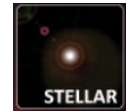
### **Project partners**

Seven Universities from West, Central and East Europe, fourteen secondary schools (every couple with links to one University), three TEL research centres

### **Project justification**

Current formal education systems often are not successful in helping learners to build a sound scientific knowledge. This impacts on individual growth, choice of job/careers, societal development, economic competitiveness, etc...

To identify in the rich EU diversities common aspects that can be offered as possible criteria and guidelines is a contribution to build a knowledge-based society



### **236. Improve Practices of Formal Education**

**Group: Researcher**

#### **Project title**

Exploiting TEL to improve students' graphical literacy

#### **Project description**

Traditional curricula strongly emphasise linguistic literacy, indeed 'English' is a subject in its own right in the UK and USA. However in the digital world in general and TEL in particular, students are increasingly exposed to an ever-widening array of graphical representations (data visualisations, hybrid text and graphical combinations, graphical representations of text (word clouds) to name but a few). One form of graphical representation, diagrams, is particularly useful for problem solving in many formal domains. Students' digital communication skills require increasing 'graphical literacy' or graphicacy as well as literacy. Yet there is very little direct instruction in the selection, creation, and application of diagrams - at least not in a subject independent way akin to 'English' as a subject. Diagrams and other graphics also cross cultural and linguistic boundaries - another facet of their importance. My proposal involves providing students with TEL environments which offer multiple representations for problem solving and which supports students as they acquire the skills of matching and selecting right representations for the task at hand, the right representation for them (i.e. one that's in their current repertoire). The support involves teaching principles of assigning representations to tasks based on the semantic and cognitive properties of various graphics, and which scaffolds students in the process of diagram construction.

#### **Project partners**

Stanford University (Centre for Study of Language and Information), London Knowledge Lab at the Institute of Education (UK), University of Edinburgh, numerous international colleagues who are members of the TEL subset of the 'Diagrams' international conference series

#### **Project justification**

Much more research is required on individual differences in graphicacy beyond the simplistic visualiser-verbaliser 'learning styles' approaches. Basic research on how students acquire graphicacy skills and common graphical misconceptions (e.g 'graph as picture') is required. Research is also needed on how best to teach students effective principles for assigning particular representational forms to educational contexts and problems i.e. what some researchers have termed the 'applicability conditions' for selecting, say, tables or network diagrams or hierarchical graphs, set diagrams, and so on. Any professional statistician, engineer, archaeologist, mathematician, computer scientist will attest to the importance of non-linguistic forms of external representation for reasoning and communication! Graphical literacy is crucial for all STEM domains and as interactive graphical systems become ever more ubiquitous students must be equipped to exploit them for their own applications. It is also crucial that students are sufficiently 'graphically literate' that they can interpret complex graphical visualisations produced by others and to be able to spot graphical 'lies' e.g. in statistical graphs and charts.

### **237. Improve Practices of Formal Education**

**Group: Educator**

#### **Project title**

Embedding technology in the curriculum enhances learning.

#### **Project description**

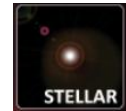
Is the introduction of new technology changing the way teachers in Malta are interacting with their environment? Is there any significant changes and improvements in how learners are reacting to the newly introduced technologies?

#### **Project partners**

Ministry of education, University, Malta College of arts science and tech. (MCAST), non state schools (Church and Private).

#### **Project justification**

**STELLAR Delphi Study - research project proposals by the experts of the 4<sup>th</sup> STELLAR Delphi round for the Core Research Area *Improve Practices of Formal Education***



All the technological investment (infrastructure, hardware, software, training) that countries are putting into educational institutions needs a change in mentality when it comes to implementation. Without the change in mentality we will not see the changes that we have been expecting through ICT.

**238. Improve Practices of Formal Education**

**Group: Educator**

**Project title**

Exploring TPACK and its Influences upon learning in the Academic Disciplines

**Project description**

How can TPACK improve teaching and learning in the English, world language, science, math, and social studies classroom?

**Project partners**

Universities and nearby urban and suburban schools secondary schools.

**Project justification**

TPACK, a theoretical construct (Mishra and Koehler) is a widely accepted cognitive framework that integrates three domains: subject matter content, technology knowledge, and pedagogy. Preparing pre-service and in-service teachers across a variety of disciplines would, in my view, strengthen the profession and improve student achievement and motivation.

**239. Improve Practices of Formal Education**

**Group: Educator**

**Project title**

Computers and their use with students with IEPS

**Project description**

How can we work with teachers to utilize computers to improved reading comprehension with students with exceptionalities?

How can computers/the web be used to do this?

On what areas can we focus digitally to improve reading comprehension?

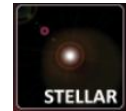
**Project partners**

University Partner  
Government Grant  
Public school system

**Project justification**

We need to move forward in both design and teacher training in order to have an impact on an under served population.





#### **240. Improve Practices of Formal Education**

**Group: Educator**

##### **Project title**

Using usage data to improve teaching and learning

##### **Project description**

How should we analyse students' usage data stored by learning software (including learning management system) so that we understand better how they learn and thus improve technology enhanced formal education?

##### **Project partners**

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##### **Project justification**

A lot of money is put in formal education (school, training etc.). Technology enhanced education gives us data that was not previously available. I am convinced that this data contain valuable (hidden) information about learning.

#### **241. Improve Practices of Formal Education**

**Group: Educator**

##### **Project title**

Best Practices of Technology in Public School Classrooms

##### **Project description**

Which technologies are used in a plurality of public school classrooms? Why?  
Which technologies would teachers like to use in a plurality of public school classrooms? Why?

##### **Project partners**

Universities, public schools

##### **Project justification**

Many times the technology used in public school classrooms is made available in random fashion.

#### **242. Improve Practices of Formal Education**

**Group: Educator**

##### **Project title**

New literacies, new texts in the formal educational context

##### **Project description**

The developing range and variety of interactive multimedia narratives (e.g. computer games) available within the home context have not yet made a similar impact within the school context. In order to empower children as critical readers of a wide range of literature, further examination is required into the way in which children 'read' such texts and the way in which such texts are integrated into the formal educational context.

How do children 'read' multimodal texts?

What are the implications for formal literacy education?

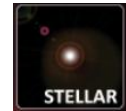
How might such texts be designed and integrated into the school setting?

##### **Project partners**

Possible collaborations between software designers, literacy educators, policy makers, primary schools. (also possible connections with mobile devices/access to multimodal texts and linkages to motivational/emotional in addition to formal/informal learning which bridges the home/school divide)

##### **Project justification**

With new and varied means of communicating available through the existence of ICTs, there is a need to develop more understanding into the way in which people construct and interpret multimodal texts. Allowing children opportunities to become critical consumers of the growing array of interactive multimodal texts would respond to this. Being 'literate' in today's society has wider implications beyond typographic text and the range and variety of suitable texts within the primary classroom needs to be developed. This presents some challenges to software/hardware designers to create texts which are relevant to the context and the purpose.



### **243. Improve Practices of Formal Education**

**Group: Educator**

#### **Project title**

Considering trainee music teachers' use of technology in their teaching in schools

#### **Project description**

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#### **Project partners**

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#### **Project justification**

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### **244. Improve Practices of Formal Education**

**Group: Educator**

#### **Project title**

Preparing teachers for the integration of technology as a way to enhance the teaching and learning process:

#### **Project description**

What technological knowledge and tools should be infused in Teacher Preparation Programs in order to help future teachers understand the potential these have in the teaching and learning process? This research project will allow universities to examine and revise the teacher preparation curriculum, from an integrated perspective (technology and disciplines experts) in order to find ways to infuse technology throughout the program. Faculty, candidates and teachers will structure enhanced technologies methodologies and do action research to document students learning.

#### **Project partners**

University faculties and students (computer sciences and education faculties), schools (private and/or public) and technology industries.

#### **Project justification**

There is a great need to provide Teacher Preparation Programs (TPP) with the tools to innovate and participate in the process of assessing, exploring, evaluating and producing knowledge on how to integrate technology to the school curriculum. TPP faculty and students, cannot do this alone, they need to see as partners computer science experts to help them understand the existing technologies and to develop/design technological tools that are capable to enhance the teaching and learning process. School teachers and students are also needed in order to develop projects that respond to the different educational context and needs. This collaboration will provide society with the opportunity to develop not only new products, but new ways of integrating technology to the schools. The technology industries are also an important element since they can provide funding to support the teaching and learning innovations, and turning ideas into marketable products. The focus of this research is on developing practical knowledge from an interdisciplinary and multiple perspectives (the innovators, the practitioners, and the users).

### **245. Improve Practices of Formal Education**

**Group: Educator**

#### **Project title**

Learning through modelling and analysing real time data

#### **Project description**

What is meaningful real time data collection?

How can learning be improved through collecting real time data?

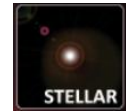
How can students be challenged cognitively with real time data collection?

There are many examples of real time data collection exercises but no attempt has been made to determine to what extent any of them might improve learning. This work would examine what sort of learning objects are already available and consider designing some for the purpose of providing a cognitive challenge.

#### **Project partners**

Universities of Southampton and Chichester. Texas Instruments.

**STELLAR Delphi Study - research project proposals by the experts of the 4<sup>th</sup> STELLAR Delphi round for the Core Research Area *Improve Practices of Formal Education***



### **Project justification**

Mathematics and science are taught in isolation at secondary level. If we continue to deliver formal education in the way we have done for the last 100 years then it is unlikely that the outcomes will change, despite the technology. This work will attempt to bring these two core subjects together with the express intention of enhancing learning. The technology will be the handheld calculator and datalogger.

### **246. Improve Practices of Formal Education**

**Group: Business Person**

#### **Project title**

predictive analytics as a tool for improving student academic progress, completion and progress.

#### **Project description**

We propose to design, develop, test, and disseminate models and middleware for conducting large-scale analyses of federated data sets found in postsecondary institutions in the US. Our intention is to use intelligence from these analyses to inform student retention, progression, and completion strategies and practices. We have focused upon generating models that identify conditions likely to improve and impede student achievement. In particular, we have paid attention to the patterns of need and opportunity demonstrated by students engaged in online learning.

Our intention is to inform decision-making and promote transparency in pedagogical research and accountability efforts aimed at young adult, at-risk populations as well as other adult learner populations.

#### **Project partners**

WCET ([www.wcet.wiche.edu](http://www.wcet.wiche.edu))  
University of Hawaii System  
Rio Salado College  
Colorado Community Colleges Online  
University of Illinois-Springfield  
American Public University Systems  
University of Phoenix

#### **Project justification**

part of the US Department of Education's national education imperatives and president Barack Obama's national goal of increasing college graduation rates in the United States by 60% over the next 8 years.

### **247. Improve Practices of Formal Education**

**Group: Business Person**

#### **Project title**

Take the best of it

#### **Project description**

What are the most cost-effective methodologies/technologies for the major part of the learning community?

Learning from the best practices and from the state-of-art technologies, look for the best scenarios to improve the teaching-learning process at several levels: basic and primary education, secondary and higher education, university level.

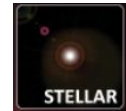
#### **Project partners**

University pedagogy department. Hardware supplier. Network and social-network company. Publishing houses. Teacher associations. Testing schools and institutions. Quality experts/consultors.

#### **Project justification**

Formal education is lagging behind other sectors in the cost-effective use of technologies that have proven their value in other more productive fields. The aim is to create a model based on good experiences in education and neighboring fields- some strong solutions for most of the actors in the educational field. Results will be of upmost interest to the content creation industry.

**STELLAR Delphi Study - research project proposals by the experts of the 4<sup>th</sup> STELLAR Delphi round for the Core Research Area *Improve Practices of Formal Education***



**248. Improve Practices of Formal Education**

**Group: Business Person**

**Project title**

Combining personalised learning with standards in formal education

**Project description**

Can we develop TEL in which learners follow individual paths and learn a obligatory curriculum?

What are the influences on this for learning outcome and motivation?

In this project we would develop educational content which adapt itself to needs and knowledge level of students with the strong demand that this education follows the standard curriculum.

**Project partners**

Educational scientists

Schools

Educational developers

**Project justification**

This project should show that the technological advances can actually contribute to better education for all students and respect the demands society makes. It should address different kinds of learning.

**249. Improve Practices of Formal Education**

**Group: Policy-Maker**

**Project title**

Using technology to engage young people

**Project description**

Many young people are disengaged from formal education - either physically or emotionally. These young people are often the most disruptive but they are often the most vulnerable themselves. We need to build on initiatives such as not-school to find ways of engaging young people in education and society recognising that the structure of employment continues to change.

**Project partners**

Companies - Microsoft and Computing At School initiative.

Cisco, Boxford, local authorities

Voluntary organisations

Youth organisations

**Project justification**

This is possibly the toughest time for young people since the 1950s and we need to find ways of supporting them and helping them find employment.