



The Future of Learning?

Results from the iClass Project

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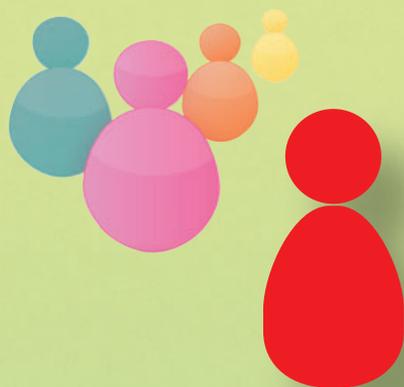


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Foreword

Education is changing, has changed, and will change further in order to reflect the diverse needs and expectations of the world today. New technologies are helping make those changes effective. Across Europe reforms of school education are placing the learner at the centre of teaching and learning, and school performance is increasingly measured by the changes in children and young people as they go through the system.

Building schooling around the learner is not a new concept but it places heavy, even unrealistic, demands on teachers – unless technology can be harnessed to serve teachers and learners. ‘Personalised learning’ is politically appealing but problematic to achieve in the schools of today. First because the concept itself is often nebulous and second because the current generation of technological tools and services may not provide the expected results.

This is why iClass was developed. The iClass project was the only Framework Programme 6 Integrated Project aimed at the school sector of lifelong learning and brought together partners from education, research and industry. Their aim: to work on both an advanced learning model built around the empowered learner and a prototype system that frees teachers and learners to design individual learning paths modelled on learner preferences, preferred learning styles and past performances.

That is also why European Schoolnet worked on the iClass project. This booklet, aimed at education decision-makers, describes the work carried out in iClass in this critical area. The early results are promising and offer a glimpse into what may well be commonplace in schools in a few years’ time.

We commend this booklet and urge anyone interested in a school fit for the future to read it and make up their own mind. Is iClass the future of learning?

European Schoolnet

Introduction

Today's education systems face unprecedented challenges: crowded classes and demanding curricula mean that teachers have less and less time for individual students which in turn causes frustration for both they and their learners.

Poorly motivated learners and school truancy also result from the growing gap between learners and their needs, and what schools and teachers offer. The iClass project, which started in 2004, aims to bring an innovative model for teaching and learning to schools in order to address these issues.

The project was developed by a collective effort of 17 partners (originally 22) in a major integrated project funded by the European Commission's Directorate General for the Information Society.

The iClass project's results consist of a pedagogy (Self Regulated Personalised Learning) and an adaptive intelligent system exploiting the potential of ICT to support a personalised, flexible, learner-centred approach.

This booklet presents these results. It aims to inform Ministries of Education, school heads, teachers, researchers and industry about iClass and discuss its results in the light of issues such as the place of the learner in schooling systems, the role of the teacher in the 21st century, the role of the school and of formal and informal learning, personalisation and self regulated/autonomy of the learner.

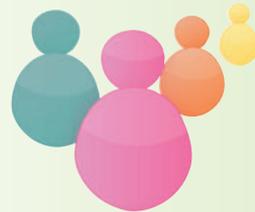
In this book, each of the main concepts in the iClass pedagogical model are described under two spotlights in the 'iClass components' sections: theory (on the left-hand pages) and practice (on the right-hand pages) together with screenshots. Thus, you can see at a glance how a theoretical framework translates into a concrete technical implementation.

Other sections of the book include the history of the project and opinions of teachers raised during the iClass validation workshops.

The iClass Pedagogical model: SRPL

In the early stages of the development of iClass, the aim of the project was to design a platform which would through a series of automatic customisations offer a new learning experience, effectively a 'teacher replacement tool'. This was to fail eventually and was abandoned. When the project took a new direction in 2006 (see chapter on genesis of the project), the aim was to put the learner in the driving seat. Instead of a smart artificial intelligence-based algorithm, learners were placed at the centre of the system, and asked to define their own learning style, paths and profile. These are brought together under the concept of Self Regulated Personalised Learning (SRPL).

SRPL promotes the **personalisation** of the learning process. It stresses the self-directedness and self-efficacy of each individual student to make **mindful and meaningful choices**, and thereby enhances intrinsic motivation. SRPL stands on three interconnected and mutually supportive pillars: **self-regulation, personalisation and intrinsic motivation**.

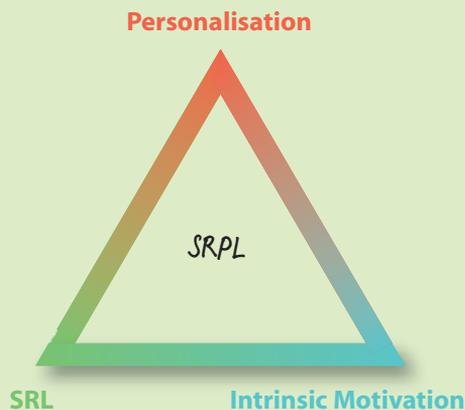


Self-Regulation describes learning that is guided by **metacognition** (awareness of one's learning process), strategic action (planning, monitoring, and evaluating personal progress against a standard), and **motivation** to learn.

Personalisation of learning offers what teachers have always tried to achieve in class: adapt their teaching to the students' characteristics, preferences and interests and enhance learners' motivation. It places the students in the driving seat, empowering them to make autonomous choices based on their own assessment of a given situation and learn from successes and mistakes.

Intrinsic motivation, in contrast to external motivational factors such as rewards, encouragement, punishments and prohibition, refers to the inherent curiosity to seek novelty and challenges.

Self-regulated personalised learning is considered to be a developmental process where an individual's identity as a lifelong learner is established.



¹ the iClass platform can be accessed here: <http://release.iclassproject.com>

Introduction

The **technical system** is a prototype¹ to demonstrate how technology can support SRPL. Some of the main features of the platform are highlighted below, showing SRPL through a hypothetical lesson (some of the main features of the system are in highlighted in bold).

The user interface contains three sections corresponding to the various phases of SRPL: Plan, Learn, Reflect.

*The teacher creates a **learning plan** in iClass based on a goal to be achieved by the student and suggests some **sub-goals, activities** and **outcomes**. As we are in a system which promotes the personalisation of learning and the autonomy of the students, some activities can be left 'open' for the student to shape (from the **assessment** method to the actual content of the assignment). The teacher can lock some sub goals and activities, this way the learner will have to complete them at a given time and according to an assignment decided by the teacher.*

In class, the teacher explains to the student there is a new learning plan about the Trojan War assigned to each pupil in the class. The teacher invites all pupils to login to iClass, and gives them a short practical introduction to SRPL. The iClass system gives them a degree of freedom to choose from, when and how to complete tasks, define activities and assessment methods.

*Students click on the 'Learn' button to start activities using a personalised sequence of tasks, based on learning objects selected by the teacher from a linked repository. During this process, a system called 'tips and alerts' supports the learner, inviting him/her to visit the **handbook** from time to time. Based on data collected from several sources including the **personal choices** of the students as pre-defined in his or her **personal profile**; activities and choices made, personal learning preferences such as whether or not he or she likes to work alone or in a team, on entries posted in a personal journal: iClass does what every teacher would do in this situation and asks 'Can you explain your choice?' The students use the personal journal to explain.*

*Finally the 'Reflect' button aggregates all the information about how the learner has reached his or her goal, with whom and using which methods or exercises in a **Personal Space**.*

The iClass system regularly advises the learner to take a look at this overview as a mirror of his or her own learning path.

The strength of the system is that it can be used in combination with traditional learning approaches: activities and goals can be handed in or assessed in a completely traditional way if needed. What iClass offers is a system to facilitate self-regulation of learning, self-reflection, goal setting and planning.

Activities



Sub-goals
The learning plan

Goal

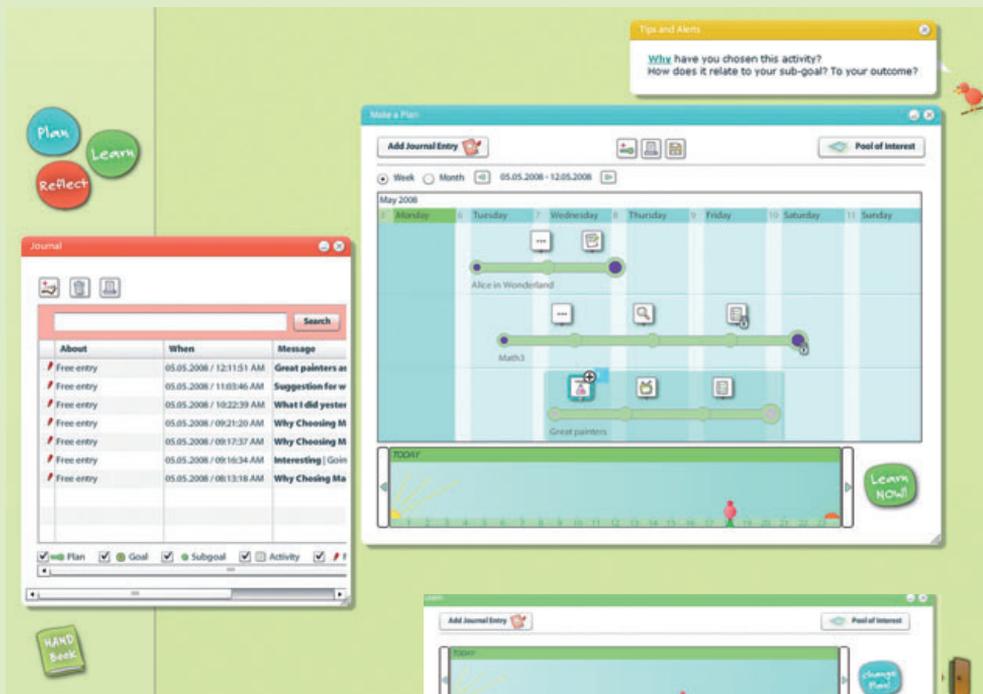
The journal is a key element as regards self-regulated learning as this is where students are invited to report on their learning process. It is a private area made 'by the learner for the learners' and which is only accessible to them.

The planning tool is for teachers to experiment with the degree of openness of their teaching methods.



In iClass, teachers are also engaged in a reflection process as SRPL invokes a shift in the teacher's role towards the support and guidance of learners' development as autonomous students. The system confronts them with questions such as "how open is my style of teaching?" and "am I ready to let students take charge of their own learning?" These questions encourage them to assess how much freedom of choice they are ready to delegate to their students.

iClass therefore raises fundamental questions about the relationship between teachers and learners in 21st century schools. Does iClass point to the future of learning? Join the online discussion on the Insight portal² and share your views!



The iClass platform

Learning with iClass

² European Schoolnet – Insight portal (<http://insight.eun.org>)



iClass is one of the largest projects funded by the European Commission DG Information Society to create an intelligent Distributed Cognitive-based Open Learning System (iClass) for schools; in short the development of an advanced pedagogical model and platform exploiting the potential of ICT to support a personalised, flexible and learner-centred approach. Since the very beginning, the project has aimed to take a different road to learning platforms such as Moodle or Blackboard by placing the learner at the centre of the learning process (as opposed to the teacher).

New momentum

In 2006 the project was given a new momentum under the pedagogical lead of the Ben Gurion University in Israel, the concept of Self Regulated Personalised Learning (SRPL) was introduced and became the pedagogical backbone of the project. The aim was to establish a commonly agreed vision – the Self Regulated Personalised Learning (SRPL) model – and to use this model and guidelines throughout the work packages and by all the partners.

SRPL

The basis of the SRPL model is learning how to learn, to empower learners to make meaningful choices when they learn and reflect upon them. The ultimate goal is to achieve sustained motivation of the learner while completing tasks and acquiring skills. Achieving personalisation in the classroom is every teacher's dream often faced with the reality of crowded classrooms and a demanding curriculum.

The pedagogical model of iClass is quite powerful but translating this into a web-based learning platform is a challenge. iClass is an intelligent system which will give feedback 'on-the-fly' to the learner about the choices he/she makes when he/she learns, his/her learning path and the difficulties he/she may encounter. As developers for the project put it:

"A system based on a self regulated personalised pedagogy and self regulation comes with a severe cognitive load" said Ali Turker, project manager for Turkey-based Sebit, responsible for the technical implementation of iClass. "What we try to do is to ease that load and also motivate the user to do more about their planning, engage in learning activities and share them. This is very demanding in terms of technical implementation."

A multicultural consortium

iClass is one of two integrated projects in the area of education to be funded under the 6th Framework Programme. The budget for this four-and-a-half year long project is over €13m out of which €9 million is European Community funding.

Key concepts in iClass

PERSONALISATION *The Learning system is designed with a learner-centred approach to education.*

COLLABORATION *iClass is a collaborative environment for teachers, students, parents, ministries... where it is possible to exchange learning plans within a community or users.*

UBIQUITOUS ACCESS *As the system is web-based, iClass can be used in traditional environment settings as well as from multiple other places including home. This allows the system to be fit for formal and informal learning settings.*

OPEN ARCHITECTURE *The system is based on international standards for the sharing and tagging of learning resources (SCORM) allowing full interoperability of the content. Content created by teachers in iClass can therefore be shared across multiple platforms and learning environment.*

RICH CONTENT *The system gives access to a wealth of rich media residing at distributed repositories. As the system is SCORM compliant, it can connect to federated repositories of learning resources such as the European Learning Resource Exchange (LRE).*

ADAPTATION *The system is adapted to different learning styles, existing knowledge and cultural backgrounds. The three steps which correspond to the various steps in the SRPL model of 'Plan' 'Learn' and 'Reflect' should fit any learning situation and can be used to teach a range of subjects be it within or partly or fully outside the national curriculum.*

The project consortium consists of 17 partners (originally 22) led by Siemens IT Solutions and Services, working to develop iClass as an intelligent cognitive-based open learning system and environment, adapted to individual learners' needs at a European level.

The iClass consortium includes four of the world's leading IT companies, three SMEs with state of the art learning and new media technologies, three multinational school networks who pilot and evaluate the iClass results during the project and leading European research partners in cognitive science, pedagogy and artificial intelligence.

Work is divided as follows:

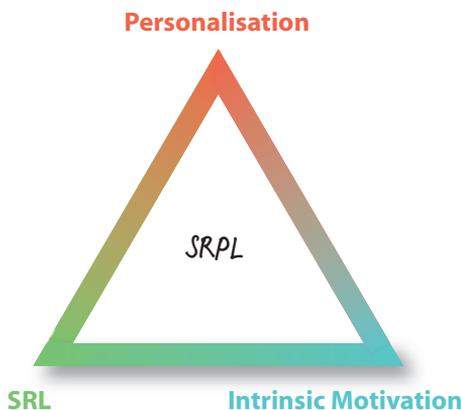
- Industry and SMEs: architecture, design and development, prototyping of the iClass platform, project management
- Research Centres: pedagogical model, research, requirements and design
- Network of schools: requirement, piloting, dissemination and validation

At the end of this publication, you will find a list of iClass partners and their responsibility in the project. iClass results from concerted effort of all these partners who continue to contribute to the various work packages to make iClass a system adapted to its users' needs.

Self Regulated Personalised Learning: Overview

What is SRPL?

SRPL, or Self-Regulated Personalised Learning, is a multidisciplinary conceptual pedagogical framework, which combines humanistic values as well as various psychological and pedagogical approaches. It is all about placing the individual learner at the centre of the learning process and highlights the student's ability to tailor the learning process to his or her own interest, abilities and needs. It thus acknowledges differences among learners and teachers, school policies, cultural differences and individual affiliations. As SRPL takes on a learner-centred approach it thus focuses on learning how to learn.



While inspired by the Self-Regulated Learning (SRL) methodological framework, SRPL goes beyond prevailing SRL approaches by promoting the personalisation of the learning process. It stresses the self-directedness and self-efficacy of each individual student to make mindful and meaningful choices, which in turn enhances students' intrinsic motivation. SRPL thus stands on three interconnected and mutually supportive pillars:

- Self-Regulated Learning (SRL)
- Personalisation
- Intrinsic motivation

Self-Regulated Learning (SRL)

Highlights the process in which the learner sets goals and sub-goals, monitors the progress towards their completion and adjusts his/her cognitive and learning processes and strategies in accordance with the outcomes of the monitoring process. iClass builds on Zimmerman's model of SRL, which portrays a cyclic process based on three phases, relating to three points in time:

- **Forethought** (task-reflection pre-action) – the premeditated processes taking place before learning. Include meta-cognitive processes such as task analysis, goal setting, and strategic planning [See: “Proof of concepts about planning”; “Metacognition”]
- **Performance** (task-reflection in-action) - meta-cognitive and behavioural strategies aimed at enhancing the quality of performance. Include self-observation strategies such as meta-cognitive monitoring and behavioural recording.
- **Self-reflection** (task-reflection post-action) - processes that influence forethought and subsequent learning efforts. Involves self-evaluation of the performance compared to prior performance, others' performance, or a standard of performance, as well as affective and motivational reactions to self-regulatory efforts. [See: “Reflection”; “Metacognition”]



Personalisation

In SRPL, the above three basic dimensions of self-regulated learning are supplemented by personalisation, which emphasises the need to tailor the learning process to the specific needs and interests of each individual learner.

SRPL underscores the students' possibility to make mindful and meaningful choices that reflect their own preferences, interests and needs.

By so doing, SRPL places the students in the 'driving seat', thereby augmenting the students' self-directedness and responsibility over their learning. SRPL highlights the **autonomous** competence of each individual student to make his or her own choices and to learn according to their own pace, interests and abilities.

By so doing, SRPL not only focuses on the self-reflective endeavour to persistently improve the students' learning skills, but more importantly promotes the development of lifelong learners and the well being of individuals. [See: "Self Profile"; "Proof of concepts about planning"; Reflection"; "Exploration"].

Intrinsic motivation

A fundamental premise of the SRPL framework is that by allowing growing levels of openness (choice), autonomy, self-regulation, and personalisation of the learning process, so grows the students' intrinsic motivation.

By supporting the emotive-emotional dimensions of learners (their needs, abilities and preferences) SRPL promotes their commitment and motivation to learn. Rather than grounding motivation on external rewards and punishment, SRPL envisions the development of intrinsic motivation in the tailoring of the learning process to the personal preferences of students and to the degree of control that students have over their learning. [See: "Intrinsic motivation"].





Linking theory to practice

One of the main challenges in iClass was to translate a complex pedagogical model, based on several concepts/components, into practical implementation using a web based interface. iClass is based on the idea of empowering learners to be in charge of their own learning process, make their own choices and reflect on them; but how can this be achieved in practice?

In this section we look at the main concepts in iClass. For those interested in knowing more about this innovative platform and pedagogy this section provides an outlook of the main conceptual models of iClass as well as how it works in practice on the iClass platform.

It is also a useful guide for teachers as well who are unfamiliar with Self Regulated Learning and personalisation of learning and wish to identify how the online platform translates the pedagogical model to use iClass to its full potential.

For each of the component we give, on the left, an overview of the theoretical framework behind the component and on the right-hand page, as a proof of concept, how it is implemented in the iClass platform.

iClass components include:

- Choice
- Exploration
- Formal – Informal
- Intrinsic motivation
- Knowledge Space Theory
- Metacognition
- Openness
- Reflection
- Self profile

Picking and choosing

A crucial part of the pedagogical model developed in the iClass project is the concept of choice. Choice refers to the action of selecting one of at least two given options, where the learner is free to select any of the options given.

A distinction is made in choice theory between picking and choosing. Choosing occurs when the choice we make is based on two conditions: mindfulness (the full understanding of the options presented to the learner at the semantic and practical level) and meaningfulness (whether the choice is significant to the individual learner and reflects his or her personal preferences). Without these two conditions, the action of choosing sums to nothing more than arbitrary picking, an empty selection that does not reflect the individual's deep preferences and characteristics nor supports them.

Meaningful and mindful choice

Researchers at the Ben Gurion University in Israel give the following example to make the distinction between meaningful and mindful choice and the simple action of picking:

Two teachers start a new subject – “Great Painters” with their pupils. Dan, the teacher of class 1, starts with a brief introduction to the subject, and then gives his pupils an assignment: each one of them has to choose from a list of 12 great artists, on one of which he/she is going to write a project.

Lisa, the teacher of class 2, also starts with an introduction to the subject, but then she shows them a list of 6 great painters and spends some time telling them a little bit about each painter. Then, she gives her pupils an assignment: first, they need to find out some more about three to six of the painters. Only then, they can choose one painter which interests them, and write their project. What are the similarities and the differences between these two situations? Both of them suggest a methodology of choice. Both of them offer multiple choices and the freedom to choose from several given options. The second one suggests a choice based on a deeper understanding of the options, and offers a greater chance to make a choice that is more relevant to the learner. Thus, the learner's commitment to his/her choice will be greater. It can also strengthen the learner's ability to learn from his/her choices and improve his/her decision-making and wonder: ‘Why did I choose this and not that?’ ‘What does it teach me about myself?’ ‘Am I happy with my choice?’ increasing the learner's sense of autonomy and self-competence.

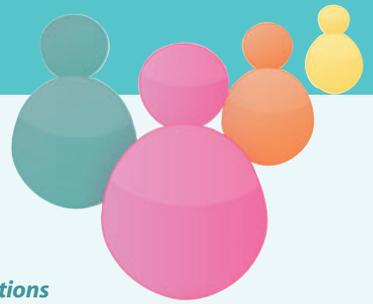
Making meaningful choices - and the process of self-reflection that follows from it, is a cornerstone of the SPRL model and is a central element for creating and sustaining intrinsic motivation throughout the learning process (see chapters on SRPL and Intrinsic motivation).

Proof of concept

There are various features and locations within the iClass system that support and encourage individual choice. Below are a few key examples illustrating how iClass enables choice.

Planning: The planning tool supports self-regulated learning by offering a wide range of options to choose from, from goal-setting and defining to assigning one's own activities and determining one's own timeframes. Making choices regarding the various aspects of their plan enhances the students' interest and motivation to learn.

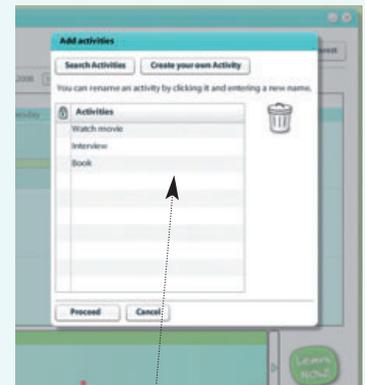
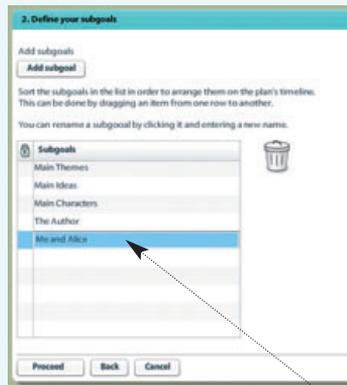
Planning is a crucial element of self-regulated learning. While the iClass planning tool is designed to support various levels of openness and thus is adaptable to almost any learning environment, it nevertheless encourages growing levels of openness, choice and personalisation. To begin with, the planning tool follows a step-by-step sequence of the various elements of the planning process, thus enabling students to become more familiar with different stages of planning. Moreover, the planning tool enables users/students to set their own goals and sub-goals, activities, and timeframes. It also displays sensitivity to various aspects of the learning process that students are usually not exposed to or do not have the possibility from which to choose. For instance, the planning tool provides users the possibility of choosing between various assessment types and modes, outcomes, and the possibility to define reminders for their timeframes. Furthermore, throughout the planning process, users are encouraged to provide descriptions for their various planning elements, thus promoting mindful and meaningful choice.



Examples from "Make a Plan" sections



The learner may define a plan according to his/her own interests and regulate the learning process in the way that suits him/her best.



*Personalised learning: Learners may add **sub-goals** of their own. They can also choose to add their personalised **activities** to their learning plan (depending on the degree of openness of the plan)*



Exploration

Plan

Learn

Reflect

“Exploration is a behaviour in which an individual translates innate curiosity to a deliberate active experimentation or nonlinear search for information and at the same time examines and evaluates this process in a self-reflective manner (a search for meaningfulness)” (Flum & Kaplan, 2006). The provision of a multiplicity of options and the freedom to try any of them is a precondition for exploration. Exploration is thus the process of giving careful thought and consideration to something in an uninhibited and open way.

“Exploration can promote a sense of competence and autonomy, and when done consciously, it can be used to support the development of individual interests and is thus motivational. An outcome of the exploration processing is the creation of self-relevant meaning (meaningfulness) with an integrative effect, and thus the facilitation of development. For linking experimentations with reflection there is need for provision of opportunities for knowledge building, encouragement of interaction with peers and experts and encouragement for considering the links between the experiences and self-aspects” (Flum & Kaplan, 2006).

To understand better why exploration in iClass is crucial in order to sustain an effective learning experience take the example of young children faced with discovering a new environment.

When children get to know their playground surroundings and take their first steps, everything is new to them and becomes a matter of exploration. During this process, they learn more and more about what they come across. In doing so, what they learn is not only about their playground, but also about themselves: what they can do, what they enjoy and what they do not like. It is easy to identify how children faced with similar learning situations have unique learning paths and more importantly how they enjoy themselves while going about their exploration.

What can we gain by implementing some of the situations described above into the classroom? Exploration, as a pedagogical tool has been described as improving flexibility, initiative, critical thinking and adaptation to changes. Research also confirms that people learn more effectively by active enquiry rather than passive reception. Additionally exploration can promote a sense of competence and autonomy. When done consciously, it can be used to support the development of individual interests and is thus motivational.

Self-reflection

One thing we emphasise in this model is the perspective of self-exploration as an inseparable part of the process of exploring. While performing any exploration task (and / or after completing it), the students are asked to reflect on themselves and on the tasks they performed.

The concept of exploration is thus linked to other concepts further developed in this booklet: Intrinsic motivation, Choice and (self) Reflection.

Proof of concept



iClass has a special feature that supports exploration: the “explore” feature with which students can search for activities or lessons plans in an explorative manner. In this feature students have the possibility to learn about different activities outside of their plans or to search for additional activities that they can add to a given plan. Thus, the explore feature can be used either as an occasion to choose a learning goal by first exploring activities or lesson plans that they have not encountered yet, or to expand the variety of activities that they assign to plans in an explorative mode.



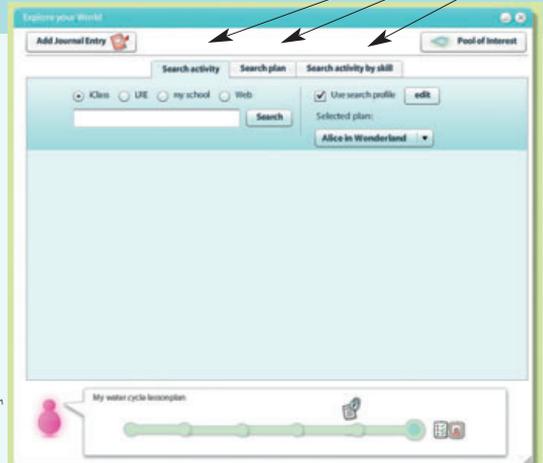
Students can search for activities or lessons plans in different ways, either by activity, plan or skill. For instance the search plan feature enables a search for existing learning plans created by peers, colleagues or the educational authority, featuring some ‘best practice plans’ which can be inspirational for teachers and learners.



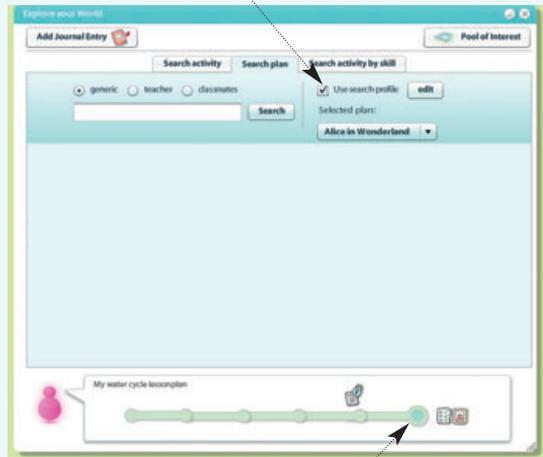
While looking for resources, teachers and students can use several search options including searching resources shared within the school/community, the web using the search engine, the iClass repository or a linked repository such as the Learning Resource Exchange (LRE), a federated repository of learning resources from 16 Ministries of Education and other partners.

Once the user finds the resource needed he or she can assign it directly to the selected learning plan.

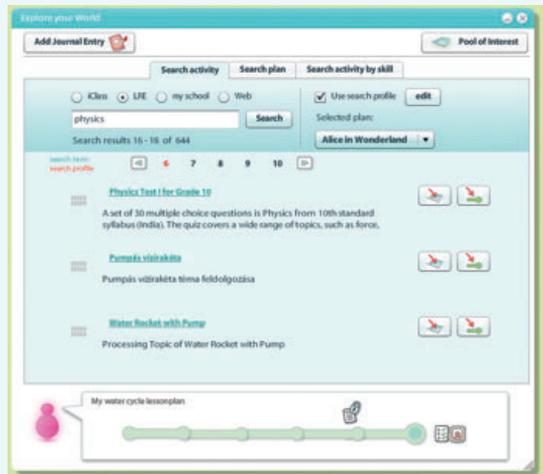
Different search option



Personalised Exploration, using the learner Self-Profile variables



Personalised Exploration: Staying in the context of the learner's plan





Formal – Informal

Plan

Learn

Reflect

Informal Learning occurs when a learner is motivated to embark in some self-directed learning. Attributes of formal and informal learning are typically described in terms of location/setting, process, purpose and content.

Formal learning regularly occurs at specific locations (schools, universities, colleges), oriented towards a specific purpose (degree, diploma, certificate). It usually does not support various learning styles, and is goal and knowledge-oriented. Informal learning, however, is far less rigid and focuses specifically on the learner's interests, preferences and needs.

The degree of informality of learning is the degree to which you haven't been told precisely what to do; informal learning focuses on creating a learning environment, setting one's own goals (rather than accepting predefined formal-institutional goals), and self-directedness (rather than direct instruction).

A further aspect of informal learning is that what has been learnt is not necessarily the result of a person's deliberate decision; it is a learning process that can take place when the person is unaware of what precisely it is that he or she has acquired.

Informal learning can be defined as a learning process which supports the needs and interests of the individual learner. Another way of putting it is by asking how much control the learner has over the learning process, and what degree of choice and options is at his or her disposal at any given time.

iClass allows teachers to assess the degree of openness of their teaching method. By definition a formal learning environment generally follows a rigid set of rules of learning that are commonly shared by all students, focusing on assessment.

Informal learning on the other hand promotes more creative and dynamic learning environments that encompass a greater degree of openness towards the content or topics learnt or, in particular, the way in which these topics should be learnt. By applying the principles of informal learning learners are better equipped to promote their individual expression, independence and self-directedness.

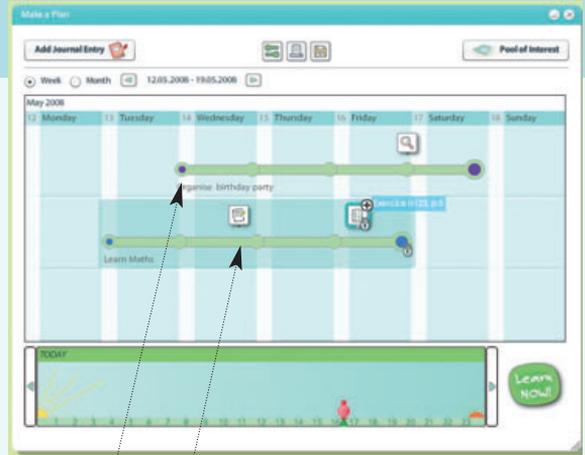
Thus, using the principles of informal learning in class means letting students take charge of their own learning to a reasonable degree. It encourages teachers to keep an open mind and be creative in choosing how to facilitate learning.



Proof of concept

iClass is a highly flexible learning environment that supports a wide variety of learning styles and approaches, from the very formal and structured to the very informal and open. iClass can be used either in formal contexts as a tool to assist schools and teachers or in informal settings to promote open-ended and explorative styles of learning.

In iClass, this flexibility of use is displayed mostly in its planning tool which can be used by teachers to assign plans in a fun and creative way to students without offering them any choice on the learning process. However, at the other end of the formal/informal spectrum it can also be used independently by students with very high levels of openness and choice. While the planning tool supports both possibilities, the iClass system as a whole – including the planning tool – encourages the enhancement of levels of openness and choice and promotes higher levels of student self-regulation and personalisation.



Informal and open learning
More formal and structured learning

1. Define the plan's title and goal

Plan's title:
Organise birthday party

Choose the goal's domain:
Cells

When should the plan start?
05/13/2008 1 o'clock

Set of skills:
No skills set

Plan's description:
My friends are coming on Saturday as it is my birthday party...

Proceed Cancel

2. Define your subgoals

Add subgoals
Add subgoal

Sort the subgoals in the list in order to arrange them on the plan's timeline. This can be done by dragging an item from one row to another.

You can rename a subgoal by clicking it and entering a new name.

Subgoals

- Choosing games
- Inviting friends
- Baking cookies

Proceed Back Cancel



Informal learning - Planning a project

Using the planning tool a student can plan projects, define goals and activities and engage in self regulated learning.



Formal learning – Learning Maths

A teacher creates a lesson plan, following official curriculum guidelines, but uses iClass to allow the students to reflect on the learning process. The teacher may also experiment with the degree of openness of his or her teaching style by leaving some activities open for the student to define.

1. Define the plan's title and goal

Plan's title:
Learn Maths

Choose the goal's domain:
Cells New domains

When should the plan start?
05/02/2008 9 o'clock

Choose the competence goal to reach:
Choose competence goal

Set of skills:
No skills set

Plan's description:
In this lesson you will learn how to add, multiply and subtract fractions to prepare for the test on Monday

Proceed Cancel

2. Define your subgoals

Add subgoals
Add subgoal

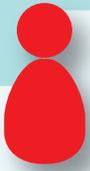
Sort the subgoals in the list in order to arrange them on the plan's timeline. This can be done by dragging an item from one row to another.

You can rename a subgoal by clicking it and entering a new name.

Subgoals

- Learn how to add fractions
- Learn how to multiply

Proceed Back Cancel



Intrinsic motivation



When you start using iClass, you find your students well accustomed to school. They know what classes are, what is expected of them, how they are supposed to behave and how they shouldn't. In other words, they are familiar with the school's framework and regulations. Also, in their minds, the dynamic of the teacher-student relationship is already imprinted.

In most cases and in most schools, students are also used to behave and perform according to external motivational factors (reward and encouragement, punishment and prohibition).

However, when we consider the reasons why people learn, inevitably we arrive at something that constitutes an end in itself; we want to do something for its own sake without expecting a tangible payoff for efforts made. It is the inherent tendency to seek out novelty and challenges, to extend and exercise one's capacities, to explore, and to learn. When learning reflects the learner's own personal interests and preferences and is performed in a personalised manner, then this constitutes intrinsic motivation.

The process of moving from an external motivation oriented education to the intrinsic motivation oriented education is a "step by step" process. As such, it requires patience and mutual trust between students, teachers and management. Trust, which is well connected to each of the three psychological conditions needed for facilitating intrinsic motivation in class, will act as a main factor in its implementation.

Although intrinsic motivation generates self-sustaining behaviour, it is not necessarily a self-sustained factor: it may arise in response to certain stimuli and disappear in presence of some inhibiting factors.

In order to create or to encourage intrinsic motivation in class, we suggest that the teacher focuses on managing tasks and projects in class ("what to do") and conducting a certain atmosphere in class ("how it is being done").

At the same time, and as research has shown, three psychological needs help to facilitate and sustain intrinsic motivation:

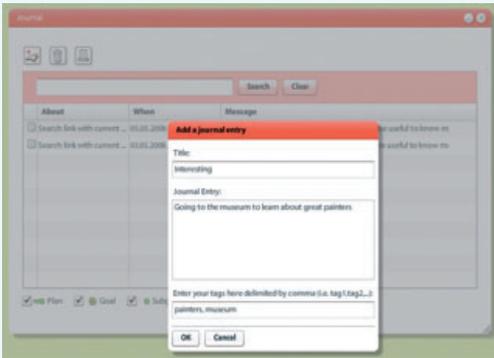
- Perceived competence - a feeling of competence and efficacy during the performance of an action.
- Sense of autonomy (self directedness) - a perceived internal locus of causality, or self-determined behaviour.
- Relatedness (sense of acceptance) - a sense of security, the immediate contextual support for autonomy and competence.



Proof of concept

There are two basic ways in which iClass supports and encourages intrinsic motivation. The first concerns the personalisation of the learning process – i.e. learning that reflects each student's own preferences and interests – and the second, self-regulation and self-monitoring. These aspects are supported in iClass's planning tool, the personal space section and the journal.

Example for personalisation – the Journal



The journal is a private area to which only the learner has access. It is used to explain choices made during the learning process, thus enhancing self regulation, self reflection and motivation (sense of autonomy).

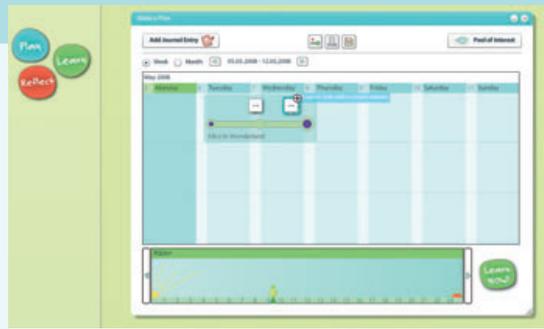
Example for personalisation – Personal Space

The personal space collects information about the learning path of the learner, what was done, with whom and what was learned. This facilitates the self reflection process and stems from the idea that learners should take a step back and reflect on their learning choices.

Content aggregator

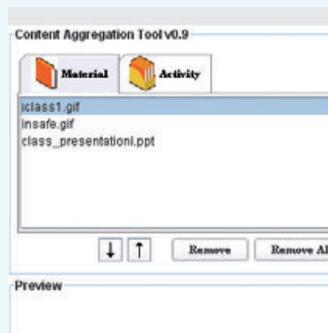
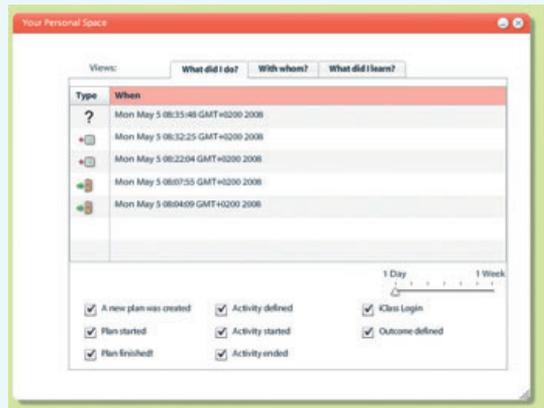
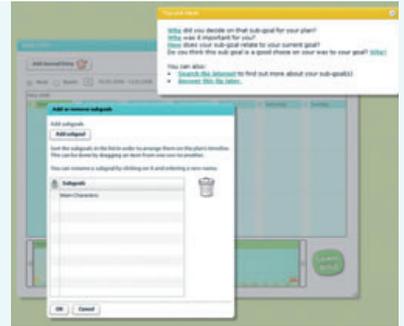
Students (as well as teachers) may also create their own content using the content aggregator. This is an in-built iClass feature which serves to bundle teaching materials, and tag them for future use. Content authoring enhances one's sense of competence and thus sustains the learner's motivation.

The content aggregator is compatible with SCORM and learning objects created with it can be shared easily.



Example for self regulation and self monitoring – "Make a Plan"

When a student adds a sub goal to his/her plan, for instance, a pop-up suggests that he/she explains how this sub goal relates to the main goal of the learning plan. The student uses his/her personal journal to explain.





Knowledge Space Theory

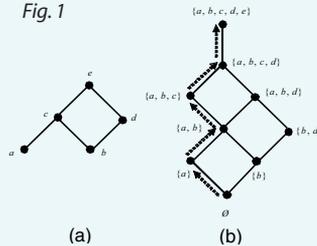
Competence-based Knowledge Space Theory

Knowledge Space Theory (KST) and its competence-based extensions provide a mathematical psychological framework for representing and structuring knowledge domains that can be efficiently applied in e-learning for adaptively assessing the knowledge of learners and for realising personalised learning.

In KST, a knowledge domain is characterised by a set of typical problems. The knowledge state of an individual is identified with the subset of problems the person is capable of solving. Due to mutual dependencies among the problems of a domain (based on logical prerequisites, instructional sequence etc.) not all subsets of problems are expected to be observable knowledge states. These dependencies are captured by the so-called prerequisite relation. Take for example two problems of basic algebra, an addition of variables and a linear equation. The first problem can be regarded as a prerequisite for the second one, as being able to solve the equation will certainly entail being also able to add variables. The collection of knowledge states corresponding to the prerequisite relationships defined for a knowledge domain, including the empty set and the whole set of problems, constitutes the knowledge structure (see Figure 1). Given

a knowledge structure, there are various possible learning paths moving from the naïve knowledge state to the state of full mastery. Furthermore, based on a knowledge structure an efficient adaptive knowledge assessment can be done presenting the learner with only a subset of problems by taking into account previous answers and exploiting the prerequisite relation.

Fig. 1



Competence-based Knowledge Space Theory (CbKST) does not only consider observable behaviour of a knowledge domain but also models its underlying latent skills and competencies. The relationship between skills and problems or learning objects of a domain is established through skill assignments associating to each item the skills required for solving the respective problem or taught by the respective learning object. By establishing a prerequisite relation on the skills a competence structure can be built in analogy to a knowledge structure. Accordingly, a competence state

is conceived as the subset of skills a person has available. The competence state of an individual can be determined in an adaptive assessment procedure by identifying the person's knowledge state and subsequently mapping the respective underlying skills. The assessment result can be used as a starting point for personalising learning - through recommending learning objects that convey skills corresponding to possible next steps in the competence structure.

CbKST provides a well-founded basis for enhancing self-regulated personalised learning (SRPL) in e-learning. Learners may not necessarily be fully prepared to direct their own learning because of some missing experience or competence in self-regulation and the subject domain, which calls for mechanisms of guidance to scaffold self-personalisation and self-regulation. Tailored support can be provided by exploiting information on the competence structure and current competence of a learner.

When choosing among learning objects or learning paths, the learner may be overburdened when being confronted with the whole range of options available in the learning system. Based on a competence structure the number of learning paths can be

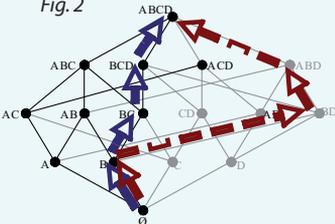
Figure 1. (a) Example of a prerequisite relation on a knowledge domain represented by a set of five problems. Ascending sequences of line segments indicate a prerequisite relationship. (b) Knowledge structure corresponding to the prerequisite relation in (a). The dashed arrows represent a possible learning path.

CbKST - Proof of concept

reasonably reduced (see Figure 2). Information on the learner's current competence state can be used to recommend learning options from which to choose that correspond to possible next steps of learning. For example, to a learner having available skill B learning activities teaching either skill A or C will be suggested (see Figure 2). In this way CbKST can be used for support in planning learning.

The adaptive assessment procedure for efficiently assessing the current knowledge and skills of a learner can be opened up to increased self-regulation. The learner may decide and plan when to undergo an assessment. Instead

Fig. 2



of one problem to be worked on next, several problems (that are equally appropriate) can be presented to the learner to choose from. Furthermore, a self-reflective assessment can be realised. By letting the learner judge whether he/she would be able to solve the problems presented (instead of actually solving them) he/she has to reflect on the learning process and acquired skills.

CbKST has been implemented in the iClass system through various tools which support SRPL. The visualisation of prerequisite structures and skills learnt provides visual guidance and feedback for the planning of and reflection on learning.

Skill-based planning (see Figure 3) can be used to set up a basic plan for learning. Based on the visualised prerequisite relation of the skills the competence goal is set by choosing those to be acquired and sequencing them taking into account the prerequisites. Then learning activities teaching the selected skills are searched for and added to the plan. New knowledge domains can be created and added by teachers through the use of a tool for domain structuring, where skills can be defined or edited and prerequisite structures can be established. Furthermore, learning activities teaching the defined skills can be assigned and problems assessing those skills can be created. A learner version of this tool can be used to reflect on what has been learned through defining skills in a simplified manner.

A tool for adaptive assessment allows for the determination of the learner's current level of competence. The assessment

procedure may be carried out by letting the learner actually work

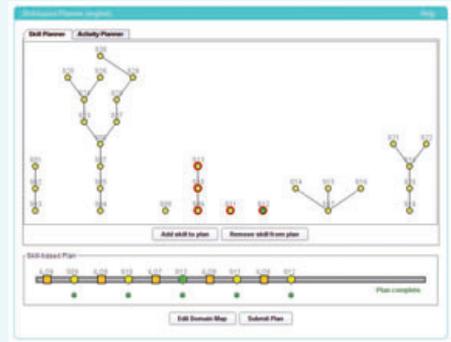


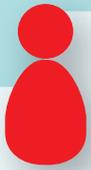
Fig. 3

on the problems – the assessment result is a verified set of skills that the learner has available. Alternatively, the assessment may be based on the learner's judgement of their ability to solve the respective problems; in this case the assessment result is an estimation of available skills based on the learner's self-reflection.

For the purpose of self-reflection a visualisation of what has been learned is provided to the learner. This visualisation includes information from different sources: the skills taught and the respective learning activities in chronological order, the assessment result, as well as the skills defined and estimated through the above mentioned self-reflective approaches.

Figure 2: Learning options and two possible learning paths for a set of four skills. The highlighted part constitutes a competence structure that reasonably reduces the number of possible learning paths. The whole structure including the grey part represents the whole range of options when disregarding any structure on the skills.

Figure 3: Skill based planning. Skills are selected and sequenced based on the depicted prerequisite relation. Learning objects teaching those skills are searched for and added to the plan.



Metacognition



Metacognition is thinking about thinking and knowing what we know and what we don't know. Perhaps the clearest statement on the meaning of metacognition has been provided by John Flavell (1976, 1987). Flavell described metacognition as "ones knowledge concerning one's own cognitive processes and products and anything related to them."

In simple terms it means a higher-order thinking which involves active control over the cognitive processes of learning.

Some of the activities that can be described as meta-cognitive in nature are:

1. planning how to approach a given learning task
2. monitoring comprehension
3. evaluating progress toward the completion of a task.

Meta-cognition consists of three types of knowledge:

- **Knowledge of person variables** (self-knowledge): general knowledge about how human beings learn and process information, as well as individual knowledge of one's own learning, cognitive and affective dispositions, strength and weaknesses.
- **Knowledge of task variables**: includes knowledge about the nature of the task as well as the type of processing demands that it will place upon the individual.
- **Knowledge about strategy variables** (knowledge of learning modes): includes knowledge about both cognitive and meta-cognitive strategies, as well as conditional knowledge about when and where it is appropriate to use such strategies.

iClass improves the learners' ability to learn by making them aware of their own role as

learners. By encouraging students to think about learning as a process beyond learning something (content, skill) iClass gives them the ability to control their learning environment much more effectively.

Metacognitive or reflective strategies form a crucial component in the development of the self-regulating learning environment.

One way of facilitating metacognition is to make it explicit and infuse the language of thinking and learning into the planning of teaching and into classroom discussion. The aim is to model the vocabulary we want children to use in their own thinking and understanding of learning by using it ourselves to describe our teaching.

This will also involve the direct explanation of terms being used, and also challenging children to define these terms in their own words.

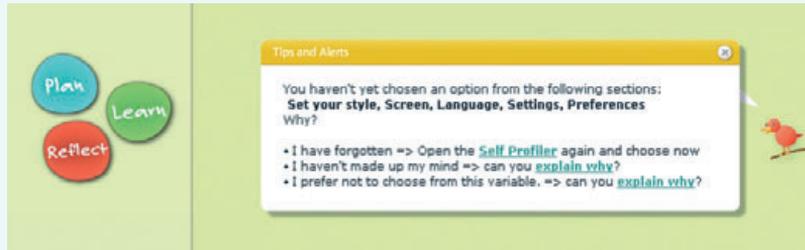
Another helpful way would be to create and share with the students an understanding or definition of the term 'metacognition'.

We need to encourage children to probe deeper into what they have said and what they think, through what has been called 'empathetic challenging' (Bonnet 1994). Enquiring into a child's thinking facilitates thinking. Metacognitive questions can offer the challenge children need to become conscious of their thoughts and feelings, before, during or after an activity. 'What helps us to learn in this lesson?' 'What do good readers do?' 'How should we plan this?'

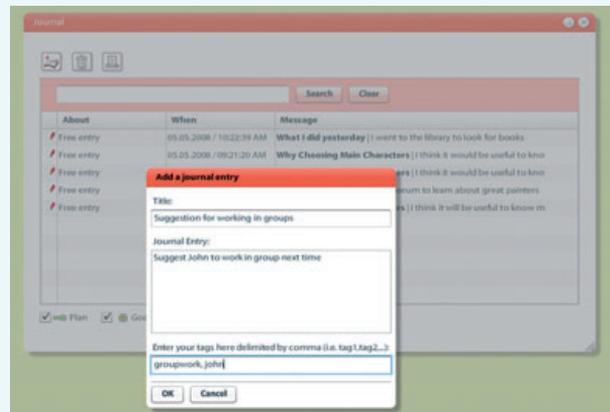
Questions such as "what do I know on this topic?", "Am I knowledgeable enough to proceed in this task", encourage processes of self-knowledge in which the student may assess and evaluate the depth of his/her own knowledge and learning capabilities, weaknesses and strengths.

Proof of concept

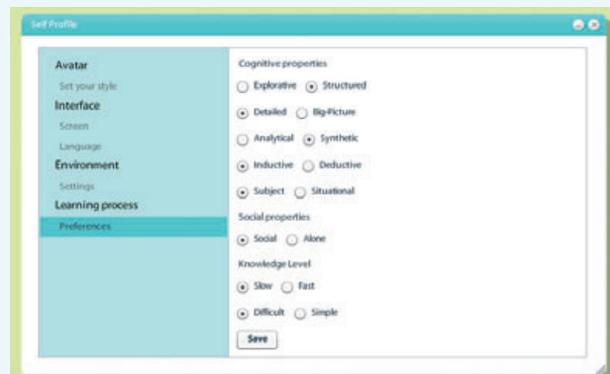
Metacognition is supported throughout the iClass system and reflected in its various features. First, the system of tips and alerts promotes - via automated and personalised questions - processes of reflection on the part of each individual user and entices users to engage deeply with how they think, the ways that they make choices and with possible paths to gain a better understanding on how they deal with problems they encounter throughout the learning process. The tips and alerts system operates throughout the different iClass features particularly in the planning process and the self-profile section.



The journal is a basic promoter of metacognitive processes. By being able to write down their experiences of their learning process as well as the possibility to search and return to view their previous journal entries (some of which have been made in response to tip and alert questions), learners have a powerful tool with which they can explore their thinking habits and how they make choices and decisions.



The self-profile also provides important opportunities for metacognitive processes by offering users variables that specifically relate to the learners' learning styles and thinking habits. The self-profile variables, supported by tips and alerts, offer users an opportunity to think about their preferences and modes of thought.



**The variables displayed in the screenshot are subject to change*



Openness

Plan

Learn

Reflect

iClass challenges the degree of teachers' openness – both in their teaching methods as well as in their learning materials. This can relate to choice in the way that students can acquire knowledge, assessment methods (such as offering to choose between a written examination and a presentation in front of the class), the order in which students can complete tasks and learn skills and many other parameters.

Openness of the learning methods can be in conflict with the curriculum in some countries which follow a set path. This is the reason why iClass allows variations in the degree of openness of teaching methods.

Openness correlates to the levels of:

- The number of choice options in a learning unit
- The extensiveness of the choice options in all aspects of learning
- The potential impact of these choice options on the learning process (they have to be non-trivial in order to have some impact)
- The support for reflection associated with these choices and the resulting learning process

Thus, the openness level of a learning programme seems to be linked to the level of choice and self-personalisation as well as the planning and self-regulation it allows, and the level of intrinsic motivation it encourages (with all of its related positive effects discussed above).

Teachers using iClass will find the platform useful in discovering more about their teaching methods; how they can play with the degree of openness of their learning style; in experimenting how this influences their students' motivation; in looking at the choices they make and subsequently know more about the learner (thus achieving a more personalised form of learning).



Proof of concept

The central promoter of openness in the iClass system is the planning tool. While the planning tool can be used in a formal and structured way – teachers define all aspects of the planning process and assign it to students – it encompasses a wide range of planning options from which to choose including goals, sub-goals, activities, assessment modes, outcomes, timeframes, reminders, and so on. Providing a wide range of options enables students who are assigned a predefined plan, to learn about the various aspects and stages of the planning process and therefore gain an initial understanding of how to create their own plans. Those students who are offered varying degrees of choice and openness gain more control over their learning process and become self-regulated learners.

Choosing and defining – from the plan's goal, to its activities: teachers evaluate the degree of openness of their teaching style



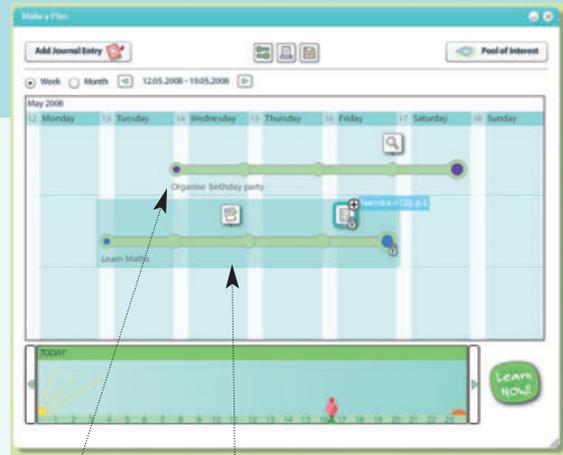
The teacher can lock goals, sub goals or activities. The more options are locked, the more teaching is delivered in a traditional way (with assignments to be completed by a certain date etc).

Choosing and defining – the Self- Profile variables



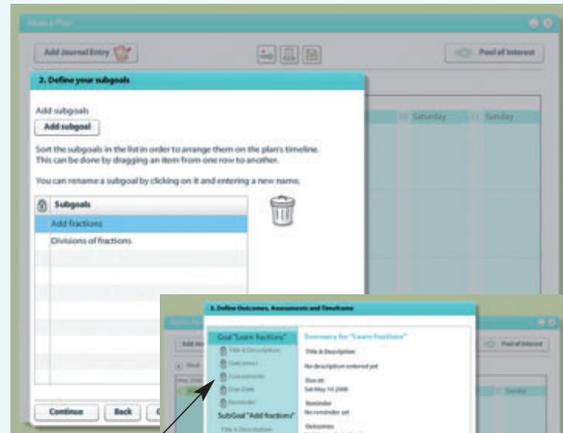
The self-profile also supports openness by providing learners with the opportunity to affect their learning process as they define their own variables. In iClass, the choice of variables impacts on the learning process; the ability to have a choice concerning any aspect of the learning process reflects the openness of the learning environment.

The variables displayed in the screenshot are subject to change

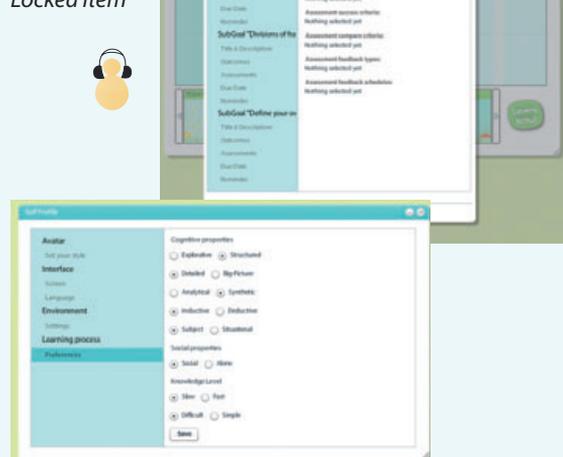


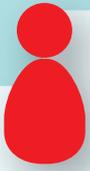
Open plan

More formal and structured plan (the teacher has locked some items, which means the learner has fewer options when modifying the plan)



Locked item





Reflection



Reflection is the process of stepping back from an experience to ponder, carefully and persistently, its meaning to the self through the development of inferences. It should be a habitual activity, an ongoing conversation with the self (although the conversation may, at times, include others) that moves hand in hand with the experience.

In iClass we have distinguished between two kinds of reflective thinking: task-reflection and self-reflection.

Task-Reflection is a cognitive competence whereby the student takes a 'step back' from the ongoing activity and considers or evaluates his or her actions or choices while engaging in a specific task, activity or learning process. Fostering task-reflection can be applied in various ways depending on the kind of activity in question. For example, in the case of reading comprehension, a text and questions are given to the students. After responding to the questions (also in multiple choice) the students are asked to answer a series of open questions in which they explain why they have marked what they have marked. In this activity the students are encouraged to evaluate their answers for themselves and stress why or what the reasons were for the choices they made. Similarly, in other types of activities, such as cooperative activities, projects or games, students can be asked the reasons for making a "move" or a series of "moves" and after consideration, asked to indicate in various ways – depending on the nature of the activity - whether the particular course of action that they have taken is either productive/efficient (is it beneficial to the fulfilment of a certain goal or task), commendable (is it the "right" thing to do) or accurate/correct.

Self-reflection is a process in which the individual attempts to reach an understanding of the kind of person he or she is. This takes place on various levels, from perceptions on the nature of one's dealing with specific activities to the more general perceptions regarding oneself as a whole.



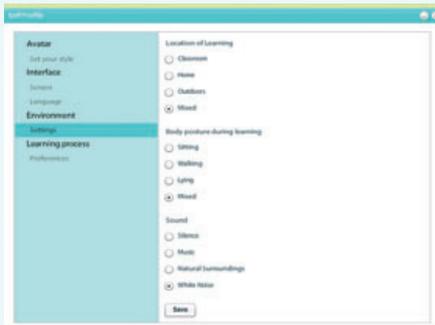
Proof of concept

iClass supports and encourages both task-reflection and self-reflective processes through a range of different features. One central promoter of reflection is the tips and alerts feature. Tips and alerts enhance the user's awareness of his actions and choices throughout the learning process by posing guiding questions. By addressing these questions the learner is able to learn more about his performance on specific tasks and in general about him or herself.



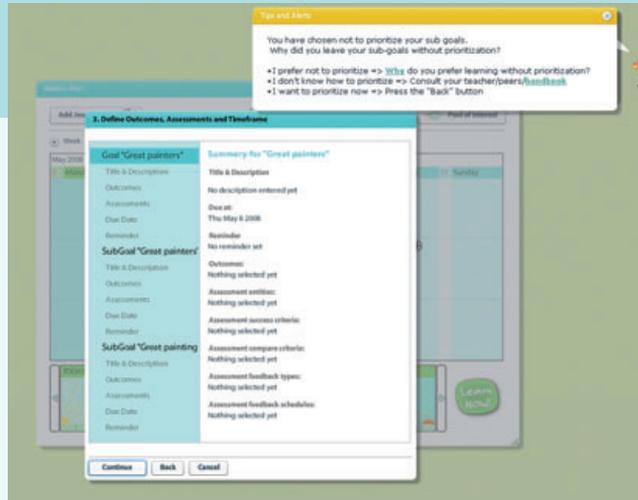
Examples for reflection opportunities – Journal and personal space

A second key promoter is the personal journal. The learner is encouraged throughout the learning process to write a journal in which he or she expresses his or her experiences, thoughts, and questions in an unstructured way. The journal documents the reflective process of each individual student and serves as a key instigator of self-reflective processes.

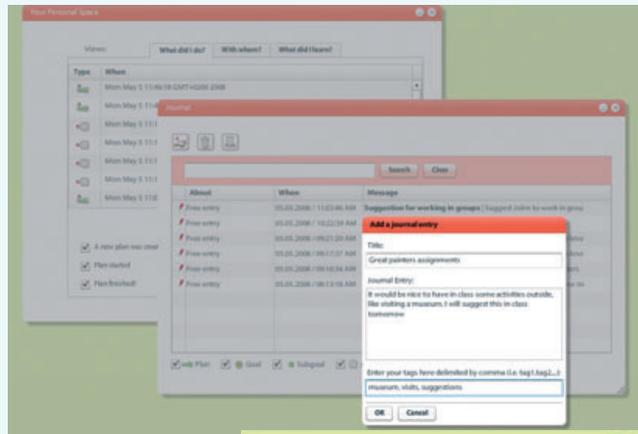


Examples for reflection opportunities – Self-Profile section:

Other system promoters of task and self-reflection are the self-profile and personal space features, in which the learner gains awareness and an understanding of his or her personal style of learning and is able to reflect on his or her learning. The self-profile enhances reflection by providing a list of variables, each dealing with different aspects of learning – from issues of environment to cognitive aspects of learning. The user is able to determine his or her specific options and thus to reflect on his or her preferences and approach to learning.

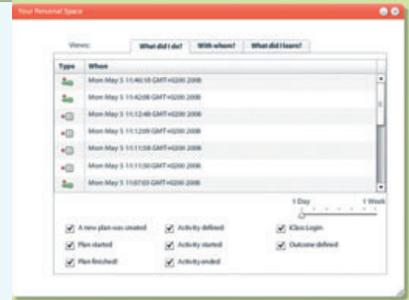


Examples for reflection opportunities – Tips & Alerts feature



Examples for reflection opportunities – Personal Space section:

In the personal space feature the learner can find information on his or her performance using the system. While this feature is still under development, the purpose of the personal space feature is to contain and track all the learner's actions and progress, as well as to provide a special section devoted to a more thorough reflection on the learning process through guiding questions.





Self-profile



The learner's self-profile accounts for all choice variables indicated by the student for the purpose of tailoring the learning process according to the student's own preferences, characteristics, personal tastes, learning style, topics of interest etc.

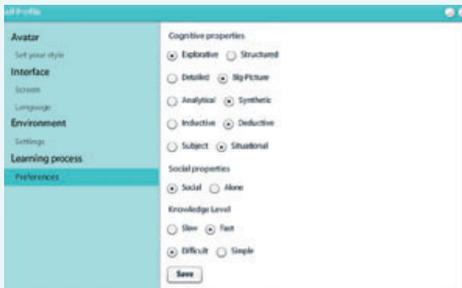
The iClass self-profile is not to be considered a customised automated model that predefines student abilities, interests and so forth. Rather, self-profiling is a working tool that supports self-personalisation and exploration. It is a dynamic platform according to which students actively shape and design their learning environment. Choice variables may vary to include physical environment, interface, learning styles, topics and level of learning.

As self-profiling supports the accommodation of the learning process to meet the student's goals, interests and preferences, class work should be able to provide students with multiple choices in their learning experience. Teachers are thus advised to keep an open mind towards individual preferences in terms of topics, styles of gathering information, work environment and so forth. The learning activities as well should support students' personal profiles. In order to achieve this goal teachers are to maintain open communication lines with the students and reserve a reasonable amount of room for personal expression and creativity. Open discussion about pupils' opinions on matters being discussed in the classroom, the kinds of activities being held, is always conducive to realising each student's profile. Profiling presupposes a teacher's attentiveness to the students' needs and abilities.

Promoting profiling in cases in which students lack strong convictions regarding the learning process may be realised by handing out questionnaires enticing the student to take a firm position on, say, his or her favourite topics, preferred working environment (in groups or alone) etc. The student's choices provide not only indicators for better motivation but also can generate processes of reflection and personal growth.

Proof of concept

Learners' self profiles are supported in the iClass self-profile feature. The iClass self-profile displays and offers a variety of learning variables and options from which each individual learner can choose. These variables are interconnected to other aspects of the iClass system (mainly tips and alerts and planning tool), and thus strongly impact on the learning process and the personalisation possibilities of each user. The iClass variables are relatively easy to understand and have practical meanings that almost any student can deal with.



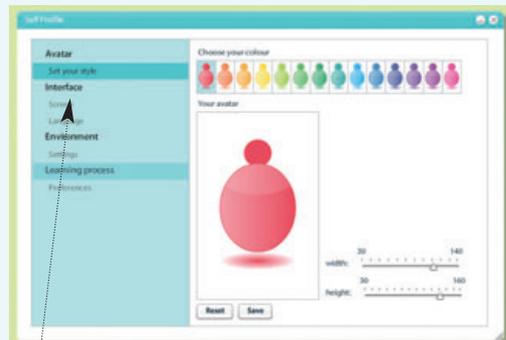
*The variables in the learning process are subject to change.



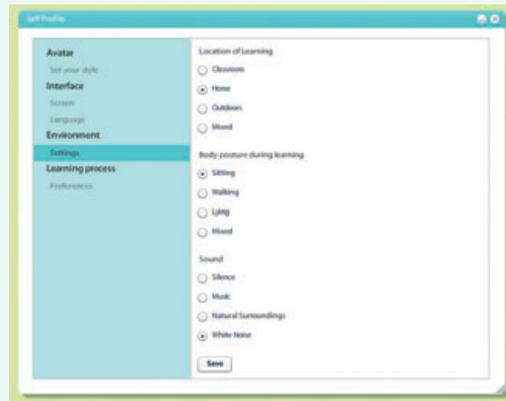
The variables in the iClass profile are used to identify discrepancies between the learners' actions and choices and his/her preferences as described in the self-profile section. Through the 'tips and alerts' - connected to various components of the iClass system, particularly to the planning tool and the self-profile - iClass points out possible discrepancies or inconsistencies between the individual user's self-profile variables and his or her choice. By pointing out discrepancies students reflect on whether they are consistently following their personal preferences and profile.



Personalised learning:
the learner is invited to create an avatar



The learner is invited to personalise iClass basic interface features



iClass profile variable: environment of learning

As with all cutting-edge developments, iClass requires a continuing process of validation with practitioners. This enables the developers to receive useful feedback and consider building in solutions to perceived problems as well as to improve the system.



Susanne and Georg at the Validation workshop in Austria

There have been a number of events – seminars, workshops – where teachers have been asked for their opinion and suggestions. Although some comments deal with details (for example, a teacher said that her students were no longer interested in learning via computers, but rather preferred physical contacts) some generalities such as the following from teachers in Austria and Lithuania may serve as an introduction:

“iClass provides an interesting insight about how to make a plan. Appealing design. Graphic planning tool with the time lines, goals, and sub goals is really wonderful. It really helped me to reconsider my way of teaching and how to determine goals and sub goals.”

Susanne is an experienced teacher of English and German in Austria where she teaches groups of 14 – 20 year old students. She’s involved in the validation of **iClass** because: “As a teacher, I just wanted to learn more about how to make teaching (for me) and learning (for my students) most successful.” She feels, furthermore, that the **concepts** (Personalised Learning, Self Regulated Learning, Reflective Thinking, Exploration and Acting on Intrinsic Motivation) are all very significant as a part of the conceptual design of teaching and learning in class and as a guiding value for life in general.

Outside and before **iClass**, Susanne attempted to introduce these concepts into her teaching: “Whenever students start to become familiar with a new field, exploration to me seems a good way to make them curious about a topic.”

“Furthermore, it is one of my experiences, that students often cannot assess their own work. They think that the teachers do not grade them in a way they expect even though the teachers did everything they could to be fair.”



Discussions about iClass in Austria

Georg, similarly, teaches English and German. About **reflective thinking**, Georg says: “I think that it is important to give students enough opportunity to reflect what we are doing in the classroom. This makes the learning process more effective in my view because the students realise what the goal of a lesson is. And this helps them to focus on the subject matter.”

He goes on to say about **Self-Regulated Learning** in students: “I think research and experimentation are very important because the findings are easier for the students to memorise. Research groups need to be organised in such a way that all members of the group can benefit from this process.”

As for his **expectations** from iClass, Georg says: “What I expect is that students take more responsibility for the learning process and ultimately that the role of the teacher changes from an instructor to an adviser within this learning process. In addition, the results of the learning process can be made accessible to other groups and information can be shared across a whole school network and beyond.”



Through the validation workshops, we were able to discuss the implementation of iClass within the school environment. When talking about **individualisation** and **Self Regulated Learning**, teachers commented that iClass gives the freedom to the teacher and student the tools to develop planning and with it independent learning:

- “It seems that the programme enhances the motivation for independent learning, develops the skills of planning and assessing activity.”
- “The main benefit for students of using the iClass environment is the fact that they will learn to plan their work, to choose the most suitable learning style for them, to plan their own time and activities. After I have completed the plan of my lesson I lock all the activities because, otherwise, students will be given too much freedom.”
- “The iClass environment may be used in English lessons as an additional method. There are students in my school who are interested in innovations. The environment may be used for differentiated and additional learning.”
- “Speaking about the practical part which allowed us to try planning our learning using iClass, I would say that it was quite challenging because we put a lot on our students and opened up the way we are used to teach. It also has shown our unwillingness to give total freedom to them thinking they wouldn’t be able to manage, but we have also assumed that giving that freedom in portions would teach us and our students to plan our work better.”



Validation workshop in Austria

- “iClass has many additional features that encourage students to learn independently, at their own pace and at the time suitable for them.”

Teachers also comment that using new technology and new systems aids students’ **motivation**, although they also note that without motivation, it is difficult to make students accept the responsibility for their learning.

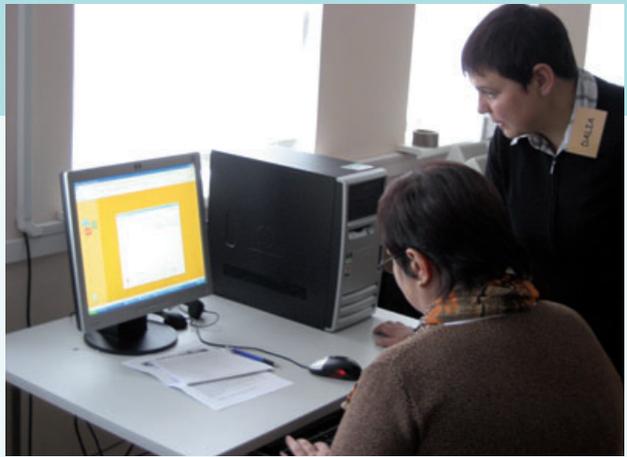
- “Because it is a new thing, it is always interesting for students. I noticed that a student working with the iClass system would be fairly motivated. If he is not motivated he will not wish to create goals, tasks and activities and plan own learning time.”

One of the great advantages for teachers of the iClass system is that plans can be shared by them, diminishing the time required on preparation as it is a **collaborative tool**.



By the same token, the collaboration also extends to the students themselves...

- "A teacher can use the plans created by other teachers, edit them to meet particular needs."
- "The students having chosen the plan indicated by the teacher can edit it and add new goals."



Working together on iClass in Lithuania

Of course, it would not be possible (or desirable) to carry out a validation procedure without the analysis of **problems**:

- "Although the theoretical part was a bit too long, I understand that it was necessary and helpful, letting us understand the purpose of the platform."
- "The newly presented learning environment is interesting, but complicated. I think that all obscurities can be eliminated by joint effort."
- "The planning tool is not easy to use for young people. Students are not good planners and have to be familiarised with the system. Training is needed for teachers about how to plan the learning."

However many teachers comment favourably that iClass as a new environment may well prove to be one of the new tools at their disposal:

- "The environment is new, unseen, and different from distant learning environments I have used."

- "This environment is different. It is more playful and visually attractive. It uses new forms of work and provides more options for students."



Validation workshop in Lithuania

- "As teaching and learning is really going to change in the future, I think iClass is like a glance at that process from today's perspective. So I dare say we've had a chance to see the future in some way."

iClass partners

- Ben Gurion University of the Negev - The Center for Futurism in Education (*Israel*)
- Centre for Research and Technology Hellas - The Informatics and Telematics Institute (*Greece*)
- European Schools (*Belgium*)
- EUN Partnership (*Belgium*)
- IES Educational and Information Technologies (*Turkey*)
- Intel PLS (*Ireland*)
- Laboratory for Mixed Realities (*Germany*)
- Klett (*Germany*)
- Microsoft (*Belgium*)
- Middle East Technical University - Department of Electrical and Electronics Engineering (*Turkey*)
- ORT (*France*)
- RtB Education Solutions (*Turkey*)
- Siemens IT Solutions and Services (*Belgium*)
- Siemens IT Solutions and Services (*Italy*)
- The German Research Centre on Artificial Intelligence (DFKI) (*Germany*)
- Trinity College Dublin - The Knowledge and Data Engineering Research Group (*Ireland*)
- University of Graz - Department of Psychology (*Austria*)



Division of tasks



Research

Ben Gurion University of the Negev - The Center for Futurism in Education (Israel): *Self-Regulated Personalised Learning*

Middle East Technical University - Department of Electrical and Electronics Engineering (Turkey): *Technology (DB, Content Distribution)*

RtB Education Solutions (Turkey): *Pedagogy and Concept Maps*

The German Research Centre on Artificial Intelligence (DFKI) (Germany): *Profiling/User Modeling/Tracking*

Trinity College Dublin - The Knowledge and Data Engineering Research Group (Ireland): *Adaptive Hypermedia*

University of Graz - Department of Psychology (Austria): *Adaptive Assessment*

Development

Centre for Research and Technology Hellas - The Informatics and Telematics Institute (Greece): *Learning Design Authoring*

EUN Partnership (Belgium): *Adapter*

IES Educational and Information Technologies (Turkey): *System Design, Content Packaging, Structuring, Aggregation, Content Development and Preference Tools*

Intel (Ireland): *Content Distribution*

Laboratory for Mixed Realities (Germany): *Presentation, User Interface*

Microsoft (Belgium): *Collaboration Through Learning Gateway*

RtB Education Solutions (Turkey): *Educational Technology and Design*

The German Research Centre on Artificial Intelligence (DFKI) (Germany): *Action Analysis*

Trinity College Dublin - The Knowledge and Data Engineering Research Group (Ireland): *Generation of Learning Objects and Personalised Learning Paths*

User Representation, User Requirements and Testing, Demonstrations

European Schools (Belgium)

ORT France

Application Service Provision (Infrastructure)

Siemens IT Solutions and Services (Italy)

Educational Vision

Ben Gurion University of the Negev - The Center for Futurism in Education (Israel)

EUN Partnership (Belgium)

Consortium Management

Siemens IT Solutions and Services (Belgium)

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For further references, see the iClass handbook available at <http://wiki.iclass.info> or directly from the iClass platform: <http://release.iclassproject.com>

One of the largest integrated projects funded by the European Commission DG Information Society, iClass aims to develop an advanced pedagogical model and platform exploiting the potential of ICT to support a personalised, flexible and learner-centred approach. This book presents the results of this four-and-a-half year project bringing together 17 partners including four of the world's leading IT companies, three SMEs with state of the art learning and new media technologies, three multinational school networks and leading European research partners in cognitive science, pedagogy and artificial intelligence .

This publication is part of the Insight series of the European Schoolnet, a not-for-profit organisation funded by education ministries in Europe dedicated to supporting schools in the best use of technology in learning, promoting the European dimension in schools and education and improving and raising the quality of education in Europe.



iClass Site: <http://www.iclass.info>
iClass Platform: <http://release.iclassproject.com>
Insight: <http://insight.eun.org>

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