

THE TRANSVERSAL KeyCoNet CASE STUDIES ANALYSIS SHARED VARIABLES GROUP D

Topic: “Pedagogical use of ICT tools in the context of different practices of the school environment (teaching, learning, management, training, counseling, etc.), understanding that digital competence developed by stakeholders in these contexts impacts in improving their learning (of education professionals and/or students)”

Features of the initiatives included in Group D:

"Group D" is composed of a set of initiatives pertaining to KeyCoNet multiple-case study that from their respective proposals, focus on the pedagogical use of ICT tools in the context of teaching, learning, management, teacher training, counseling, etc. They are initiatives that focus, primarily, on the role of these tools in solving tasks involving, as appropriate, to various stakeholders, strengthening their competence development, either students or education professionals (developments that are often interconnected, although actions belong mainly to one or other group).

The initiatives included in Group D are the following:

- 1. GD-CS 16 *Mobile Learning Tutors***
The project *Mobile Lernbegleiter* is a network of schools coordinated by the *Federal Ministry for Education and Women's Affairs* (former name: *Federal Ministry for Education, the Arts and Culture*). The underlying objective is to enable innovative teaching and learning by using mobile devices in class on a regular basis and to develop students' digital competences, but also their media literacy, social competence, ability to respond positively to criticism and self-organisational skills.
- 2. GD-CS 17 *ICT management and assessment model for schools***
The Estonian ICT management and assessment model described in this case study was developed to ensure that schools use their limited ICT resources intelligently, develop the digital competence of their staff, as well as use ICT optimally for teaching and learning purposes. The main competence developed through the project is digital competence, with school administrations establishing and working towards the achievement of new ICT goals for their schools in order to support learning; the project also helps to develop a sense of initiative, and problem solving, risk assessment, decision taking and school management skills.
- 3. GD-CS 18 *EduScratch***

The Portuguese case is a national initiative devoted to developing digital competence, and more specifically computational thinking skills, through training teachers to use the programming tool *Scratch* as a teaching and learning tool for their students.

4. GD-CS 19 Teaching Tools Database

The *Teaching Tools Database* is shaped in a way to help teachers understand how the tasks for students should be prepared in order to get them involved in reasoning and searching for best solutions to problems. In addition to being a “store” of ready-to-use materials, the database is supposed to serve as a learning platform for teachers aimed at stimulating them to create their own materials and sharing the idea of incorporating key competences into their teaching practice.

Initiative	Partners	Code
<i>Mobile Learning Tutors</i> Austria	<ul style="list-style-type: none"> - eLSA - ENIS Austria - eLearning Cluster Austria 	GD-CS 16
<i>ICT management and assessment model for schools</i> Estonia	<ul style="list-style-type: none"> - Schools (administration and ICT departments) 	GD-CS 17
<i>Eduscratch</i> Portugal	<ul style="list-style-type: none"> - Directorate General of Education (DGE) - Ministry of Education and Science - School of Education: Setúbal Polytechnic Institute - Sapo Portal (Portugal Telecom) 	GD-CS 18
<i>Teaching Tools Database</i> Poland	<ul style="list-style-type: none"> - Educational Research Institute 	GD-CS 19

Scope of the initiatives included in Group D	
Initiative	Code
<i>National initiative</i> <i>Mobile Learning Tutors</i>	GD-CS 16
<i>Teachers, school level and local initiative</i> <i>ICT management and assessment model for schools</i>	GD-CS 17
<i>National initiative</i> <i>Eduscratch</i>	GD-CS 18
<i>National initiative</i> <i>Teaching Tools Database</i>	GD-CS 19

D1. The initiative is inserted into the network of European and/or national actions related to the pedagogical use of ICT tools and the consistent competence development that it fosters.

- A.** The *Mobile Lernbegleiter* project started in 2009/2010 and is renewed on a yearly basis (with a break during the school year 2013/14). (...) [It] was the first one in Austria to include several school types and school levels in an e-learning project, which called for a consideration of different pedagogical cultures and management issues, depending on the different administrative responsibilities for each school type. (...) 1:1 initiatives in the US and Germany but also national experience with notebook classes at secondary level since 1998 (in the framework of future *Learning and eFit21*) served as an inspiration. Moreover, with mobile devices becoming more and more affordable, the project aimed to improve school lessons by making them more competence oriented. (...) The initiative is embedded in a general framework *Building Blocks of Pedagogy 2005-2018 competence oriented teaching* aimed at making teaching in Austrian schools more competence oriented. The starting point for this framework was setting educational standards in 2005 (...), based on the competence model developed by Anderson/Gratwohl; Weinert. Currently, the Austrian curriculum is being revised regarding key competences for several school types. **GD-CS 16**
- B.** In the national curricula for secondary schools and high schools adopted in 2010, it is stated that teachers must use up-to-date study materials and tools that are based on information and communication technologies (ICT). This requires the schools to be informed on the field of ICT, on teaching and learning with ICT tools and also on supervising and managing ICT resources. (...) There is a great deal of information on the field of ICT and many ICT management models, but these do not fit directly into the school context. For this reason school managers need a more adapted approach; schools need an approach that is in Estonian and that is adapted especially for them. In 2011, the *Tiger Leap Foundation* launched a programme on managing the field of technology and self-evaluation in schools. This programme consolidates the understanding of what is happening in the field of ICT management, helps schools to understand their actual level and to use their restricted resources in an effective way and provides schools with examples of best practice from the field of ICT management. **GD-CS 17**
- C.** Work on this initiative coincides with curriculum reforms in the Portuguese education system introduced in August 2012. The new curriculum requires the existence of an ICT subject in grades 7 and 8 that includes a target dedicated to the exploration of computational environments. Work carried out within the *EduScratch* initiative also counts towards corresponding to these new curriculum demands. (...) One of the most important enablers for the introduction of *EduScratch* has been the official recognition of digital competences in the curriculum, and also the official inclusion of Scratch as a recommended language for the development of this competence. **GD-CS 18**
- D.** Experience and research show that supporting students and teachers while introducing changes into the education system is crucial for the benefit of education (...) The new curriculum reform of 2008 in Poland underlined the concept of critical thinking and problem solving in teaching at all school levels. (...) The new Core Curriculum was introduced in lower secondary schools in Poland in 2009. The Curriculum underlines the importance of higher order skills and key competences in teaching and learning. With the change of approach in the Curriculum itself, new kinds of tasks and tests had to be created. In 2012, a new format of lower secondary school leaving exam was implemented. (...) As a consequence, tasks that could assess skills not just pure

knowledge were demanded. As the *Educational Research Institute* started its EU co-funded project “*Education Enthusiasts*” in 2009 the decision was made at the Institute to create a database with new kinds of tasks. It was supposed to be aimed mainly at teachers but available to the general public. (...) The *Educational Research Institute* developed a tool for teachers representing primary, lower secondary and upper secondary schools aimed at supporting their preparation for work with students.(...). The *Teaching Tools Database* is a living initiative – in December 2013. It was incorporated into a bigger entity called the *Good Practices Database*, and is constantly being developed. The updated website contains not only tasks directed at teaching and developing key competences in education, but also examples of good practices identified during the Institute’s research. Those good practices also evolve around key competences and higher order skills and are real-life examples. **GD-CS 19**

D2. The initiative is an official program designed ad hoc and intended to facilitate to school teams and students the development of the digital competence through the pedagogical use of ICT

- A. The *Ministry of Education and Research*’s aim is to encourage and spread the use of different ICT tools in the teaching and learning process. (...) The Ministry was interested in the use of small size, energy efficient mobile devices in class to foster new forms of teaching and pedagogical settings in schools. (...) The *Federal Ministry for Education and Women's Affairs* coordinates the project. Participation in the project is open to all schools in Austria, provided that participating classes are equipped with mobile devices. (...) The project is implemented on a yearly basis, which allows for a certain flexibility to integrate new questions/topics in the project and to develop some hypothesis further. According to the project coordinator, it is nonetheless important to online requirements as regards, pedagogy, technological and organisational issues of the project, also to enable a comprehensive and continuous evaluation of the project **GD-CS 16**

D3. The initiative is a program designed ad hoc by different partners (from public and private sphere) and intended to facilitate to school teams and students the development of the digital competence through the pedagogical use of ICT.

- A. This initiative is a ICT management model in order to enable schools to develop their capability, knowledge and skills. It is needed to support schools in using limited ICT resources in a well-planned way, to show the schools methods of self-development and to provide them with examples of best practice in ICT management. (...) The **ICT** management model was created in cooperation with ICT auditors, ICT managers and school representatives. The model focuses on the technology management field and is based on six criteria: leadership, strategy and planning, employees, resources and safety, processes and services, and results. In 2012, the ICT management model and programme successfully passed the piloting phase, in which 12 schools across Estonia participated. On 1 May 2013 the *Tiger Leap Foundation*, which originally managed and ran the piloting of the ICT management programme, was merged with two other organizations which, all together, now form the *Information Technology Foundation for Education*. The ICT management model is now being developed by the *Estonian Association for Quality (Eesti Kvaliteediühing)*. **GD-CS 17**

B. The *EduScratch* initiative was implemented by the *Directorate General for Education* in partnership with the *Portuguese Ministry of Education and Science* and one of its *ICT Competence Centres*. (...) The main partner for the development of this project has been the *Ministry of Education*, through the official support of *EduScratch* in the form of human resources (one of the project coordinators is provided and paid by the Ministry) and also technical support for the project's online portal. The partnership formed with the private internet service provider *SAPO* has been important for the development of the project's online presence, through resource-sharing via the *SAPO* web portal, and more recently with the *MEO cable TV* (Channel 151232). Finally, the establishment of partnerships with other *ICT Competence Centres* has also been a decisive factor for the network development and coverage of the project, which is currently present throughout Portugal. **GD-CS 18**

C. The *Teaching Tools Database* was created by the *Educational Research Institute*, whose main objective is to carry out research in the field of education. The employers and experts of the Institute felt there was a need to create such a database but it never was supposed to become an initiative that would be used by all teachers or a project that would be implemented in every school. It is meant rather as a source of inspiration targeted at a specific group of people, not as a venture where a high number of recipients is the most important and ultimate goal. However, the idea is to reach as many teachers and as many schools as possible. **GD-CS 19**

D4. The initiative stems from a collaboration between different bodies of education authorities and, in turn, between them and schools.

A. While the national Ministry is responsible for higher general secondary schools, the provinces are responsible for schools at primary and lower secondary level ('*Volksschule*'/'*Hauptschule*') (...) Of the 45 schools participating in school year 2012/2013, 15 schools were also eLSA schools and 12 schools were part of the ENIS network. Several project schools were also part of the eLearning Cluster Austria which already exists for 11 years. The fact that this project is partly embedded in existing networks enables synergies between the different networks, e.g. some schools also take advantage of support offered within the ENIS network and synergies exist in terms of dissemination activities. **GD-CS 16**

D5. Initiative focused primarily on competence development of students from secondary level

A. The *Database* is still addressed mainly to lower secondary school teachers and most tasks are designed for this educational level. It is difficult now to create a similar volume of tasks for the second and fourth level and to pilot them in schools, mainly due to the lack of time. Also, research efforts concentrated mostly on the third educational level as the most problematic one, so plenty of material for this educational level was developed. **GD-CS 19**

D6. Initiative focused primarily on competence development of students from basic education

- A. It has been successfully implemented in grades K-12, with a naturally increasing level of complexity. Moreover, it contributes to the curricular integration of ICT, as well as giving context to the implementation of ICT curricular goals in grades 7 and 8.

GD-CS 18

D7. Initiative focused on competence development of students from different education levels

- A. It is open to all Schools in Austria at all school levels. The secondary school level was the starting point of the project, as these schools are usually better equipped and parents are more willing to invest money in their children's education. Different school types at primary and secondary level are involved in the project. One difficulty with fostering the collaboration between different school types is that their school culture, administration, pedagogical concepts, way of working and budget possibilities can differ. (...) To connect different school types is a more innovative approach but also more complex. **GD-CS 16**

D8. Reports on social and professional requirements to which the European citizen faces facilitate the implementation of initiatives that enhance competence development in students

- A. It is also counted as an enabler that today, ICT is the main supporting structure in all organisations and is depended on by all of the main and supporting processes in all organisations, including schools. The main goal of schools is to support learning and the learning process now depends on ICT. Examples of supporting processes that depend on ICT include providing schools with tools and planning school work. If the ICT in the main and supporting processes functions correctly, then the school's main and supporting processes also function well. **GD-CS 17**

D9. ICTs as the main tool to achieve educational, training, advisory and school management objectives, etc.

- A. The underlying objective is to enable innovative teaching and learning by using mobile devices in class on a regular basis and to develop students' digital competences, but also their media literacy, social competence, ability to respond positively to criticism and self-organisational skills. (...) The participating schools experiment with 1:1 pedagogy using different mobile devices e.g. netbooks, smartphones, tablets. (...) (...) There could be a stronger focus on content (ebooks, MOOCs) and context questions (e.g. forms of intervention in the lessons). Other topics considered for the future of the project is using the flipped classroom concept to support media literacy and to engage in an exchange on an international level. **GD-CS 16**

- B. The goal of the ICT management and assessment model for schools is to develop the ICT competences of school personnel, especially the schools' administration and

management (head teachers, head of ICT etc.) as well as teachers. Through educating the teachers we are also educating the students. (...) [An] enabler of the programme is a need to support schools in using limited ICT resources in a well-planned way, to show the schools methods of self-development and to provide them with examples of best practice in ICT management. Participating in the programme enables schools to understand their level of ICT management and to improve their level through training, self-evaluation and feedback from consultants. **GD-CS 17**

- C.** *EduScratch* is an initiative aimed at promoting the educational use of a programming language – Scratch – by supporting, training and sharing good practices among the Portuguese educational community. (...) This tool allows the development of computational thinking and has proven to have huge potential in developing different types of skills (digital and subject-relate) in students. **GD-CS 18**
- D.** The *Teaching Tools Database* is shaped in a way to help teachers understand how the tasks for students should be prepared in order to get them involved in reasoning and searching for best solutions to problems. In addition to being a “store” of ready-to-use materials, the database is supposed to serve as a learning platform for teachers aimed at stimulating them to create their own materials and sharing the idea of incorporating key competences into their teaching practice. **GD-CS 19**

D10. The implementation of the competence-based model at school level requires a change in mindset of teachers: a shift from ICTs as object to the pedagogical use of the ICTs as pedagogical tools.

- A.** General possible obstacles in schools are the lack of digital competence and resistance from both teachers and students. (...) The project fosters in particular the development of students’ digital competence. The definition of the ICT use in school currently used in the project was only developed in 2013 (...). A clear definition of the term became necessary because for some schools the difference between “ICT as a subject” and “e-learning” was unclear; a clear distinction between both terms was missing. The developed definition focuses on three dimensions (Pedagogy, Didactics/ Learning theory, Technical didactics) and five different levels of use of ICT in school. It is an outcome of the work of this project since 2010 and earlier notebook projects. The definition is based on a previous overview developed by the project coordinator Christian Schrack in 2006. **GD-CS 16**
- B.** For the school teams, the most difficult aspect was understanding the main concepts of ICT management, such as “processes” and “services”. Since school management in Estonia is still very traditional, it was difficult for the school teams to comprehend which are the processes that occur at school (e.g., printing is a process that can be optimised), and which are the services that a school offers, should offer and is able to offer. School heads do not fully understand their role in technology management. They presume that ICT is the responsibility of ICT consultants or ICT teachers and underestimate their own role in this area. They also underestimate the importance of their position as the school’s leader and as a role model for teachers; this affects the other members of the school – not just teachers but also students. (...) The fact that school heads and school personnel in the ICT management team could, using the knowledge they gained, explain their info-technological needs (including hardware) to school administrators (local municipalities) was also seen as an important added value. **GD-CS 17**

- C. The main official focus of this initiative is the development of digital competence, present at various levels throughout the curriculum. Activities have therefore been developed to work with teachers and students from grades K-12. In particular, the main efforts to spread this initiative have been targeted at the development of in-service training for teachers at all levels and in all subject areas. **GD-CS 18**
- D. [An] objective was to encourage teachers to ask questions and give comments about the database and the tasks (...). In the first months of the *Database*'s existence many questions appeared, not only about the content of tasks themselves but also about how the tasks are constructed to measure competences. The authors are always very happy to receive these kinds of questions as they mean that teachers are trying to write tasks themselves and one of the general goals of the database is to inspire and train teachers. At present, the strategy is to publish news tasks regularly. **GD-CS 19**

D11. Deploying of the initiative from an initial training proposal focused on the development of digital competence.

- A. The project has been divided in three phases, starting with a small number of pilot schools. In 2009/2010, 7 pioneer schools already experienced with e-learning tested the use of netbooks with regard to the possibilities for new teaching and learning methods. (...) Second phase: Pilot phase: In 2010/2011, further pilot schools started using netbooks, with the support of the experienced schools and experts within the network. In total, 25 schools participated. These pilot schools had, in contrast to the pioneer schools, only an average level of infrastructure and limited experience with e-Learning. (...) Upon completion of this phase, again a strategic decision was taken concerning the next phase of the project. Third phase: Regular implementation: Since the school year 2011/2012, the possibility to test the developed model is open to all Austrian schools, provided that the participating classes are equipped with mobile devices. The project supports the schools in their dissemination activities. That school year, 27 schools participated. Since 2012, the project recommends the use of the "BYOD" concept which allowed for a major enlargement of the network. For the school year 2012/2013, 45 schools participated. (...) The project design and organisation is currently designed for a rather small group of innovative project schools. (...) If the number of participating schools continues to rise, the project design would have to be adapted. New forms of exchange, other forms of moderating the exchange and a higher number of meetings could be envisaged. **GD-CS 16**
- B. In the spring of 2011, an expert group of 15 members was created. (...) In March 2012, the search for schools willing to participate in the pilot project began. Twenty schools across Estonia originally registered, with 12 schools completing the pilot year. Two one-day training sessions were organised for the ICT management experts from the private sector and the external consultants. For the ICT management experts it was compulsory to attend at least one training session (the other was optional), while both training session were compulsory for the external consultants. (...) It was originally planned that the ICT management model would be offered to all interested schools in 2013 but, due to budget constraints, this was not possible. **GD-CS 17**
- C. Since its introduction, the popularity of *EduScratch* has grown steadily. In 2009-10, the initiative began with in-service training workshops across the country. This approach has developed a network of certified trainers in other *ICT Competence Centres*, contributing to a growing impact of the initiative. From an initial development based in the *Setubal ICT Competence Centre*, there are now four centres (Minho, Coimbra,

Santarem and Évora) that are actively engaged in dissemination and training activities. However, the impact at classroom level has not yet been clearly quantified. Project leaders have developed an implicit notion of the impact of the initiative through levels of participation in national conferences and in *EduScratch Day* (2010, 2011, 2012, 2013) where students presented their projects (with an exponential growth in the number of participants), and also from the growing number of student projects shared via the *EduScratch* online portal. **GD-CS 18**

D12. Curriculum cross-cutting and key competences

- A.** The underlying objective is to enable innovative teaching and learning by using mobile devices in class on a regular basis and to develop students' digital competences, but also their media literacy, social competence, ability to respond positively to criticism and self-organisational skills. (...) The evaluation report 2010/11 recommends to embed the project in the general school development strategy: cross-subject projects including several classes, teacher visiting their colleagues' classes, organisational development and evaluation are recommended. **GD-CS 16**
- B.** Even though its natural focus is on ICT competences, *EduScratch* has also had a diverse impact on a variety of other key competences, depending on the different implementation context. For example, when implemented within the context of mathematics classes it has clearly contributed to the development of mathematics competences; when used in the context of foreign language classes it has had an impact on the development of competences in this area. Furthermore, given the innovative nature of *EduScratch* projects, the initiative has also brought about a clear development of other key competences: e.g. communication skills when participants are required to share, discuss, clarify and present their projects; learning to learn competences due to the highly student-centred approach; and also initiative and entrepreneurship, since students are encouraged to adapt and customise their own projects. Therefore, although the main focus of *EduScratch* is on the development of digital competences, we have found that all other key competences have also been supported, to varying degrees, depending on the contextual factors of implementation. **GD-CS 18**

D13. Coordinate activities from a central organization giving prominence to the network participants.

- A.** The project *Mobile Lernbegleiter* is a network of schools. (...) The project origins are "bottom up" and stem from the coordinator Christian Schrack who developed the idea for the project. (...) Successful elements of this project such as developing the project by establishing a focus group at the school and the idea of a "gradual didactical transformation" inspired the current project *Mobile Lernbegleiter*, which was then initiated by the Ministry. (...) The concept of one organisation providing central support, inspiration and guidelines to the schools while leaving flexibility to each school on how to implement its own project, proved to be an efficient approach welcomed by the schools. (...) Each year, the project coordinator organises two meetings for all participating schools. (...) During the school year, each school implements its own project. (...) The project coordinators published 10 step guidelines for the implementation at school level. **GD-CS 16**
- B.** The reduced size of the official team coordinating the project inhibits its possible outreach and support to a larger network of participating teachers. This obstacle has

been partially overcome through the development of the capabilities of the ICT Competence Centres to support *EduScratch*-related activities throughout the country.
GD-CS 18

D14. Organize a teacher trainers network.

- A.** [The initiative has designed] teacher training and the development of a network of teacher trainers to support *Edu-Scratch* activities. (...) This training has taken a variety of formats, ranging from two- to three-hour dissemination presentations, to 15-hour officially-certified workshops. These longer workshops have been the main format adopted and are where the greatest efforts have been channeled. The workshops have adopted an extremely interactive model in which, after a short presentation of the Scratch software, participating teachers are prompted to actively engage with the programme in order to develop their competences. Moreover, participating teachers are required to develop classroom projects with their students that are supported and discussed throughout the workshop, and then to present their projects and student products in the final workshop sessions. Furthermore, there has also been an effort to customize the in-service training workshops for different grade levels and subject areas whenever possible. **GD-CS 18**

D15. Integrate into the teacher training plan the perspective provided by experts in various disciplines (multidisciplinary approach).

- A.** The [expert] group included ICT management experts from the private sector, school representatives and representatives of the *Tiger Leap Foundation*. The experts developed an ICT management model, a self-evaluation test, a booklet on ICT management and a training programme on ICT management for schools. A system of external experts/consultants was also developed within the expert group, with a training programme allowing the expert group to understand the school context, how to assess schools, what are the needs of schools, etc., and a more thorough self-evaluation form for schools and an external evaluation form for the experts that were sent to schools were drawn up by the expert group. **GD-CS 17**
- B.** (...) Already in 2009 and 2010 Institute [*Educational Research Institute*] experts were preparing the new format tasks for their research studies and most of those tasks were being piloted in schools. The tasks in the database are of a very good quality, with the best psychometric parameters (...) Tasks in the *Database* undergo a few stages of verification – they are reviewed, piloted, checked statistically and also need to be approved by heads of research subject teams at the Institute before they are published in the *Database*. (...) The tasks and good practices included in the database are prepared by subject experts at the Institute. The *Subject Teaching Unit* is responsible for the content of the TTD. The *Unit* consists of a Polish team, maths team, science team, history team and foreign languages team, each led by a leader, usually a renowned expert in the subject matter. **GD-CS 19**

D16. The advisability that members of the professional team share between them the issues and the foundation of knowledge that each of them brings into training (transdisciplinary approach).

- A. The most problematic part of ICT management and assessment model was related to trainings. According to the feedback, in the future more emphasis should be placed on training all three parties (school teams, school ICT consultants and ICT management experts) and the training sessions should focus on explaining the basics of the topic, so that the knowledge and understanding of all parties would be based on the same foundation. Creating common basic knowledge enables participants to move forward in the programme at the same pace and ensures that evaluation results are comparable. **GD-CS 17**

D17. Training sessions for school managers

- A. The training sessions focused mainly on introducing the specifics of ICT management in schools, presenting the ICT management model, establishing the external evaluation process and explaining the evaluation according to the model. (...) The most important aspect for partners in the ICT management and assessment initiative is that all the partners (school teams, school ICT consultants and ICT management experts, mostly from private sector) have some common basic knowledge about ICT management and school context. The importance of understanding how schools work, what are their needs and goals is important to create an initiative that works well and is focused on the real needs of schools. **GD-CS 17**

D18. Groups of experts evaluating the use of ICT in school management and deliver an advising report

- A. A school visit by a three-person group consisting of external evaluators and consultants also took place. This group was made up of one ICT management expert (from the private sector) and two ICT consultants from other schools. The external evaluators came to the school, studied the school's self-evaluation form and discussed issues of **ICT** management together with the school team. After the visit, the external consultants filled in the external evaluation form and the schools received oral and written feedback on their technology management. The feedback indicated what was done well in the school, what could be done better and also suggested some concrete steps that the school could implement in order to ensure that their ICT management was more systematic and would better fulfill the needs of the school. After attending the training session, the schools were asked to carry out a comprehensive self-evaluation on technology management, for which they could also use a form on the programme's website. **GD-CS 17**

D19. Self-assessment of the school team

- A. Schools taking part in the pilot project had to put together a team in their school that would implement the ICT management project. After putting their team together, schools had to carry out the self-evaluation, for which there was a web tool on the ICT

management and assessment model for schools website. The first self-evaluation test consisted of about twenty questions that gave the school an initial overview of what ICT management is all about, how it fits into the school context and the ICT management level in their school. For school teams not familiar with ICT management concept, the self-evaluation test tended to be superficial. (...) For schools, the most important aspect of the programme was learning to evaluate themselves accurately without over- or underestimating their capacities (...). Schools stated that they would have liked more in-depth feedback, including more specific guidelines and examples, following the visit from the external evaluators. The feedback they received from the evaluators consisted mostly of numbers, but the schools did not know how to interpret these numbers in order to plan their next steps and to improve the situation within the school. Since the evaluators were not well acquainted with the context of the schools, the school teams would have liked more contact with them, in order to analyse the process and results of the evaluation in greater depth. **GD-CS 17**

D20. Resources for the teaching: tasks and teaching practices that promote student's competence development.

- A.** The tasks included in the *Teaching Tools Database* measure and assess scientific reasoning, critical thinking, concluding, interpretation, argumentation, experiment design etc. They focus on shaping skills not just testing pure knowledge. The tasks are accompanied by real-life texts, examples, maps, tables and graphs. (...) At present, it comprises approximately 700 tasks and 30 examples of good practices accessible on-line. The specific subjects concerned are history, Polish language, mathematics and science. (...) Students interviewed pointed out that the tasks are unique, different than in textbooks and revision books. They measure student's reasoning and it is fairly easy to make a mistake. The analyses of results and explanations came in handy as well. The students stated that standard materials just gave the right and wrong answers without any comments about what to do to improve. (...) What brings the biggest value is the work of practising (professionally active) teachers as they have the insight and knowledge about what is easy for students, what is difficult, what works better in the classroom, etc. **GD-CS 19**

D21. The need to reflect on the characteristics of the tasks that foster the development of key competences.

- A.** Consistency among subject tasks was the biggest issue. The tasks can be found according to Core Curriculum requirements or according to subjects. Each school subject has its characteristic features, a slightly different approach to content matter, and focuses more on different aspects of teaching and learning. The authors wanted all tasks, no matter what subjects they refer to, to be constructed in the same way and in a similar format. The key issue at the beginning was to come to an agreement how to make the tasks consistent, especially given that the authors of the tasks come from different teaching and subject traditions and from different regions of Poland and have varied backgrounds. An attempt was to be made to find a consensus not only about the way of thinking about the tasks and the way of presenting them but also about simple matters like task descriptions and what should be included in comments for each task. **GD-CS 19**

D22. Relations between the tasks and the specific competences that its solving allows developing

- A.** The intention of the authors was to create high quality tasks and shows diverse tasks formats rather than present just a high volume of tasks. The goal was to inspire teachers rather than bombard them with just another source of ready-to-use materials. That is why carefulness about the commentaries for all tasks was expressed – attention was paid to the description of the purpose of the task, the competences and skills covered and the task structure. Statistics on right and wrong answers are provided in order to make teachers aware what they should pay attention to in their further work with students. **GD-CS 19**

D23. Participation of teachers in materials development that the initiative includes in its proposal

- A.** The teachers play a vital role in testing the solutions used in the TTD. Their comments are invaluable. All tasks are first tested by practising teachers and then standardised on a large number of students. If it happens that a task does not achieve high statistical parameters, it is not uploaded onto the *Database*. **GD-CS 19**

D24. School textbooks: need to be compatible with the competence-based model

- A.** It was not only teachers who took advantage of the *Database* but also publishing houses preparing new textbooks and the authors of exam tasks. Some forms of tasks that first appeared in the *Database* were later used in textbooks, some for regional student competitions and even for final exams. **GD-CS 19**

D25. The teaching team constitutes a learning community dedicated to analyzing the pedagogical and/or school management use of ICTs environments

- A.** The focus is on the integration of mobile devices in the lessons in order to make them more competence oriented and improve the quality of the lesson. The particularity of the project is that schools have a lot of flexibility on how to implement the project based on these principles [establishing a focus group at the school and the idea of a “gradual didactical transformation”]. The peer exchange between schools is a core aspect of the project which schools appreciate. Schools also actively shaping the focus of the project, e.g. the future focus on tablets reflects the schools interest in the topic. (...) the project benefits from the ideas coming from the schools themselves, which is encouraged at central level. (...) [An] enabler is to build a “focus group” of teachers which initiates and implements the project at school level. This group has to receive training. (...) All evaluation reports highlighted the need for more training and professional development opportunities for teachers. Teachers expressed the wish for more training on the use of mobile devices in general and adequate software in particular. **GD-CS 16**

- B. For the schools taking part in the pilot project, the start of the process meant that they had to put together a team in their school that would implement the ICT management project. The team had to have up to five members, including the principal, head teacher and the head of ICT (ICT manager, ICT consultant etc.). In addition, having a teacher in the team was considered as an added value as this gave the team's work a pedagogical perspective. **GD-CS 17**
- C. The *EduScratch* initiative aims to contribute to the creation and development of a teachers' community of practice on the educational use of an intuitive programming tool. (...) This initiative aims to promote the educational use of the programming language Scratch by supporting, teaching and sharing good practice among members of the Portuguese educational community.(...) **GD-CS 18**
- D. The *Teaching Tools Database* was intended to show the new Core Curriculum guidelines in a practical way. Sometimes, as research shows, the guidelines are complicated and not very practical for teachers; teachers do not know how to make use of them in the classroom. So it was decided to show them how to teach and assess the key competences that the new Core Curriculum focuses on. In the *Database* there is always a reference to a specific requirement/point in the Core Curriculum (general and detailed), so this way teachers know that the curriculum is a document that can be practically implemented in their everyday work. In this respect, there is a systemic change behind the *Database*: promoting the new Core Curriculum among teachers and making it easier for them to understand. Going a little bit further, there was an intention to promote the content of the curriculum, especially the general requirements that consist mainly of key competences. The idea was also to show teachers how those key competences can be taught and assessed by multiple-choice tasks in a friendly way. **GD-CS 19**

D26. The school management team has a decisive role for the development of the initiative.

- A. Without the support of the school management and the head master it is not possible to run such a project. (...) The project has not been designed as a systemic one from the starting point. The project, however, recognises the importance of factors like the school organisation and management, training and evaluation. **GD-CS 16**
- B. As ICT management is strongly connected with the topic of management, the principal [School head] had to be involved in all phases. The principal, together with the head of ICT, was required to critically evaluate the school's situation in terms of ICT management and introduce the changes needed. (...)As the ICT management programme focused mainly on management issues, participating in the programme had a remarkable effect on the work of the principals, who began to understand the influence of their actions on the schools' operation, teaching and learning. (...) Since participation in the programme developed their perception of the field of technology, school heads also began to understand the importance of regular training.**GD-CS 17**

D27. Generate synergy between schools: networks that exchange knowledge, experiences, resources, etc.

- A.** The aims of the project were to develop the pedagogical use of mobile devices in class and to foster the cooperation between different school types. (...) Peer Exchange between schools is an important element of the project. Each year, a certain percentage of “new” schools is taken on board which can take advantage of the experience of the “old” schools. The ratio of “old” schools/ “new” schools being around 60:40 has proven to favor an effective transfer of knowledge and experience. (...) In 2011/12, the project started a particular type of collaboration between schools: so-called “vertical collaboration”. The project supports the forming of local and regional school clusters, with one secondary school exchanging with their feeder schools in the region on the use of mobile devices in class. Each of the clusters selected its activities itself and activities were very different in each cluster. (...) In the school year 2012/13, 13 of these clusters were in place, compared to 9 the year before. (...) In general, the initiative has been perceived as quite successful. In particular, fostering the peer exchange between schools has worked well. **GD-CS 16**
- B.** For the participating schools, the most valuable lesson was learning to perceive ICT management as a whole and to understand its supporting role in the everyday work of the school. Having the chance to learn from the experience of other schools was also seen as important, since this is something outside the norm of regular school work. Schools and principals work separately and do not exchange their knowledge and experience with each other. (...) After the self-evaluation, team members were required to read through the booklet on ICT management before taking part in a two-day ICT management training session. This practical training session presented different practices from various schools, gave participants the chance to discuss questions from the self-evaluation test and placed a great deal of emphasis on the work of school teams. **GD-CS 17**
- C.** There has also been an effort to provide direct support to schools (teachers and students), not only through an active community of practice for Scratch users, but also through the projects developed at the schools, in order to showcase successful experiences and to promote students supporting other students and teachers. (...) Concerns for the project’s sustainability focus on assuring an on-going investment in teacher training, with the aim of enabling the project’s community of practitioners to become more autonomous and self-driven, with the establishment of medium- and long-term goals. Also crucial for this will be an increase in the number of staff involved in the implementation of the project and a more active engagement of the *ICT Competence Centres*. **GD-CS 18**

D28. The exchange of experiences, strategies, consultations, etc. between teacher teams promotes the professional development of teachers

- A.** One key aspect of the project is to enable face-to face peer exchange between teachers. Both the big project meetings for all schools and the cluster activities have been very well received. The main benefits are the possibility to exchange, getting to know new problem solving strategies and learning from each other. The exchange encourages schools to try new things. It is also helpful for the schools to know that other schools face the same problems. Visiting each other is also a recognition of the school’s work

from outside which is perceived as motivating. Schools also found it positive that working together with other schools on a project put a higher pressure on them to actually complete it. **GD-CS 16**

- B.** All ICT personnel who have participated in the initial training will then have the chance to become an external consultant for another school, giving them an opportunity to discover best practices in ICT management from other schools and to gain a better insight into ICT management in general. **GD-CS 17**
- C.** There has also been an effort to provide direct support to schools (teachers and students), not only through an active community of practice for Scratch users, but also through the projects developed at the schools, in order to showcase successful experiences and to promote students supporting other students and teachers. **GD-CS 18**
- D.** Meetings with teachers while promoting the *Database* proved to be most effective. Although the *Database* is really an online tool and there is no need to meet face-to-face with the initiative's target groups, the Institute organises meetings with teachers just to present the *Database*. Special meetings with teachers and parents were held especially when it was first launched. Those meetings were very productive as they gave the teachers' perspective and they in turn received the researchers' perspective and the philosophy of the tool. Even sceptical teachers usually left meetings convinced that the Database is worth having a look at. Teachers (...) appreciate the statistical data that is published under tasks and references to Core Curriculum guidelines. They underlined that the Database is very useful for exam preparations and extra classes. What they also liked was the idea of including the TTD in the *Good Practices Database* and showing a wider context of tasks and other materials being put together in one place. It seems to be a practical solution as they have easy access to a wider range of materials and they do not need to waste time looking for interesting ideas on different websites. **GD-CS 19**

D29. Collaborative culture fosters that all participants (students, teachers, trainers, management team, etc.) achieve better competence levels.

- A.** The design of the initiative, being renewed on a yearly basis, allows for a certain flexibility to take on board new upcoming issues. The focus topics only became apparent, as the project developed and the participating schools were very active in defining a new focus/areas of interest. The project started as a netbook initiative. Therefore, netbooks and the question whether these new devices could play a role for mainstreaming were at the focus of the school year 2010/11. Vertical collaboration between secondary schools and their feeder schools was in the focus of the work of the two following school years. Since 2012/13, the project does not focus on a particular device anymore and promotes the "BYOD" concept. In the future, tablets could be increasingly in the focus of the project, as this is also a topic of interest for the schools. (...) Typical activities were projects on specific topics allowing for the exchange between students, exchange of knowledge and experience, further trainings together and school visits. Examples for project topics schools collaborated on are e-safety, preparation for the job market, healthy nutrition, and the use of mobile devices in science subjects and language classes. **GD-CS 16**
- B.** The focus on in-service teacher training has been an active investment to empower a large number of teachers in order to reach many student classrooms. (...) [The two decisive factors supporting the development of this project were, on the one hand,] the

development of a large community of practice of teachers who support each other (online and face-to-face) and who help their colleagues with the implementation of Scratch projects and resources [and on other hand] the emergence of a number of highly-skilled volunteers (mostly retirees) who offer their time and expertise to support teachers and students throughout their Scratch projects (both online and in the classrooms). **GD-CS 18**

D30. Teachers get certification of the continuous professional development received in the context of the initiative

- A.** This training has taken a variety of formats, ranging from two- to three-hour dissemination presentations, to 15-hour officially-certified workshops (...) This approach [service training workshops across the country] has developed a network of certified trainers in other *ICT Competence Centres*, contributing to a growing impact of the initiative. (...) The teachers in Portugal need to complete a minimum number of in-service training hours per year, the programme developed certified workshops so that they could be counted towards teachers' required training hours. **GD-CS 18**

D31. The school makes a commitment to the initiative

- A.** (...) the free choice of devices for the school is seen as an enabling factor, as it raises the acceptance of the project both by students and their parents. (...) Each participating school has to ensure that the participating classes have mobile devices. In the past, the project coordinator helped to organise netbook offers for the schools; in recent years schools make increasingly use of the *Bring Your Own* device "BYOD" concept. (...) The funding of the mobile devices is an issue to be tackled by the schools and raises the question of social equity, in case parents can not buy the device. The schools interested in the project are responsible for ensuring that each participating class is equipped with devices. **GD-CS 16**
- B.** Participating in the programme enables schools to understand their level of ICT management and to improve their level through training, self-evaluation and feedback from consultants. (...) Every school that takes part in the project completes an online self-assessment regarding its ICT management, following which members of the school administration and ICT department are offered ICT management training and all participants receive a best practices in ICT management handbook. Following this training schools undergo a deeper process of self-assessment regarding their ICT management and are provided with an external ICT management consultant who provides feedback and advice according to the results of the self-assessment. External consultants help to identify the gaps between schools' self-assessment and external assessment. **GD-CS 17**

D32. The school have to be provided with ICT infrastructure to develop the initiative

- A.** For the schools new to the project (in particular primary and upper secondary level), technology and equipment were still an issue: the infrastructure at the school and a reliable internet connection had to be put in place. At school level, there should be rules

in place regarding the maintenance of the infrastructure; one person at the school should be responsible. In particular, at primary schools, these structures still had to be put in place. Even when a school opts for the “BYOD” concept, it still has to ensure that it has a certain infrastructure in place. The concept brings even new challenges for the school infrastructure and the lesson delivery in terms of compatibility of different devices. When introducing mobile devices in class, an orientation phase is necessary in the beginning both for teachers and students, especially if they have no prior experience of working with the devices. For the “old” project schools, technology and infrastructure has not been an issue anymore. **GD-CS 16**

- B.** The diversity in the levels of school and student resources is often an obstacle to ICT-related projects in general, and to *EduScratch* in particular. In fact, while some schools are already very well equipped, most schools do not have enough functioning resources. (...) One particular obstacle in this area has been the erratic functioning of the *EduScratch* portal, crucial for the maintenance of the community of practitioners, and which has recently been targeted by spam attacks that led the ministry systems administration to temporarily reduce the portal’s interactive resources. **GD-CS 18**

D33. Students responsibility in relation to the use of ICTs

- A.** [An] element that worked well was to give students responsibility for their own device and to allow for the use both at home and school (for educational and non-educational purposes). (...) The project coordinator recommends participating schools to conclude an agreement with each student on the use of the mobile device. (...) One issue the project devoted particular attention to was the potential of mobile devices to distract the students’ attention. (...) The majority of teachers does not seem to see this risk of distraction as a fundamental problem to the use of mobile devices. **GD-CS 16**

D34. The Website as communication context and monitoring of the proposals.

- A.** Online collaboration is the basis of the cluster activities, but can not replace the personal contact. The step from “meeting virtually to meeting face-to-face” has been seen as an important enabler for the project work between schools. Therefore, the schools being located close to one another can be beneficial to the project. In the school year 2012/2013, so-called “Buddy-systems” were often developed and tested: older students taught younger students from other schools. This concept has proven to be a win-win situation for all students involved. (...) During the cluster projects several achievements of the project became apparent: students digital competences and media literacy improved as well as their subject knowledge. Further, social competences were fostered, e.g. empathic skills, collaboration skills, project management and pedagogical skills. The project work also improved the relationship between students and their teacher. Finally, the project fostered teachers’ professional development and motivation. **GD-CS 16**
- B.** Schools taking part in the pilot project had to put together a team in their school that would implement the ICT management project. After putting their team together, schools had to carry out the self-evaluation, for which there was a web tool on the ICT management and assessment model for schools website. **GD-CS 17**

- C. The partnership formed with the private internet service provider *SAPO* has been important for the development of the project's online presence, through resource-sharing via the *SAPO* web portal, and more recently with the *MEO cable TV* (Channel 151232) the use of *EduScratch* (...) the impact is clear from the presented student projects (both in traditional conferences and on the online portal), and from teachers' reports on students' accomplishments and increased motivation in a variety of areas (even outside of school). **GD-CS 18**
- D. A special website was constructed and is open for everybody wishing to participate. Although mainly addressed to teachers, students and parents can also benefit from it. What is worth mentioning is the fact that teachers and other website users can exchange their views on the tasks included in the database as well as provide administrators with useful comments. Opinions collected via Internet show that the database is well evaluated by teachers as a helpful instrument that supports them in their everyday work with students.(...) The updated website contains not only tasks directed at teaching and developing key competences in education, but also examples of good practices identified during the Institute's research. Those good practices also evolve around key competences and higher order skills and are real-life examples. **GD-CS 19**

D35. Publication of materials, guides, videos, examples and other supporting documents to accompany the processes for continuous training of school team

- A. The project coordinators published 10 step guidelines for the implementation at school level. The first steps are to define the motivation to use mobile devices in class, identify a target class and convince parents. Then each school should develop a pedagogical concept for the school, conclude agreements with each student on the use of the mobile device and check whether infrastructural /technical requirements are in place. As a next step, the pedagogical concept should be implemented together with several teachers (including the visits of each other lessons). Finally, there should be an exchange with other schools and a strategy for the sustainability of the project. The evaluation report 2010/11 showed that most of the schools had implemented the 10 steps programme entirely or partly by the end of the school year. **GD-CS 16**
- B. The ICT management programme ensured that the schools ICT documentation (guidelines etc.) was reviewed. It was also concluded that this documentation should be renewed on a regular basis, since the field of information and communication technology is a rapidly developing one. (...) In June 2013 a new and improved version of the ICT management booklet was published, where examples of best practice from the pilot schools were added. In addition, examples of documents were added to the booklet for other schools to use and adapt to their own needs. **GD-CS 17**
- C. The Institute publishes a newsletter that is sent to subscribers and people interested are informed about new materials that are ready and waiting for them online (of course, there is always an option of just printing the tasks). **GD-CS 19**

D36. Participation of families

- A. Parents need to be informed in advance about the advantages of working with a mobile device in school. Since 2011/12, the project recommends schools that students can bring

and use several devices “BYOD”. In that setting, parents’ consent is even more crucial. It proved to be helpful to show parents what happened in the classroom and explain to them that mobile devices enable new forms of innovative pedagogy. Another enabling element seems to be a quick start of the project after the decision on using 1:1 devices in a specific class has been taken, to avoid frustration on the side of parents and students. **GD-CS 16**

D37. The participation of academic institutions (universities, research centers or initial teacher training institutions) in the dynamics and/or research of the initiative

- A. The programme coordinators point out the necessity for more applied research into the development and transference of key competences into traditional curricular areas through the use of *EduScratch*. Even though the impact is clear from the presented student projects (both in traditional conferences and on the online portal), and from teachers’ reports on students’ accomplishments and increased motivation in a variety of areas (even outside of school), there is a recognition for the need for formal research in the area in order to more clearly explore this intended result. **GD-CS 18**

D38. The importance of reporting/dissemination/promotion between teachers the possibilities offered by virtual resources about teaching and assessment practices, and the competencies.

- A. Another pending issue is the promotion of the *Database* among teachers. The Institute realises that its website is not the typical place where teachers would look for materials that they could use in their everyday work. They would rather search special websites and portals that are dedicated especially for this purpose. Various attempts to promote the *Database* were made, also with the help of a professional PR agency. An example of an activity that was designed to make the *Database* known to the general public is the Good Practice in History lessons competition. It was designed for teachers to come up with good practices in real school situations. Simultaneously, the *Database* was promoted on the radio and in national newspapers. The authors of the tasks wrote articles for educational newspapers, always with examples of tasks in the *Database*, we also published comments to the exam tasks and always took the opportunity to direct people to the *Database*. However, it cannot be said that the Institute is a hundred percent satisfied with the results of these promotional activities. It is aware that there are many teachers who do not know about the existence of the *Teaching Tools Database* and there is still some work to be done. **GD-CS 19**

**Summary: variables selected in Group D (4 initiatives pertaining to KeyCoNet multiple-case study):
Initiatives code: GD-CS 16; GD-CS 17 GD-CS 18; GD-CS 19**

GC	Variables identified	Shared frequency
D1	The initiative is inserted into the network of European and/or national actions related to the pedagogical use of ICT tools and the consistent competence development that it fosters.	4
D2	The initiative is an official program designed ad hoc and intended to facilitate to school teams and students the development of the digital competence through the pedagogical use of ICT.	1
D3	The initiative is a program designed ad hoc by different partners (from public and private sphere) and intended to facilitate to school teams and students the development of the digital competence through the pedagogical use of ICT.	3
D4	The initiative stems from a collaboration between different bodies of education authorities and, in turn, between them and schools.	1
D5	Initiative focused primarily on competence development of students from secondary level	1
D6	Initiative focused primarily on competence development of students from basic education	1
D7	Initiative focused on competence development of students from different education levels	1
D8	Reports on social and professional requirements to which the European citizen faces facilitate the implementation of initiatives that enhance competence development in students	1
D9	ICTs as the main tool to achieve educational, training, advisory and school management objectives, etc.	4
D10	The implementation of the competence-based model at school level requires a change in mindset of teachers: a shift from ITCs as	4

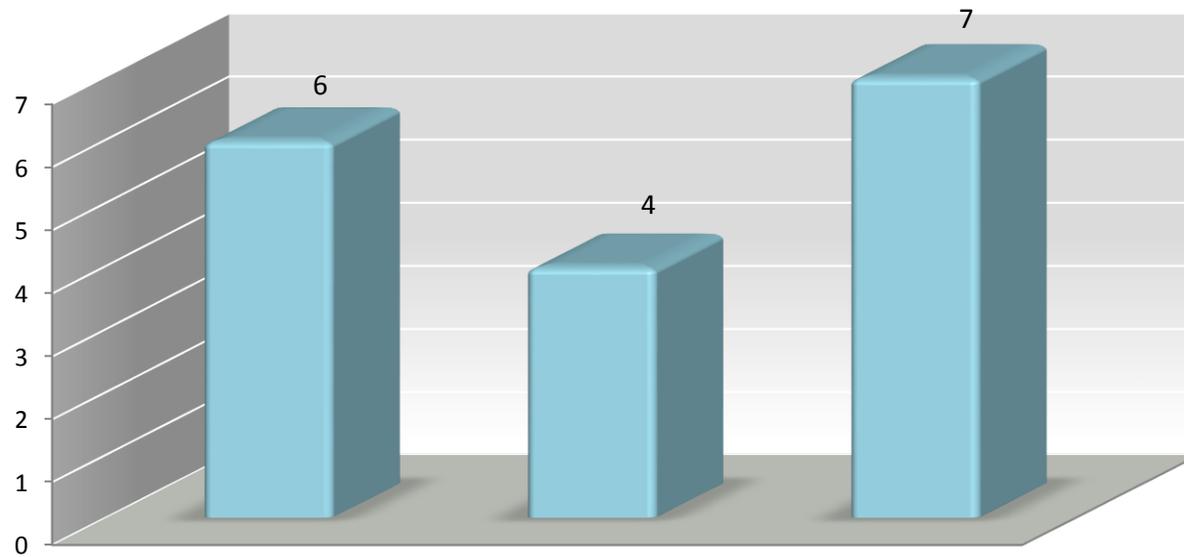
	object to the pedagogical use of the ICTs as pedagogical tools.	
D11	Deploying of the initiative from a initial training proposal focused on the development of digital competence.	3
D12	Curriculum cross-cutting and key competences	2
D13	Coordinate activities from a central organization giving prominence to the network participants.	2
D14	Organize a teacher trainers network.	1
D15	Integrate into the teacher training plan the perspective provided by experts in various disciplines (multidisciplinary approach).	2
D16	The advisability that members of the professional team share between them the issues and the foundation of knowledge that each of them brings into training (transdisciplinary approach).	1
D17	Training sessions for school managers	1
D18	Groups of experts evaluating the use of ICT in school management and deliver an advising report	1
D19	Self-assessment of the school team	1
D20	Resources for the teaching: tasks and teaching practices that promote student's competence development.	1
D21	The need to reflect on the characteristics of the tasks that foster the development of key competences.	1
D22	Relations between the tasks and the specific competences that its solving allows developing	1

D23	Participation of teachers in materials development that the initiative includes in its proposal	1
D24	School textbooks: need to be compatible with the competence-based model	1
D25	The teaching team constitutes a learning community dedicated to analyzing the pedagogical and/or school management use of ICTs environments.	4
D26	The school management team has a decisive role for the development of the initiative.	2
D27	Generate synergy between schools: networks that exchange knowledge, experiences, resources, etc.	3
D28	The exchange of experiences, strategies, consultations, etc. between teacher teams promotes the professional development of teachers	4
D29	Collaborative culture fosters that all participants (students, teachers, trainers, management team, etc.) achieve better competence levels.	2
D30	Teachers get certification of the continuous profesional development received in the context of the initiative	1
D31	The school makes a commitment to the initiative	2
D32	The school have to be provided with ICT infrastructure to develop the initiative	2
D33	Students responsibility in relation to the use of ICTs	1
D34	The Website as communication context and monitoring of the proposals.	4

D35	Publication of materials, guides, videos, examples and other supporting documents to accompany the processes for continuous training of school team.	3
D36	Participation of families.	1
D37	The participation of academic institutions (universities, research centers or initial teacher training institutions) in the dynamics and/or research of the initiative.	1
D38	The importance of reporting/dissemination/promotion between teachers the possibilities offered by virtual resources about teaching and assessment practices, and the competencies.	1

GROUP "D"

N = 38 variables - 4 initiatives



Non-shared variables (GD): 21

*(D2, D4, D5, D6, D7, D8, D14, D16, D17, D18, D19, D20, D21, D22,
D23, D24, D30, D33, D36, D37, D38)*