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The COLLAGE Project
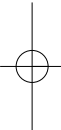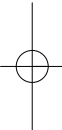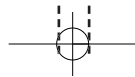
Guide
of Good
Practice

Mobile and Game-based Learning

European Commission

e Learning
Designing Tomorrow's Education

collage

The COLLAGE Project
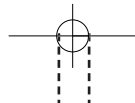
Guide of Good Practice

Mobile and Game-based Learning

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ISBN: 978-960-6701-56-6

To Betty,
In memory of Prof. Elizabeth Wallinger,
our friend, colleague and pilot
in the COLLAGE adventure

Contents

For the Teacher

For the Teacher

Learning happens in various ways. Students learn in classrooms, but they also learn by exploring streams and parks, trying and failing to perform tasks, talking to friends etc. Actually people learn in many different ways, by experience, by involvement, by talking with peers and experts, or by delving into a practical problem. All of these can be legiti-mate learning activities. Virtually any experience can be a learning opportunity, but often the resources to make it so are lacking. We are used to thinking of knowledge as something "stored," "held," or contained in a "body of knowl-edge." That conception lends itself very easily to conceptions of learning as "acquiring knowledge," collecting it from books, lectures, and other media. We are following a different, complementary insight here, that knowledge is some-thing active in situations and contextual in its very nature. Knowledge is something that happens rather than some-thing that is stored and applied when appropriate. The idea of contextual learning is fully supported within the frame-work of mobile learning applications. It is obvious that for the expansion of the idea of learning and the creation of learning schemes that are based on the effective use of motivation that arises when a student is faced with the stim-uli, mobile devices with Internet access can offer significant advantages. Mobile technology actually offers the appro-priate educational environment to assist learning activities both inside and outside the classroom. Within this frame-work mobile learning is translated into flexibility in accessing learning materials but also students and teachers any-time, anywhere.

In this context, the overall aim of the COLLAGE project is to contribute towards an innovative, more flexible approach to e-learning, which will afford a rich pattern of integrated formal, non-formal and informal learning spaces (learning at school, in museums and sites of interest, at home, in the street, during travelling, etc.), through the inte-gration of a blend of technologies (laptops, PDAs, mobile phones, the Internet) into a single learning-supporting and learning-enhancing environment.

COLLAGE project aspires to support the development of a new 'everywhere-learning' and 'lifelong-learning' culture among secondary school students, who will realise that the walls of their classroom do not exist as a barrier between school activities and everyday life, and that learning is related to life in general rather only to schooling.

In this integrated mobile learning environment secondary school students learn to gather data from all over around them and interpret it as information useful for learning, either on their own, or, most importantly, through face-to-face and virtual collaboration with their peers. Students, together with and supported by their teachers, learn how to acquire, create, use and re-use e-learning content, which, thanks to mobility afforded by technology and thanks to the translational aspect of COLLAGE, transcends national borders and reflects the linguistic and culture diversity of the integrated Europe. In this way, students and their teachers have access to a rich source of good quality, multilin-gual content for e-learning. Most importantly, beside the content which is produced professionally and offered by third parties, libraries, museums, and other sources of knowledge, the COLLAGE learning environment is filled with stu-dent-generated content, according to learning activities planned by their teachers. From this variety of co-existing learning content, the same students and teachers, as well as other interested students and teachers, can also select, re-purpose, use and share content with other end-users. In short, COLLAGE offers an integrated, coherent, and prac-tical mobile learning service for learners and teachers, thanks to which they can co-create and manage rich e-learn-ing content effectively, efficiently, and innovatively.

It is also important to note that the implementation of the COLLAGE scenarios took place in three different phases so that the results and outcomes of each phase provide input to the next implementation phase. The repeated cycles of implementation were not intended only for evaluation purposes; they will gave students as well as teachers the opportunity to actively participate in the design and redesign cycle of the proposed service.

During the first cycle of school activities, the partnership initiated the application in the school communities. Students' reactions to the COLLAGE pedagogical approach were monitored and analyzed in detail. With the experience gained

and after the appropriate modifications on both the educational tools and on the didactical approach, during the second cycle of implementation, the partnership introduced systematically the project in the classroom. During this phase students and teachers followed the constructed lesson plans, by using the already developed tools. The main purpose of this phase was to familiarise both students and teachers with the new approach and the new tools and to prepare them for the final and most important cycle of the student-centered work, the students' projects cycle. During the last phase students and teachers organized their own project and explored further applications of the handheld devices. Students considered their involvement in this procedure as a craft, which encourages a spirit of creativity, humor, and personal expression. The idea is that in each of these cycles of the student-centered work less guidance is needed incrementally, giving the chance to the students to actively participate to the co-design of the future educational tools.

The aim of the Guide of Good Practice is, first, to guide the teachers of the COLLAGE project to design, create and evaluate educational games that are adopting the basic principles of COLLAGE pedagogical framework. Secondly, the Guide illustrates a number of scenarios that were implemented on the COLLAGE platform and are considered good practice of implementation.

The Guide includes 6 main chapters. The first one describes the pedagogical approach of the project. The main principles for the design of effective educational games are presented. The chapter includes a full description of the stages a teacher has to follow in order to develop educational games. The second chapter describes the process for authoring a game with the COLLAGE platform, while the third is providing directions on how the teacher could use the platform tools in order to support the students during the game. The fourth chapter illustrates the implemented scenarios and the fifth presents the evaluation framework and results of the evaluation procedure. Finally, our conclusions and lessons learnt are summarised in the final chapter.

Additionally, a DVD, with video illustrating the implemented scenarios "Ancient Agora" and "Fodele: The River of Life", is attached to the end of this Guide.

Chapter 1:
Pedagogical Approach

The COLLAGE Pedagogical Approach

The future of education is outside education. It is in the everyday life, in the world.
The principles can be applied inside formal education. They require a change in thinking,
to move toward problem-centered, meaningful activities in the classroom. To exploit students'
interests and subvert them to lead to natural, inspired learning activities.

D. A. Norman (2001), The Future of Education.

COLLAGE project emphasises the perspective of game based learning. Modern academic research strongly backs up the idea that when students are engaged in the learning process, they learn and retain more. Engagement may come through emotion, relaxation and especially through fun. Within this perspective, it is obvious that games are a strong motivating and engaging factor.

Game-based learning is one of the main pedagogical principals that will form the basis for the design and development of the COLLAGE project's pedagogical framework. Within the COLLAGE project's framework students will participate in a series of entertaining and fun activities, a series of web based games. In the partnership's vision the engagement of the students in a game context will motivate them to learn and, furthermore, will make the learning results stable. By placing a game at the core of an interactive, learning environment, the use of the COLLAGE platform will provide students with the opportunity to participate in an active learning process, enabling them to gain knowledge and skills beyond 'traditional' classroom results. Further, learning through games is based upon a communicative approach so that students' communicative activities with experiential value will be used for the acquisition of knowledge and the development of communicative competence.

Moreover, the pedagogical concepts and methodological approaches underlying the COLLAGE project will follow contemporary methods of teaching and learning, based upon:

- **Constructivism**: Individual learners' construction of knowledge based on pre-existing and developing schemata. The learning environment built around a game is familiar and resembles computer games children are accustomed and attracted to. In this way the learning process is facilitated.
- **Socio-cognitive principles**: The COLLAGE project takes account of, and accommodates the social and cultural factors and the respective backgrounds of learners as they affect their learning process.
- **Exploratory learning**: By placing a game at the core of an interactive, learning environment, the mobile activities will provide an active learning process enabling the students to gain knowledge and skills beyond 'traditional' classroom results.

Although the COLLAGE project will use front-end technology, the aim is not to test this technology but to investigate its impact on education, and to focus on the results and changes that it can produce in the learning process. The project will develop a new learning scheme by introducing a technologically advanced approach for learning and teaching through every day activities. The COLLAGE approach will thus eliminate the distinction between the different educational environments (school, home, libraries, cultural places like museums, archaeological areas, etc.) and will bridge the theoretical and applied aspects of every day personal activities. The educational content will be not transmitted theoretically, but rather biomatically in the form of real life experiences. As research in pedagogy demonstrates, successful learning can be achieved in authentic situations. Furthermore, very much related to constructivist learning theories, the learner should be encouraged to actively explore "the world" by himself instead of teacher-oriented approaches which are often based on the idea of "knowledge transmission". Without denying the potentials of traditional education, it is attempted here to set a link between educational methods of traditional classrooms settings and the potentials given by mobile technologies, which still needs to be further explored. The COLLAGE concept takes furthermore the need for more interdisciplinary school education and collaboration into account, which is crucial for enhancing the effectiveness of education. This can provide a unique way of strengthening learning processes, such as discovering analogies, similarities etc., while providing topics which are inherently closer to real world problems.

The COLLAGE approach crosscuts the traditional boundary between the classroom, home, and other settings as distinct learn-

ing environments. It aims to involve the users (students, teachers) in extended episodes of playful learning. Specific elements to focus on here include motivating learning, demonstrating application, and scaffolded practice. One implication of this model is that students should be assigned activities that reflect the application of content knowledge as it is practiced outside the classroom. The goal is to induce the learner into a 'culture of practice' which makes knowledge meaningful. Another implication is that the feedback ideally should be intrinsically embedded into the context in which the activity is performed. A further implication is to have the learning challenge carefully balanced to keep it within a "zone" that matches the learner's ability. What we see is that elements that contribute to effective learning environments include a thematically meaningful story ("situating" the application of the knowledge), relevant and rapid feedback, and a carefully managed level of challenge. The working hypothesis of the partnership is that Autonomy-Oriented Education can be built around the notions of autonomy and a sense of belonging. Autonomy is composed of authenticity and self-direction. By authenticity we mean the individual's ability to be aware of his/her feelings, aspirations, his/her characteristic style of activity and learning and his/her various talents - and to adopt them. Self-direction is based on the individual's ability to think and act rationally, on his/her adequate level of literacy and on an adequate measure of emotional maturity. Belonging is grasped as being based on the individual's conception of himself/herself as belonging to a social group (and thereafter to a culture) to which he/she is committed.

Within this general framework the COLLAGE service supports the pedagogical method of autonomous self-directing learning and allows for a self-directed acquisition of skills to meet users individual communication and learning needs, regardless of place and time. The self-learning method will be supported by elements of entertainment (learning by playing) in order to enhance learning at any time and in any place.

The proposed project will develop an innovative educational approach, which will guide students through the learning process, by using day-to-day activities as possible subjects of both formal and informal investigation. Many daily activities can be seen from a different point of view, where the every day reality will return. The goal is to shift away from classroom learning to 'daylong' learning and to use mobile technology to facilitate that shift.

To this end, COLLAGE envisages the following steps:

Through the organisation of a dedicated workshop at the early stages of the project, a reflection and exchange process will be initiated among project partners working on pedagogical design and invited experts, who will continue to communicate electronically towards carrying out an analysis and study of the pedagogical specifications for the COLLAGE platform , including a series of specific mobile learning scenarios and the corresponding lesson plans. The learning activities will be designed on the basis of a learning-game approach, which is extremely motivating for secondary school students' learning. More specifically:

Initially the implementation parameters (e.g. necessary adjustments to the curriculum) will be determined. Then a number of specific scenarios will be designed covering different educational contexts (pedagogical concepts), users (learner, teachers) and school subjects (Physics, History, Arts, Environment, Language, etc.) from various perspectives. A series of lesson plans for the different scenarios will be developed.

In the early stages of the development process, scenarios can be used for the planning of methodology as well as to characterise episodes or a sequence of activities like in a story. These stories will provide the context in which activities are carried out, giving insights about needs, difficulties and motivations students have in particular contexts. In this respect, scenarios are methods for requirements gathering. A second usage of scenario-based design in the early stages of the development process is the depiction of how a new tool can support a proposed course of actions. From this point of view, scenarios are a prototyping method, a design proposal.

Key elements for the COLLAGE scenarios are the users (single students or groups of students, and teachers), their goals, the sources of information accessed during the activities, the information generated by the students themselves and their needs.

Learning Principles in Game-based Learning

The COLLAGE learning scenarios consist of a mesh up of principles of learning principles and educational computer games. The aspects of these scenarios are described in this guideline chapter. All further development of the pedagogical framework is based on them.

Principle 1: match to the curriculum

The material should be matched with and aligned to the appropriate curriculum through:
- Clear objectives (at an appropriate level and form of specification)
- The relevance of content covered
- The appropriateness of student activities
- The nature of the assessment (where this is present)

Principle 2: inclusion

- Wherever possible we should make the material applicable for different types and range of achievement (including special needs)
- Physical disabilities that can be particularly supported by electronic material (e.g. those with visual impairment)
- Different social and ethnic groups
- Gender
- The imperative here is not just that a particular group is served by the material (and that this is made explicit), but that it does not exclude a group

Principle 3: learner engagement

The material should engage and motivate learners. This engagement should be evident in an ethos of being:
- Educational i.e. have a 'worthwhile' educational aim, and not just be used to occupy or entertain learners, although it might employ 'game-like' approaches to learning
- Motivating such that it is both enjoyable for learners and makes them want to continue using the material or want to carry on with learning the topic
- Such that it does not produce adverse emotional reactions that are likely to cause reduced motivation to learn in general, or to use digital material in particular
- Motivating such that it improves the class atmosphere for learning and makes it a good experience for teachers and learners alike
- This engagement and motivation may be achieved through one or all of aesthetic, technical and educational design

Principle 4: innovative approaches

It should be evident why learning technologies are being used, rather than a non-technological approach which achieves the same end as effectively. Digital forms should be used where it brings an innovative approach which cannot be achieved in any other way. E-learning should, in other words, be fit for purpose

Principle 5: effective learning

This principle can be demonstrated in a variety of ways:
- By the use of a range of approaches that will allow the learner to chose one that suits her, or can be personalized to her, or will extend the learner's repertoire of approaches to learning (such as 'learning how to learn')
- By providing empirical evidence of effective outcomes of the material
- By satisfying a number of the characteristics of good learning (learner agency; learner autonomy; encourages metacognitive (and high order) thinking; enables or encourages collaboration)
- By providing authentic material (authentic to situations outside school and to the learners' perspectives and situations),

and that also exhibits multiple perspectives on a topic (this could be seen as another aspect of authenticity)

Principle 6: formative assessment

The material should provide formative assessment, i.e. assessment that is primarily aimed at improving learning. This may be achieved by a number of ways:
- By providing rapid feedback that helps learners to see how they can improve and what they must do to improve
- By providing opportunities for peer assessment, with appropriate understanding of the criteria or standards of performance required
- By providing opportunities for self assessment, with appropriate understanding of the criteria or standards of performance required

While it is possible (although not easy) within the project we should provide more rapid and personalized feedback to learners that will tell them what areas of their understanding are lacking, and where in the material they must put more effort, these by themselves are unlikely to make any difference to learner improvement. Similarly feedback which is too general for the learners' particular problems is unlikely to be effective. Feedback has to be specific to the learner's problems and specific to their needs for improvement.

Principle 7: summative assessment

Summative assessment here is understood as that which is used to grade students for guidance as to, or selection for, future educational or work opportunities. Although not all digital material will have summative assessment (but it should have formative assessment), where it does, it must be:
- valid and reliable (i.e. assess what is aimed at in the objectives, and do this in a way that can be demonstrated by things like expert views, or ways of testing construct validity; give consistent results for particular learners or other users)
- Comprehensible by teachers, learners and parents (as appropriate)
- Able to deal with a range of achievement levels
- Free from adverse emotional impact on the learner

Principle 8: coherence, consistency and transparency

The material must be internally coherent and consistent in the way the objectives, content, student activity and assessment (where present) match to each other. It must be open and accessible in its design. This implies that the components should each match and that the match should be transparent in its intention; for example the activities should be consistent with the objectives and the assessment should assess these objectives (and not un-stated or unknown ones). It should be clear to the user what they are expected to do.

Principle 9: ease of use

The material should be transparent in its ease of use through:
- Being open and accessible
- Being intuitive and not requiring guidance on use (for either the teacher or the learner)
- The provision of appropriate guidance for the learner or the teacher and, in the case of the learner, should not require extensive training or instructions that are not themselves part of the educational aims of the material
- Appropriate assumptions about the ICT skills of users (both learners and teachers), or the provision of straightforward guidance on this

It is accepted that for teachers there may be some training in use, but where possible this should focus on pedagogy and not on software requirements. (However, in some cases, where software tools are to be used, some training is unavoidable, but it should be specified, in context and available.)

Principle 10: cost-effectiveness

E-learning approaches are expensive. There are costs for technology, software, provision, maintenance, training, design, development, deployment. Technology solutions need to be justifiable, affordable and the costs sustainable.

Characteristics of a Learning Scenario

A learning scenario has to have certain characteristics:

Engagement

- Game-based learning
- Problem-solving
- Role Play
- Narrative

Teaching and learning orientation

- Communicative
- Collaborative
- Encouraging higher order thinking
- Authentic
- Blended
- Reflection
- Recursion
- Exploration
- User generated - consumer/producer

Innovative

- Balance between student driven, teacher driven and media driven
- Evidence why learning scenarios and technologies are chosen
- Evidence why mobile technologies are chosen

Practical

- Simple, transparent and coherent
- Usability
- Re-usable
- Location (location based / independent)

Inclusive

- Accessibility - inclusion of disabled students
- Transportable into different languages and cultures

Intrinsically motivating

- Motivating - challenging
- Providing formative feedback

Additionally following points have to be defined:

- Learning goals
- Defined criteria for evaluation
- Match to curriculum (every national curriculum)
- Cost-effective
- Metadata
- Constraints
- After school activities (homework) - 24 h learning

Main steps in building a Game with the COLLAGE Platform

We identify five steps that encomapass the authoring of the game, playing the game and reflecting on the learning gain after the end of the game. The steps may correspond to objectives which could be realised with a theoretical learning principle in mind.

Educational objective: Getting interested in the place of the game

With the COLLAGE game experience learning takes place in a real context, beyond the four walls of the classroom. For example, choosing to play a game in the ancient palace of Knossos, students are in a place where it is possible to observe social classes and roles and realise that the Minoan civilisation is not just the palace, the ruins and the museum, but a whole system of social organisation which could be seen in any time and place. Choosing a place that would trigger the teacher interest would more likely trigger the students' interest too.

Educational objective: Getting familiar with web-based and mobile learning technology and in particular with the COLLAGE platform

The teacher and the students that will work on the COLLAGE platform would profit from accessing information that they could find on the web and exploit them in a creative way. Getting familiar with searching and accessing the web would also be a benefit. Excellent opportunities of learning may be generated though collaboration of teachers of different subjects. For example, an IT teacher would help with accessing on-line resources and reusing them in a creative way, and a history teacher who is introducing the Minoan civilisation, and a sociology teacher who is teaching political organization. Secondary school students learn to gather data from all over around them and interpret it as information useful for learning, either on their own, or, most importantly, through face-to-face and virtual collaboration with their peers.

Educational objective: By building learning paths and authoring questions the students set the scene of the game

A scenario or a narrative that will guide the players through the game will make the experience much more game-like. We need to show to the students that the questions to address to the players and the paths that will be crated through the order and the setting of the questions will contribute to a thematically meaningful story and a carefully managed level of challenge. Tasks and roles in authoring the game are assigned to students who have to take the initiative and collaborate in a game authoring team. Students think what would be a difficult question since their aim is to make the opponents team's work harder. They would be encouraged not include the most obvious question and search more for challenging question.

Educational objective: Learning through playing games

When the students finally reach the place of the game, the teacher does not intervene in the game procedure, but to give instructions and guidelines, when he/she realizes that the students deviate from the desired target. The students who play the game learn to collaborate, even under the exciting but somehow tight moments of falling behind the opposite team.

Educational objective: Reflecting on the game experience as a process of knowledge construction and strategic collaboration.

As the opponent teams play the games their answers to the questions as well as data they collect to support their answers are recorded on a logbook that the platform support. After the game is played and is lost or won on the basis of accumulated score a second more qualitative round is played in the classroom to evaluate the data the players provide to support their answers. Photos or comments that the players have provided to support their question may be criticised by the opponents. Thus, the students are introduced not only in how to play a game but also in what it takes to author a game, to reflect on the quality of the questions and answers in the classroom, and to comment on the the team's strategy during the game.

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Best Practices in Educational Computer Games

Computer games are a unique, powerful medium with great educational potential. To deliver on this potential, games must be designed according to best educational practices that reflect the differences and strengths of this medium. Below, the key best practices that are especially important are listed.

Create context
- To create emotional investment, the game should give players strong identity, and present either a core problem to be solved or a journey to be taken.
- The game also needs to create a compelling world that the player interacts with and can meaningfully affect.

Invite participation
- The game should understand and honour the players' existing skills
- The game should show players the path they can take (from newbie to star) and the ways in which they can impact the game world.

Design for activity, not content
- The game should be designed around what the learners DO. They must gain and use knowledge in the service of action. They must learn in order to win. The game provides the tools to learn and understand the necessary knowledge.

Learn through activity
- In order to learn through game activity, players should make decisions and face the consequences of those decisions.
- Players should have a chance to apply and test skills, and also to learn through pushing boundaries, failing, and trying again.

Design for moment-to-moment engagement
- The game should give frequent feedback and rewards as part of game mechanics, and the game play should allow a "try, learn, try again" rhythm of interaction.
- Challenges should change based on player performance, and the player's impact on the game world should be clearly seen.

Enable critical thinking
- The game should provide multiple overlapping goals, making it possible for different strategies to be used.
- The game should give the player the chance to examine choices and consequences, and to distil lessons from the action. Game feedback, assessment and reporting should help bring big things to light.

Design for students
- The game should encourage teamwork and interaction in learning and play.
- Game complexity and action should be appropriate for varied student levels, and non-gamers should be able to easily use it.
- The game should provide students with help, feedback and reporting tools to allow them to succeed in the game and understand what they have learned.

Provide tools for teachers to integrate the game into curriculum
- The game should provide teachers with in-game tools to monitor and control game play, as well as tools to review, assess, and present game activity in classroom discussions.
- Reporting tools should give complete information on game activity, so teachers can track and assess student performance.
- Game systems should be transparent, so teachers can know why game consequences occur.
- Tutorials, teacher support materials, and class plans will enable ease of integration into class and curriculum.
- Game options should provide teachers with flexibility in game use, while customization tools allow for further adaptation of games where needed.

What do I need to get started?

To get started you will need:

http://www2.ellinogermaniki.gr/ep/collage
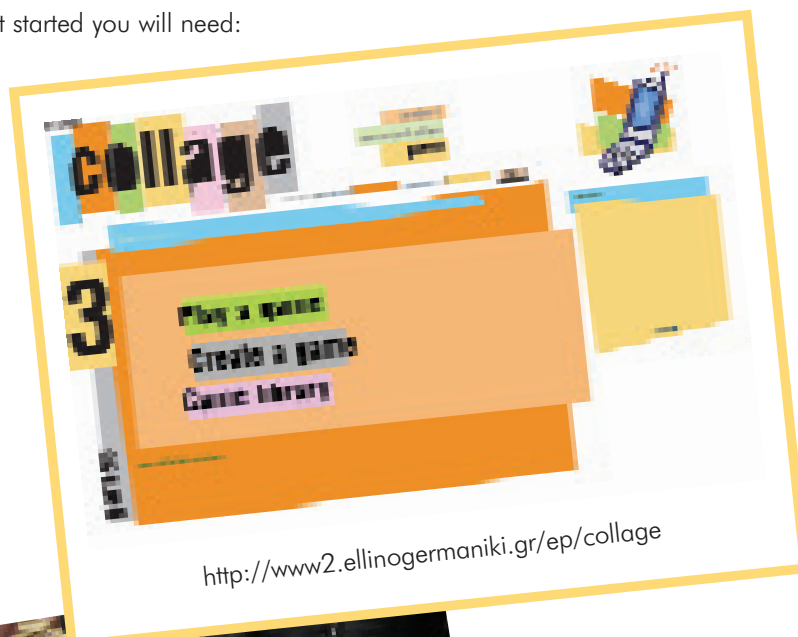
1

Internet access via a PC to the COLLAGE games platform for creating a game or for playing from a distance along with the players who are visiting the site

2

While playing the COLLAGE games the players team needs at least one PDA handheld computer with Internet access, GPS unit and a photo camera

3

Pictures and text in digital format to incorporate in the questions of the COLLAGE games.

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In the following chapters we will describe the basic functions of the COLLAGE platform:
- how to author a game and
- how to play a game

Author a game

Create your Team

Play the Game

Game Library
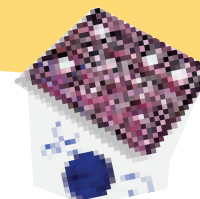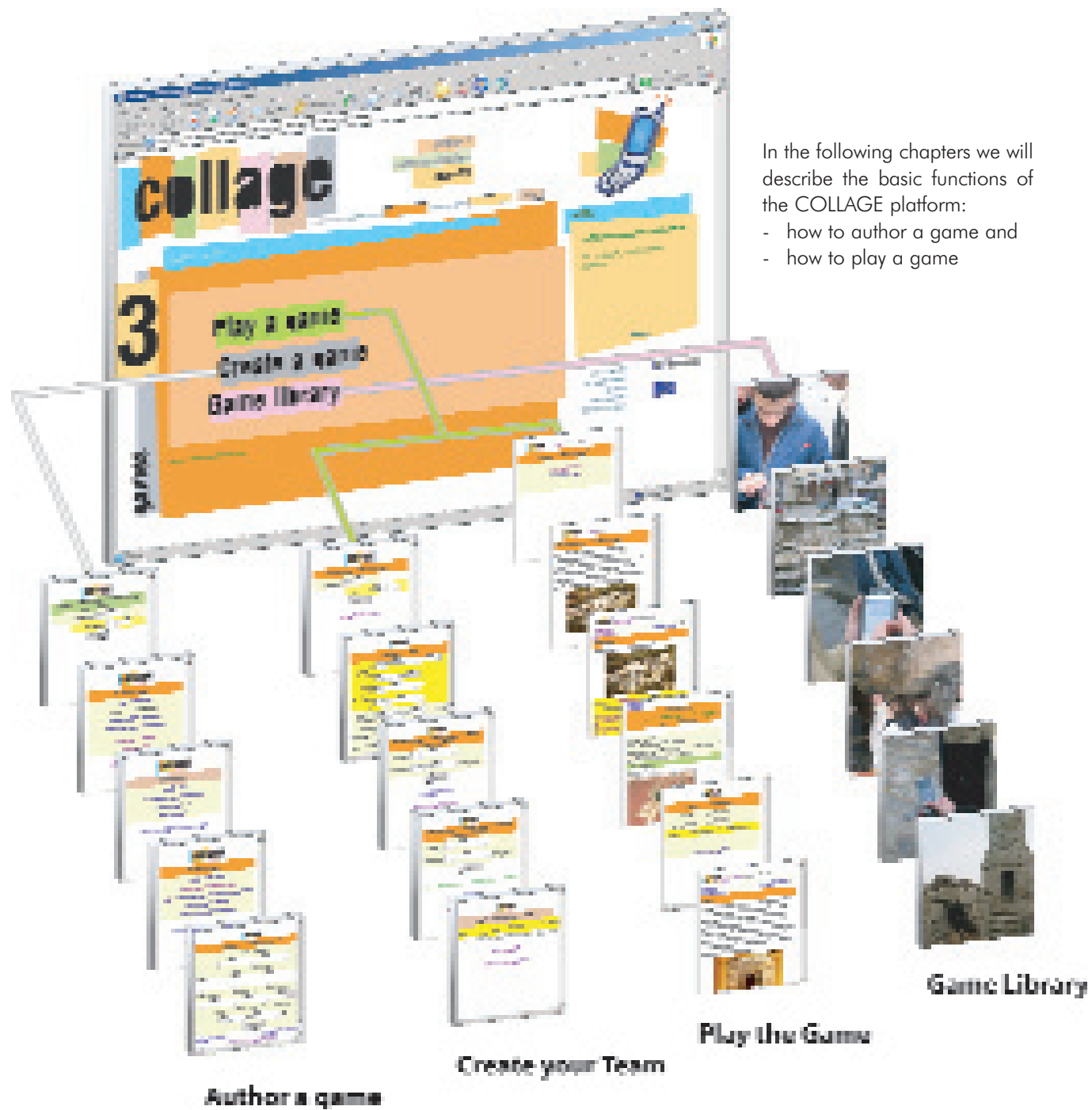
Chapter 2:
How to author a Game

Create a Game

In the COLLAGE platform we welcome users who would like to apply their imagination and creativity in creating games, whether they are teachers or students.

In this chapter we present a basic user manual of the COLLAGE author area alongside with suggestions on inventing the basic elements of a successful COLLAGE game[1]. The COLLAGE games aim to engage the player, challenge the learner, and trigger 'after-game' reflection and discussion within the game teams. The suggestions proposed here on games creating should be treated as a stimulus rather than a recipe. Successful games are designed as result of wit and imagination rather than as checklist fulfilment. Nevertheless, in the context of authoring a game for a specific site or location we know that we need two particular ingredients:

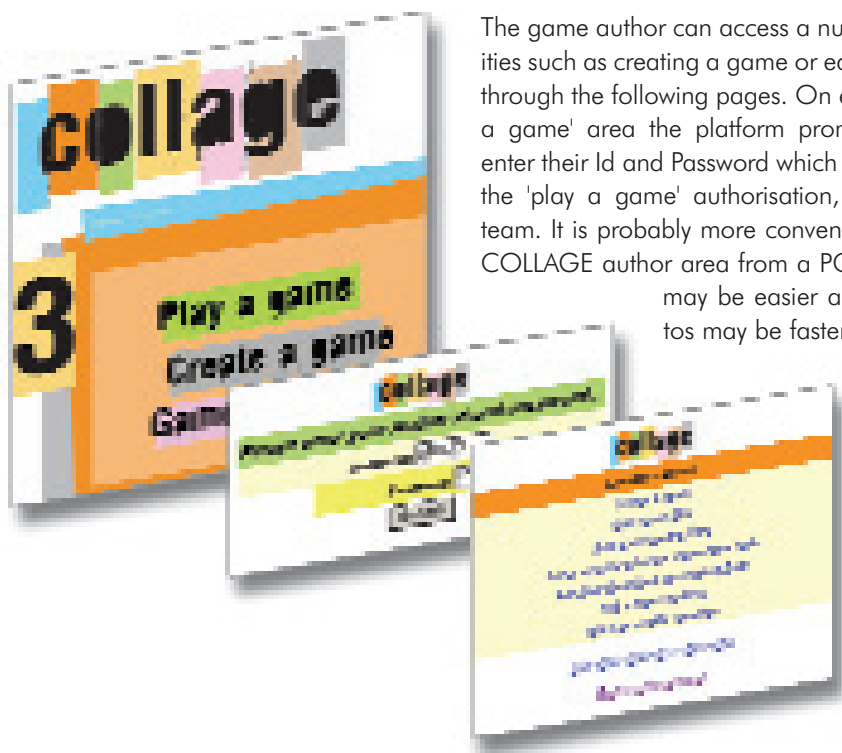- A good narrative that will engage the student in the game
- And an appropriate challenge for the learner

Overview

The game author can access a number of functionalities such as creating a game or edit an existing game through the following pages. On entering the 'Create a game' area the platform prompts the author to enter their Id and Password which is provided, as with the 'play a game' authorisation, by the COLLAGE team. It is probably more convenient to work on the COLLAGE author area from a PC where editing text may be easier and uploading photos may be faster.

The suggestions are based on the complementary COLLAGE publication 'Workshop on Educational Game Design'.

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The diagram below illustrates the necessary elements in creating a game on the COLLAGE platform. It is hoped that the understanding of the COLLAGE platform structure will help game authors to expand the potential of game-based learning.

CREATE A GAME

| ADD A SITE | ADD A GAME PATH | ADD A QUESTION TO A GAME PATH | ADD A QUESTION TO A GAME PATH | ADD A TERRITORY |

SITE NAME:
SITE DESCRIPTION:
IMAGE:
SCHOOL (AUTHORED BY):
LANGUAGE:

GAME PATH NAME:
GAME PATH FOR SITE:

CHOOSE SITE:
CHOOSE PATH:
TEXT OF QUESTION
3 POSSIBLE ANSWERS
TICK CORRECT
REMARK
IMAGE

CHOOSE SITE:
TERRITORY NAME:
LATTITUDE:
LONGITUDE:
RANGE:

CHOOSE SITE:
ENTER QUESTION CODE:
ENTER QUESTION TEXT:
ANSWERS:

The Location

Stage 1: Think about Place, Role or Scenario: What does it have to offer the learner

Stage 2: Define the big stories

Develop game like learning that grows from narratives. The narratives may come from specific locations, roles or scenarios.

A narrative example:

A group of time travellers returned from the Knossos Place of Bronze Age back to modern time. It is a group of friends and colleagues with various interests, characters and backgrounds: a painter, a civil engineer, a sociologist, a journalist and a fashion designer. Thanks to their time travel in the past they lived an extraordinary day in Knossos Palace and they left with the best memories and a painting of the Palace created by their painter friend.

With a great desire to re-live their fantastic experience the five friends decide to go for a holiday to modern Crete. They are eager to go again to Knossos, to visit the ruins of Knossos Palace.
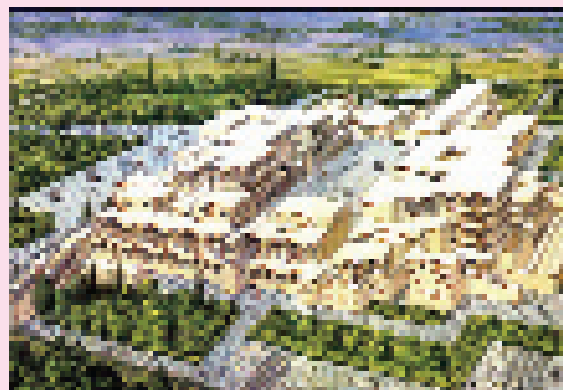
Adding a Site on the Platform

In order to define the location in the COLLAGE platform simply
- add a name for the Site (e.g. Knossos)
- a brief description which may include your narrative as on your left page
- and an image which may illustrate an element of your narrative.

You may also indicate under which school the game was authored and with the help of which teacher.

If you would like to edit the text and image on this page you can follow the link Return to the Author's main area.

From here, you can follow the edit a game link...

...to edit any of the game elements

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Stage 3: Think about the potential learning outcomes - what are the important things to be learned about the space? What stories has this place got to tell?

The important things to be learned may be identified through the following questions:

What was it like in the past?
What is it now?
Who used to use this space?- what did they do?
What is important about the physical geography of this space? - has this changed?
What is important about the ecology of this space (the study of relationships between plants, animals, people, and their environment, and the balances between these relationships)?
What is important about the man-made and man-shaped artefacts in this space?
What is important about the ways that the physical geography, ecology and human activity interact?
What has happened in this space?

The Knossos Palace is one of the most frequently visited archaeological sites in Greece, and there are a lot of guides, books, web sites, and photos of this place. It is easy to feel overwhelmed by all this available material.

Stage 4: Think about how the activity may have game -like potential- possibilities

The ruins of Minos' palace at Knossos have been found, but the labyrinth has not. The enormous number of rooms, staircases and corridors in the palace has led archaeologists to believe that the palace itself was the source of the labyrinth myth. It is said that no visitor could enter the Palace without someone to guide him around. Ariadne, the daughter of King Minos and Queen thought up a simple solution to the problem of the man she loved, Theseus, to survive the Labyrinth. She gave Theseus a ball of yarn (mitos) so he could find his way through the Labyrinth and kill the monster Minotaur.

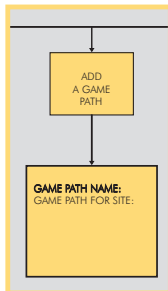**Stage 5:** Outline a plot- a story board- 3 act play

Myth and Bronze Age History are blurred. Unfortunately there is no 'mitos' for the time travelers who return back to Knossos. A plot may develop around finding your way in and out of the Knossos Palace, avoiding to get trapped in any of the rooms, finding things that the time travelers have admired during their trip back in time, and taking these things out of the labyrinth (effectively take a photo of these things).

1. ENTRANCE A: West Wing: (Finding the way in the labyrinth) - getting around the entrance A, identifying elements in the ruins from the reconstruction, that is the supposed painting. Devise an act around the, west court (it used to separate the palace from the rest if of the city), the circular pits (used for depositing remains of religious rituals). On entering the Palace, the ruins reflect elements of social segregation, art, and religion
2. CENTRAL COURT: (Going around the central court). Why a central court in the middle of a maze? To make the kings department inaccessible? To create currents of air for a cooler to palace during the summer? What is the most impressive evidence of luxury? The running water? The paintings? On exploring the central park elements about the Palace administration, the architecture and engineering of the building become evident.
3. EAST WING: (Finding the way out) To get out you have to win a game of zatrikiion, a board game of the time. But first you have to find it! Win a bull fight, after finding out what the rules of winning the game are.

In terms of site structure we can identify the three-part plot with three game path areas. These are areas that the players are going to explore with the help of questions. Each game path imposes a challenge to the team players. It may also have a learning objective.

Adding a Game Path to an Existing Site

There are three game paths that are based on the plot described in the previous page.

From the create a game page choose to add a game path, then fill in the spaces as in the example.

On a separate browser you can preview how this would look like when players are selecting the Central Court Path.

Stage 6: Think about opportunities for Meta-learning and increasing cognitive demand.

The story with five friends with the different profession gives a possibility of specialising the content of the game around categories. In the table below we can see a list of categories with corresponding professions. This categorisation is also a way to deal with the immense material on Knossos from guide books, history books and web sites. Could combining the themes with the questions proposes earlier by Stage 1 and 2, help to invent some interesting questions?

Themes	Roles, Professions
Art	Painter, Architect, Sculptor
Engineering	Civil Engineer, Computer Programmer, Technician
Education	Teacher, Physicists, Sociologist
Politics and Administration	Politician, Journalist, Lawyer
Sports and Entertainment	Actor, Football Player, Fashion Designer

Adding a Question to an Existing Game Path

You can start adding questions to the game path.
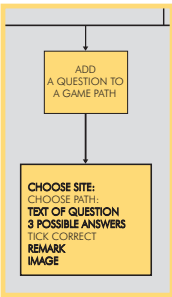
From the create a game page choose to add a question, then choose the appropriate path and fill in the spaces as in the example.

On a separate browser you can preview how this would look like when players are about to answer this question.

Chapter 3:
How to play a Game

Play the Game

A COLLAGE game is played at a site where a student group and their teachers are visiting. Leaving behind the school classroom the students are supposed to carry with them a PDA or a mobile laptop for accessing the COLLAGE games platform and web based information, as well as one or more mobile phones for communication.

When students play a game on the COLLAGE platform they need to know that for every site there are various Game Paths (learning scenarios) that they need to take in order to win a game.

The site may be identified with a physical location, for example an archaeological site such as the Knossos Palace. Many games will be uploaded on the COLLAGE platform, for various sites, by various European Schools and in various European languages. Students and teachers can browse the platform before deciding on the site they will visit (see Game Library). They may like some of the existing games or they may decide to create their own game for other students to play, as described in the chapter 'Create a Game'.
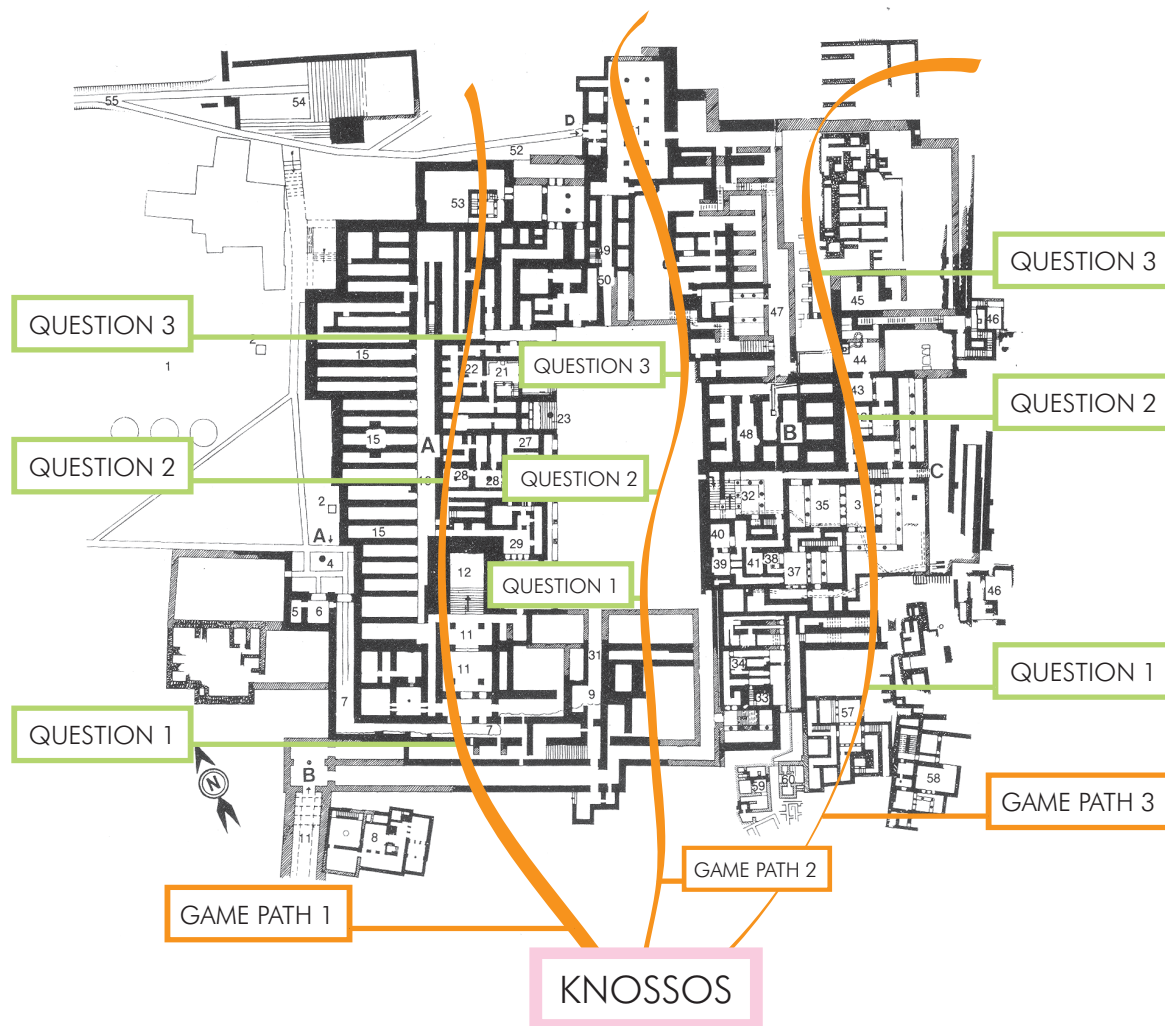
A Game Path, e.g. the path 'Through the Central Court', consists of a sequence of Questions that you need to successfully answer. The concept of a Game Path represents a set of question that is related to a specific area of the site, such as a court, a room or a building. Following a Game Path is like facing a challenge such as understanding the way of living in Minoan times, the heating mechanism in a Roman village, finding out how planes fly. Such a challenge drives the players to explore the Site, get lost, discover secret corners and win points. A Game Path has a beginning and an end. In the beginning the players are introduced to the Challenge of the Path and then they have to answer a sequence of Questions. In completing the Challenge they are enthusiastic to take up another Challenge.

Create your Team and...

Open Sesame! On entering the COLLAGE platform, the first thing you need to do is to identify your team by entering you credentials, for example Team Id: 654321, Password: 4321. The author of the game you played (for example, Teacher: Evi Chryssafidou), is supposed to provide you with the school code and her Id. You need to add a mobile phone number so that you can receive SMS messages in the course of the game.
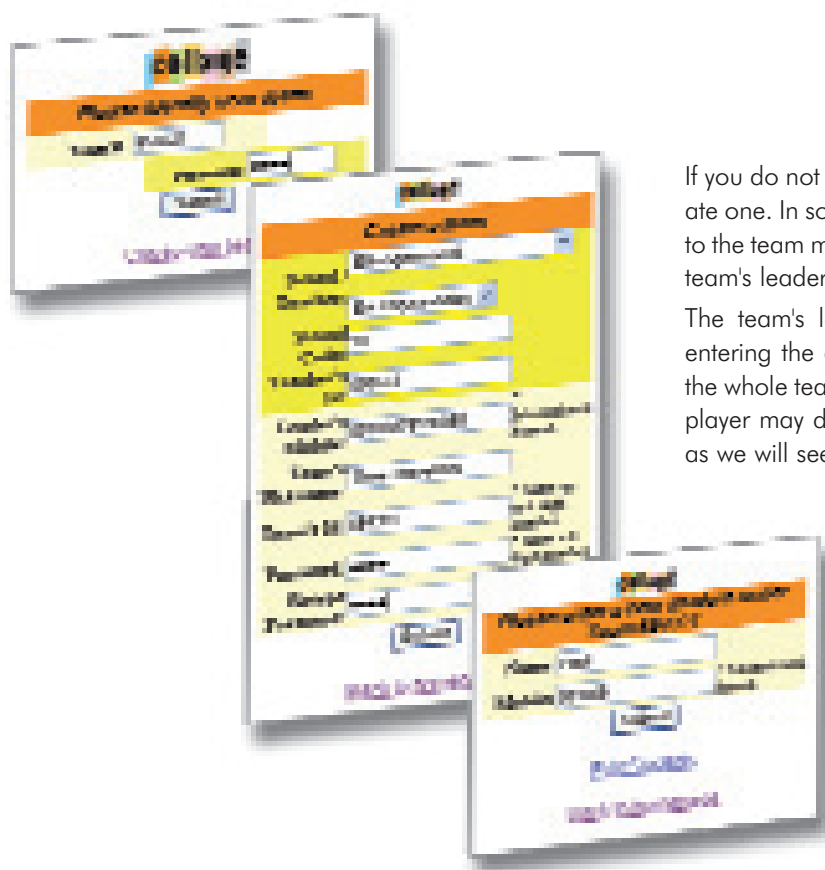
If you do not have a team yet you need to create one. In some games, roles will be assigned to the team members. Here we simply have the team's leader and the team's players.

The team's leader is usually responsible for entering the answers through the PDA. While the whole team should agree on one answer a player may disagree with the team's decision, as we will see later.

As soon as you create your team the platform prompts you to enter new Players (students) in the Team. You can add your fellow students' mobile numbers so that they can receive SMS messages too.

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Go to Questions

1, 2, 3… GO!

As soon as you identify your team the COL-LAGE platform prompts you to Select a Site. You can view All the Sites, for which Game Paths and Questions are already written, or you can choose the Sites for which Game Paths are prepared by your School. As this game is addressed to many European schools, you can also select a site on the basis of the language the material is written in. The Knossos Site has a few game paths only. Let's choose the 'Entrance A' Game Path.

The Challenge is described in the screen besides. The game starts.

The Logbook - The Learning Scenario

The logbook is a record of how the team dealt with the questions of each Game Path. The Players have to add a comment in order to support their answer, whether is the right or the wrong one. However, on entering the Logbook the player can infer from the Points collected whether they have chosen the correct answer. The pedagogical objective of the Logbook is to allow the players and the teams to review their playing strategy. By providing support for every answer the players are encouraged to think critically.

On entering the logbook the team has an overview of their situation, how many points they have, how many questions they have answered and how

Every entry in the Logbook corresponds to a Game Path question. The player is usually required to back up his or her chosen answer with a written comment, a photo taken on site or other information from the web, e.g. a hyperlink

Other players of the same team can add their own comments to back up the chosen answer or the comment initially add to support the chosen answer. Furthermore, a player that disagrees with the team's chosen answer can declare his or her disagreement with a comment

Playing a Game with the COLLAGE Platform
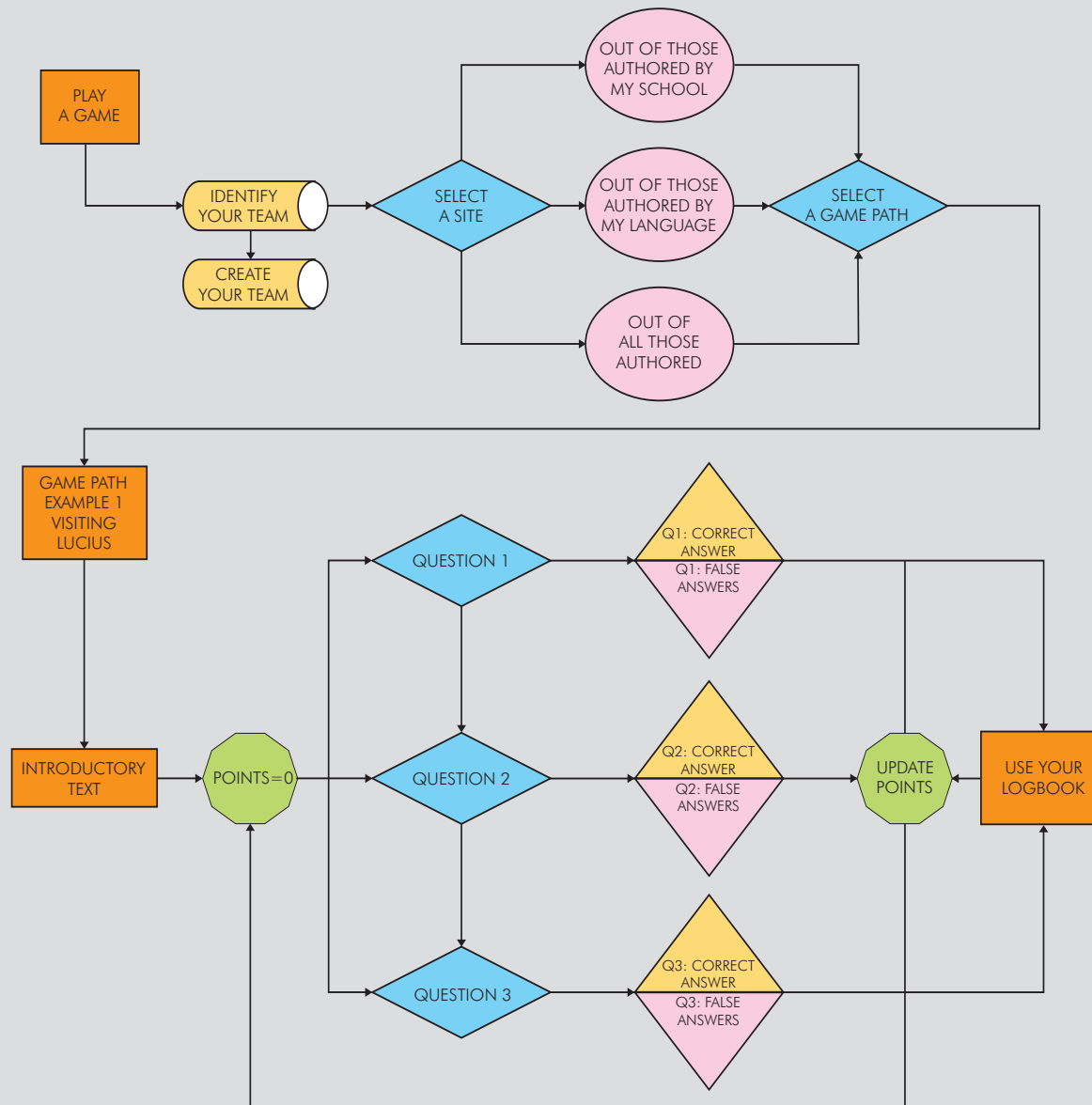
Chapter 4:
Implementation of COLLAGE scenarios
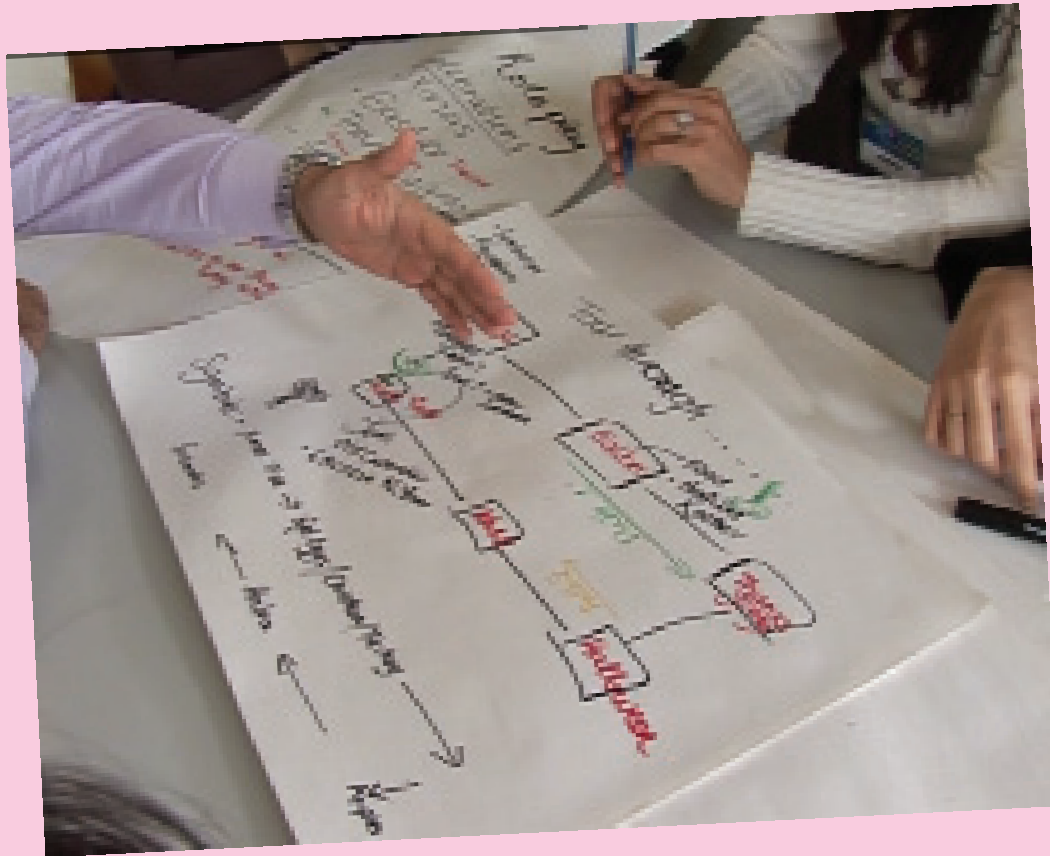
Implementing game and location-based scenarios using the **COLLAGE** mobile learning platform

The importance of the COLLAGE project's contribution relies on the teacher's involvement in creating mobile learning and game-based scenarios. All scenarios are associated with a visit to a place of interest, where the students are involved in tasks, and quizzes aiming to motivate learning by inquiry, observation and collaboration. In COLLAGE, teachers play a very important role in the implementation. They initiate mobile learning scenarios, apply gaming concepts and principles, implement them in a formal education context, and integrate them with their own curriculum objectives. The teachers involved in the creation and implementation of the COLLAGE scenarios dealt with issues related to

● Game based-learning
● Mobile and location-based learning
● Creation of educationally authentic content

The teachers involved in the game authoring had almost no previous experience in setting up and motivating similar technology based activities. All the teachers were supported with training through workshops while further help was provided upon request by representatives of the COLLAGE partnership.

The implementation of scenarios was realized during **3 cycles of implementation**.

During the 1st cycle the teachers designed scenarios while at the same time were getting familiar with the COLLAGE platform and the concepts of game-based learning and location-based learning. At this phase the scenarios were implemented with a limited number of students but with the participation of the COLLAGE partners. Experience from this cycle contributed greatly to providing feedback to the designers of the platform as they received feedback directly from the teachers, who designed and implemented COLLAGE scenarios. The following scenarios will be presented as good practices during this cycle

● The Knossos scenario (Greece)
● The airport scenario (Austria)
● Visiting the House of Lucius (1st Carnuntum scenario -Austria)

The aim of the **2nd cycle** was to involve significantly wider groups of students. During this cycle of implementation new scenarios were implemented based on the experie nce of the previous cycle. Some of the new scenarios evolved from the rational and concepts of the initial scenarios.

The Ancient Agora scenario (Greece) was created by the authors of the Knossos scenario who build on their acquired experience in order to create a new game. The creation of educationally authentic content was at the center of this endeavor.

The Fodele scenario implemented at small river is a best practice scenario of inquiry based learning implemented in a location that underlines the value of location based learning.

Visitate Carnutum (2nd Carnumentu scenario) made the most of the experience of the previous by introducing the role playing element.

The 3rd cycle of implementation invited students as authors of games, who after they gained experience as players they authored their own questions in order to add them to existing scenarios. Students who authored questions for their own games worked on the Ancient Agora and the Canruntum scenarios.

The Knossos scenario

The Knossos scenario was implemented at the archeological site of the Knossos palace, near Heraklion, Crete, known as the center of the Minoan civilization and culture during the Bronze Age. The design of this scenario was undertaken by history teachers who teach secondary school students in the area of Athens, Greece. Initially, the teachers collected the necessary material through books, guides and on-line information. Although they have visited the archeological site of Knossos in previous years, direct inspection of the site was not possible. As the archeological site is continuously conserved and works take place all year round, the teachers needed to know which rooms of the Knossos palace was open to visitors, and how walkways and guard rail-

Pedagogical objectives

The teachers have identified objectives that are directly related to the school curriculum:

● The Minoans' worship of nature through female representations
● The role of the palace as place of religious worship
● Sacred symbols of Minoan religion

The story (narrative)

In order to liven up the experience of the game the teachers came up with a story:

A group of time travellers returned from the Knossos Place of Bronze Age back to modern time. It is a group of friends and colleagues with various interests, characters and backgrounds: a painter, a civil engineer, a sociologist, a journalist and a fashion designer. Thanks to their time travel in the past they lived an extraordinary day in Knossos Palace and they left with the best memories and a painting of the Palace created by their painter friend. With a great desire to re-live their fantastic experience the five friends decide to go for a holiday to modern Crete. They are eager to go again to Knossos, to visit the ruins of Knossos Palace.

ings would intervene with the game paths. A third teacher who lives in the area of Knossos visited the site and took photos and video following specific itineraries, as the two history teachers have requested (Figure 1). Information from interpretive signage through the photographs (Figure 2), in both Greek and English, was also very useful to find out.

Questions

The history teachers compiled a set of questions that animates the story (narrative) The questions were associated with specific rooms and spots of the palace to form a sequence or path that could be drawn on the Knossos map (Figure 3).

aThe curator of the archeological site was asked to read the questions they prepared and provide comments. Here is an example of a question that could be addressed to the civil engineer of the story. The curators' comments are shown below. […Not necessarily correct for all the Minoan period. They may just have had a different Set of Rules for Combat .. also they did have elaborate warning systems: beacons in central Crete and a fort network in the East…] Dr Donal Evely, Knossos curator of the British School of Athens .
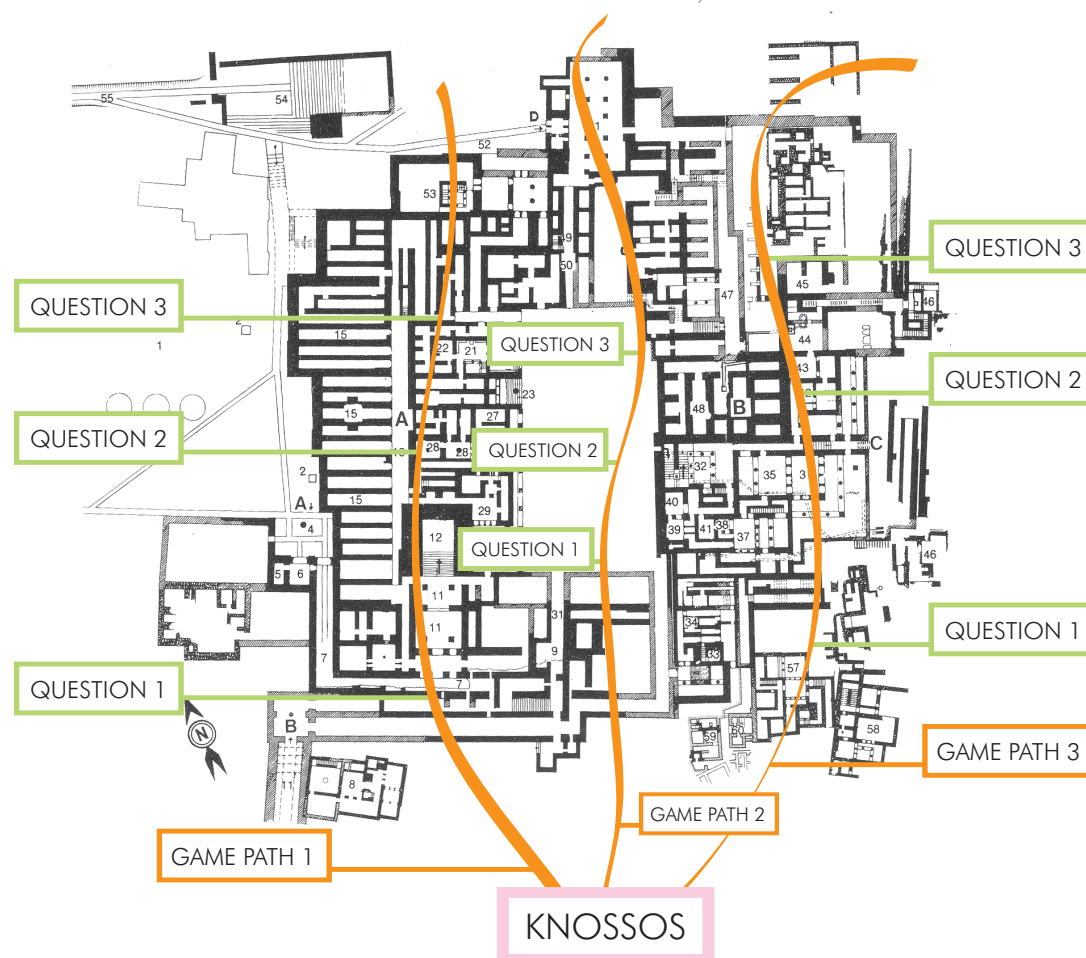
What do you think is the reason why there are no fortification works?

A. The Minoans did not know how to construct such structures.

B. There had been some fortification but they have all been destroyed.

C. Fortification was not necessary as the Minoan control of the sea safeguarded them against intruders

(C: correct answer according to teachers' suggestions).

Accompanying material

The teachers, students and consortium partners who visited the Knossos site were given maps of the site on which the paths were drawn.

Activities before, during and after the visit

As this scenario was implemented only with a limited number of students, who were invited from a local school, activities were planed only for the duration of the visit. The players had a specific mission to arrive to the Central Court of the Palace and from there to the King's room. Using their PDAs they had to identify specific areas in the palace, explain the possible usage of the rooms they are crossing, discuss the way of living of the citizens of the palace, explain symbols and paintings, and finally, after answering a series of questions correctly to find their way to the Central Court.

Related on-line information:

The British School at Athens (Institute for advanced research): The palace of Knos?s and its surroundings - 3D virtual reality tour http://www.bsa.ac.uk/knosos/index.htm?vrtour (accessed January 2008)

Video: \easerver\PHOTOS\R&D\2006\2006-12-08_Crete_Collage

The airport scenario

The implementation of this scenario was undertaken by a teacher of Latin, also pilot of small planes, and a teacher of physics, at the Bad V?slau airport, close to Vienna Schwechat. The students, who volunteered to participate, came from secondary education (BGS Schwechat). The teachers prepared the content for an introductory lesson on aviation and a series of questions that would motivate the students to explore the airplane and would trigger answers that are based on their knowledge of physics. They also arranged for a virtual flight with a simulator over the same airport. The students got on their PDA the questions which they had to answer after observing carefully the airplane, collaborating with the other students, and asking the pilot for hints.

Pedagogical objectives

The identified aim of the learning experience at the airport:

● Introduction to principles of aviation

● Learning in situ

● Drawing on knowledge of physics to understand the basic concepts of aviation

Questions/Taks

The 33 questions covered information about the airplane body and structure, the cockpit, basic principles on how to fly a small airplane and how to deal with dangerous situations. Here is an example: The "Carnuntum" sce

Why is there not only a "normal" magnetic compass, but also a gyro (directional indicator) in the cockpit?

a) because the gyro can be connected with a GPS

b) because the magnetic compass must be adjusted by using the gyro to show the true north

c) to have a back up, when the magnetic compass does not work

d) because of the compass errors of the magnetic compass when climbing or increasing or decreasing speed

a) WRONG - a GPS does not need any other instruments to work

b) WRONG - a magnetic compass cannot be adjusted by the pilot

c) WRONG - the probability of a total failure of the magnetic compass is very low
(and a gyro cannot work precisely without a magnetic compass for a longer time)

d) RIGHT

Activities during the visit

The excursion of the students started with the introductory lesson on aviation and continued with answering the questions on the PDA's. Having answered all the questions, they were given permission to fly - with the Mircosoft Flight Simulator for which the Austrian Map had been installed. Thus they completed a very realistic scenario of flying over the airport of Bad Vslau.

Related on-line information:

Bad Vslau, airfield Austria www.loav.at

Video: mms://archiv.schule.at/vis/collage/CollageMeeting06.wmv

The "Carnuntum" scenarios

The Carnuntum scenarios were realized at the archaeological excavation areas of Carnuntum, the largest Roman excavation site in Austria and very popular destination with schools. The school visits are usually organized around the main attractions, such as the civil settlements and the military castra, the reconstructed houses, gardens and lime roads. They are mainly associated with the Latin and History curriculum. The scenarios were developed by a teacher of Latin and a teacher of Physics, who contributed to an interdisciplinary approach to questions. The students, who volunteered to participate, came from secondary education (BGS Schwechat). Two groups participated of two age groups, 13-year olds and 17-year olds. The initial scenario "Visiting the House of Lucius" evolved later into a role play game "Visitate Carnuntum".

(I) Visiting the House of Lucius

The initial Carnuntum Scenario was set around the House of Lucius, a reconstructed Roman Villa, with a fully functioning under-floor heating system. Visitors who are no experts in ancient history and archaeology can imagine what a Roman house looked like and how people lived and worked there. They get an illusion of a "journey through the times", observe contemporary facilities, enjoy the luxurious environment, and they can even dress up as Roman citizens. Despite the archeological and historical interest of the place the scenario involved questions that were related to physics and engineering. Here, is an example with regards the heating system (hypocauston system)

You are now in the living room of the reconstructed roman villa of Lucius.
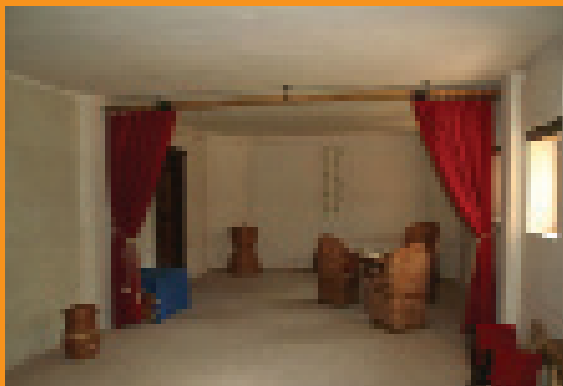
A part of the floor and the walls is open to demonstrate the construction of the heating system

Can you describe the path of the hot air?
The correct answer is….
a. The hot air is moving horizontally and through the windows
b. 'The hot air is moving under the floor towards the tubes on the wall'
c. Hot hair is moving constantly up and down

…as requested the players support their answer (b) in their logbook with an illustration
'*Here is a drawing of the movement of the air, through the tubes*'
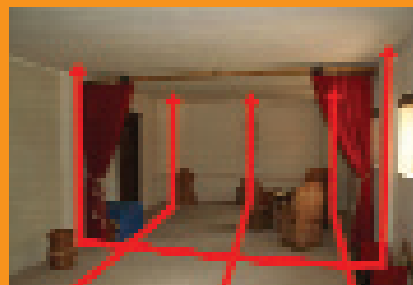
Pedagogical objectives

The aim of the scenario was to give the students a chance to get a vivid impression of the daily life in the Roman Empire. The scenario contains questions and tasks which have to be solved with interdisciplinary knowledge. Inferences based on understanding Latin and interpretations from laws of physics foster an interdisciplinary way of thinking.

(II) Visitate Carnuntum

The story

The initial scenario evolved into a new one that integrates question from the old one and consists of three paths, each one introducing the role of a fictional Roman character:

1. Fusca, a 14 year old slave girl in the household of a rich merchant

2. Gigas, a gladiator from Cappadocia

3. Marcus Septimius Maximianus, a soldier of the legio XIV gemina.
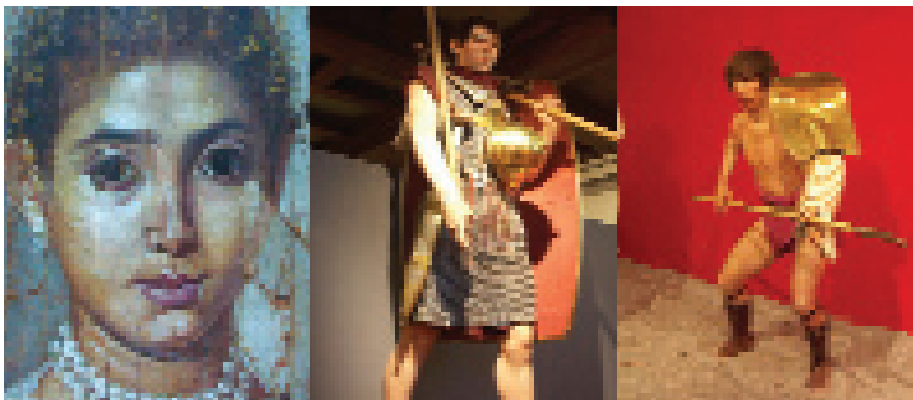
The design of the Carnuntum Scenario as role-play enables students to experience 3 different points of view of the ancient life in Carnuntum. Every player has to choose one of the three roles before he starts to play which corresponds to a game path. So everybody has to cope with different questions and tasks during the game. The players, in groups of 2 or 3, choose one path and, as they follow "their" Roman through the excavation area, they answer questions and solve tasks. The questions were related to things students could observe or infer from the context The tasks of the Carnuntum Scenario consisted of instructions where the pupils had to move, or of orders to take pictures with their PDAs and upload them to the logbook of the platform. . The paths were written in German and in English. Those wanted to take an extra challenge were encouraged to follow the game in English.

Pedagogical objectives

Further to the initial scenario objectives emphasis is given to learner engagement in the game with the role play and small group work. Collaboration and group dynamics are seriously taken into account. The required comments and photos for the logbook become object of collaboration and exchange of ideas. By providing support for every answer the players are encouraged to think critically. After the end of the game the logbook acquires an important function is to allow the players and the teams to review their game plan.

Questions

The game paths that follow the life of the Roman soldier Marcus and the gladiator Gigas describe everyday moments of their life.

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collage Sites/Path>1. Marcus Septimius Maximianus, soldier   Total Points: xxx

Question:

A few minutes later they reach a huge complex of buildings. "Who is living in this palace?" Titus asks. Marcus answers: "This is not a palace. This …" , but he doesn't continue, because he sees a very beautiful girl walking along and immediately forgets what he was going to say. So what are these buildings?

Select the correct answer:

● a "ludus gladiatorum" (barracks for gladiators)

● a theatre with a public library

● "thermae" (public baths)

---

collage Sites/Path>2. Gigas, the gladiator   Total Points: xxx

Question:

From his friends Gigas eventually finds out that Florus is at the great "thermae". On his way he sees a shop where pottery is sold. Of course he likes very much one item with the picture of a gladiator on it. For what purpose is it used?
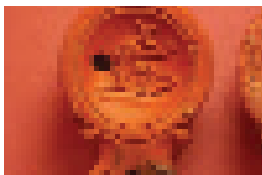
Select the correct answer:

● to collect coins

● to store spices

● as a lamp

Activities before the visit

In order to be prepared for their outside activities the Austrian students had visited the Museum Carnuntinum at one week before the visit. In the museum, information about the excavations as well as the history of the place is illustrated. A week later they set off for the game. During the bus ride to the archeological site the students watched a DVD about the ancient city of Carnuntum made by the ORF, the Austrian Television Company.

Activities during and after the visit

During the game, every team had to solve 10 multiple choice questions and perform tasks in the main excavation sites (site nr. 1 on the map- Figure XX). In doing so, the window of their logbook opened, and there they had to give reasons to justify their choice. The logbook is a record of how the team dealt with the questions of each game path. The players have to add a comment in order to support their answers, regardless whether they are right or wrong. However, on entering the logbook the player can infer from the points collected whether they have chosen the correct answer or not.

Related on-line information:

The Carnutum web site http://www.carnuntum.co.at/content-en/news?set_language=en&cl=en

Description of the school activities (in German)

http://www.bgschwechat.ac.at/index.php?option=com_content&task=view&id=238&Itemid=64

Fodele: The River of life

"The river of life" is a scenario that exploits the COLLAGE platform in an environmental activity. A biology teacher introduced the scenario, based on scientific information from the museum of natural history of Heraklion. He implemented it at Fodele, a small village, west of Heraklion, Crete, with a recreation part and an easily accessible river. The scenario could be implemented at any fresh water biotope in Greece and possibly, with a few adjustments in Europe as well. A group of twenty fifteen-year old pupils equipped with rubber boots, magnifying lenses, graphs to identify organisms and PDAs participated in the game.
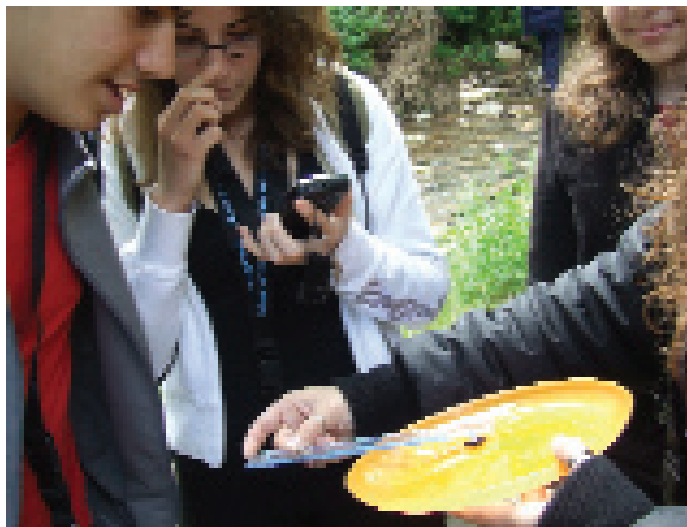
The story

"The river of life" is based on a narration about a girl named Zoe (Ζωή in Greek, is pronounced 'zoi' and means life). Zoe lives at Fodele by the river and is afraid that the river might be polluted. In such a case she should have to move out of the village and change her life plans. She and her friends decide to learn about the basic parameters of their environment and if they find something wrong to inform the other people of the village. The game is based on this narration and requires the help of Zoe and her friends in four different tasks:

1. Learn about the history of the area, the importance of the river and take photos of the ecosystem and the human intervention.
2. Collect identify and measure small animals that could be used as markers for the quality of the environment
3. Determine the temperature, the pH and the flow of the water in the river.
4. Prepare a presentation of conclusions on the "health" of the ecosystem.

"The river of life" is spread at two sites by the names "Fodele the biotope" and "Fodele small animals of the water-identities". The first is analyzed in three paths whilst the second one is analyzed in 24 paths one for each animal.
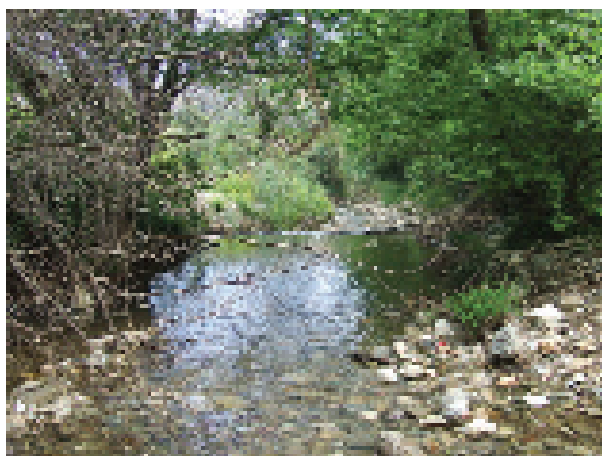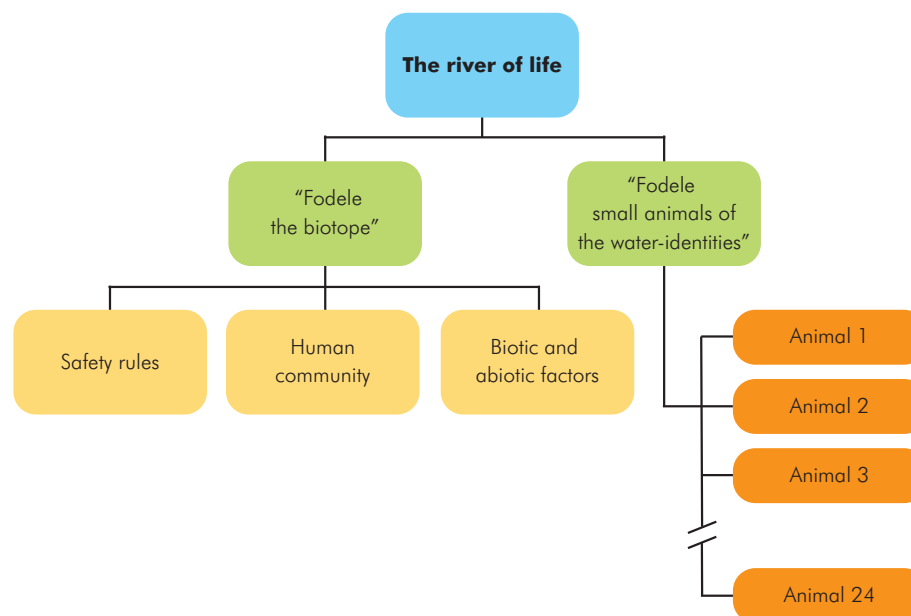
Pedagogical objectives

The objective of environmental education activities is for the pupils to realize the relation of humans to their natural and social environment, to be sensitized to the problems related to it and to be activated to the direction of their solution. The pedagogical model that was developed for the Fodele scenario is primary location-based and then game-based. The scenario invested in authenticity that would motivate students to learn about:

● Presence of life and its variability

● Dependence of the leaving creatures on their environment

● Role of abiotic factors

● Human factor interference

Activities before the visit

Before the activity, the teacher visited the site a few times to ensure the quality of mobile connections, to locate physical paths and ensure accessibility of the area. During these visits the form of the scenario was finalized. Two weeks before the activity on the rive site, the students were given all the preparative information including the rules of the game, the safety rules, and the program of the activity.

The day before the activity there was a second meeting with the students in order to get familiar with the use of PDAs.

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Activities during the visit

All groups were designated to play the paths "Safety rules" at the site "Fodele the biotope". Two groups were designed to play the path "Human community" while the other two were engaged in the path "Biotic and abiotic factors" of the same site. In the first case the "Human community" path was dealing with the history of the area and the economical activities (recreation and agriculture) which are related to the river. The path "Biotic and abiotic factors" guided the participating pupils to take pictures of the vegetation, record the sound of the water, determine the flow of the river by measuring the time a floating object i.e. a piece of wood, travels to cover a specific distance and the acidity of the water using a portable pHmeter.

Then all students gathered at the river banks were all groups searched for any of the twenty four (24) small animals mainly insects and molluscs described in their instructions. Each animal was represented as a path at the site "Fodele small animals of the water-identities" Successful identification of one of these animals helps the group to answer simple questions and perform the tasks required in the corresponding path.

1. Where did you find the animal?
2. How big is it?
3. Take a photo of the animal
4. Does your animal have this specific trait?
5. What makes your animal unique?

ΤΑΥΤΟΤΗΤΑ

Σαλιγκάρι 1

ΜΕΓΕΘΟΣ: περίπου
0   1   2   3   4   5

This activity can be considered a collection game. The more animals collected and identified the more correct answers and points in the competition.

At the end of the sampling process the students returned to the nearby park. After a short brake they combined their findings to estimate the quality of the envi-ronment. The estimation was done on the site using the logbooks of the groups and it was reported to the pupils. Out of a list of twenty-four animals the pupils recorded ten different species while may be another four or five were collected but not recorded. The recorded biodiversity is considered "satisfactory" just in the middle of a five levels scale while the collected animals move observed biodiversity one level up to "good". We recognized two out of the three organisms that are considered marks of a clean river. The presence of these two organisms strengthens the finding of a plecoptera nymph indicating that the river is very clean.
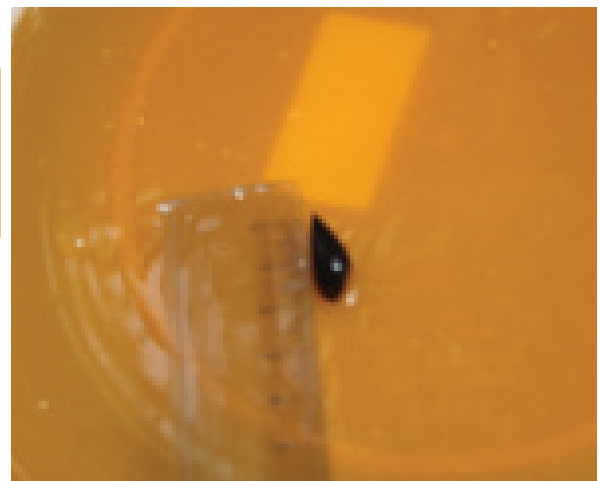
These findings were against the common misconception that everything is polluted.

Figure 5. Logbook
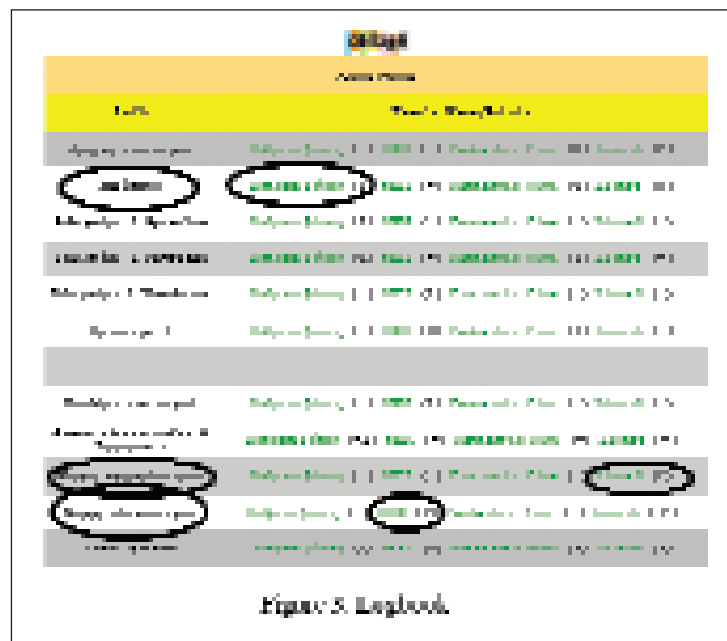
At the end of the visit an evaluation activity was organized by the teacher. The students evaluated the activity by choosing different spots in the park labeled with the expected responses (see table).

Pupils evaluated the tasks performed during the scenario:

Task Response	I knew it	It was new	Easiest	Most difficult	I am not going to use it	It was new and I will use it
Size determination	5		4		2	
Flow determination						
PDA operation	1	20	5	5		21
Taking photos	6		11			
Sound recording						
pH determination	6		1			
Temperature determination	3					
Small animal collection				16		
Small animal identification		1			19	
Total	21	21	21	21	21	21

Finally the winners of the game were declared and congratulations were exchanged between all the participants. The end of the activity was in time and its duration was estimated around four hours plus the brake and the transportation to and from the location.

Activities after the visit

At a subsequence meeting, in the school, a PowerPoint presentation was prepared based on gathered data and media: video from the activity, photos and comments from the logbook. Students were involved by preparing the presentation, in this procedure both by describing in a short communication the activity and by presenting it in public.

Related on line information:

Video: http://www.nischelwitzer.com/mm/collage

The Ancient Agora scenario

This scenario was designed and implemented by the teachers of history who have already been involved in the development of the Knossos scenario. They applied the experience they gained into the implementation of a new game: this game evolves across a number of paths that navigate the players in the archaeological site of Ancient Agora in the centre of Athens, below the hill where the Acropolis stands. There is not a particular story or narration to accompany the game in Ancient Agora. However, the experience of visiting the archaeological site is complemented by navigating the same place through a 3D interactive movie, in a modern theatre a few kilometres away. Before visiting the ruins of ancient agora, the secondary school students toured virtually the ancient Agora , at the modern 3D theatre of Tholos, at the foundation of the Hellenic World in Athens. They had the opportunity to get a glimpse into the Agora during the Classical, Hellenistic, and Roman periods, and thus get an understanding of how important the place was across periods. The Ancient Agora had been the heart of ancient Athens, the focus of political, commercial, administrative and social activity, the religious and cultural centre, and the seat of justice.

After the end of the movie the students went to the archeological site in order to play the game using PDAs and mobile phones. On site, the students followed pre-defined paths that represented a specific navigation through historic periods and by category of interest: economy, politics and religion. Driven by the game questions the students were guided to observe different places, ruins and labels, make relations between their observation and their knowledge on the role and the history of the Ancient Agora of Athens. Drawing on the experience of the virtual navigation and the actual tour of the ruins the students answered questions and provided evidence in support of answers by taking pictures and entering notes collaboratively.
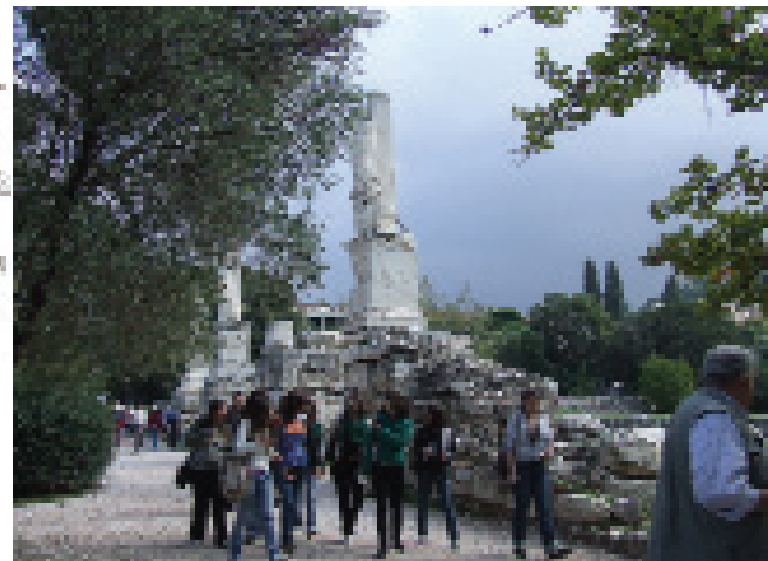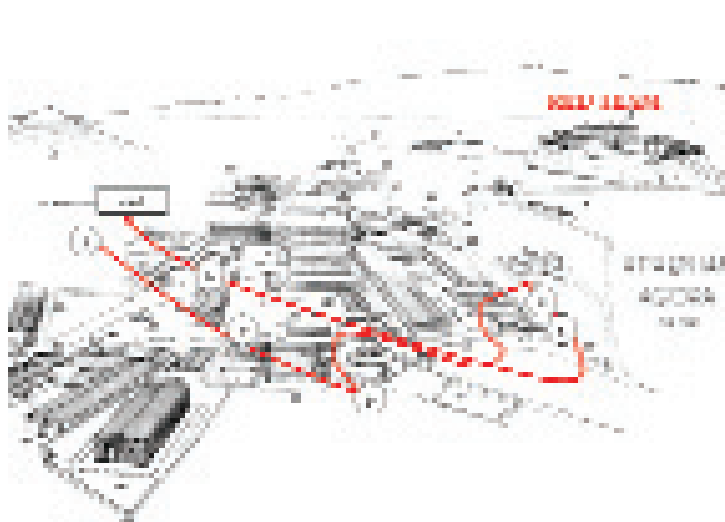
Following paths on site, answering questions and providing evidence was done in groups so that each member could contribute in a different way. After the visit the students could review online the comments and evidence they provided during the game and reflected on the way the worked together in order to provide answers.

Pedagogical objectives

The students had most of the responsibility for planning and organising their learning (autonomous learning). Although they could draw on their existing knowledge and the experience of Tholos, many of the questions required from the students to answer based on the experience they had on site (learning through discovery). Specific learning goals, which are closely related to the curriculum and the current schooling conditions were set. The teachers aspired that the students would be able to:

● place historical events in time and space

● identify the political, commercial, religious, social aspects of the Ancient Agora through the buildings

● understand that the place was important across periods, from the classic to the roman and to the Byzantine period.

● collaborate with the teacher and their classmates

● think further questions to contribute to the game

Activities before the visit

The students worked collaboratively and they were engaged in a series of preparatory activities.

● Educational material has been developed aiming to inform the students on the Ancient Agora of Athens. Furthermore, activities and exercises were designed aiming at the consolidation of the learning results.

● The students were familiarized with the computer and PDA applications of the COLLAGE project:
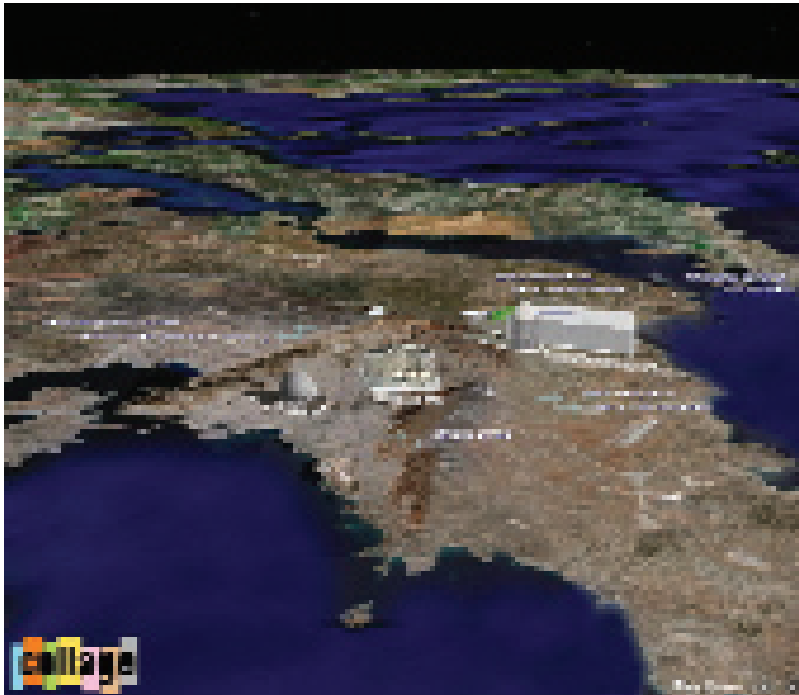
Activities during the visit

Before going to the Ancient Agora students visited the cultural center "Hellenic World", where they took part in a 3D interactive virtual tour. The virtual tour allowed students to gain an understanding of how the place evolved from the classic, to the roman and Byzantine period. At the site of ancient agora the students formed three groups and each group was given a PDA to use. The main aim of the educational activities was to study an important for that time aspect of Ancient Agora: economic, religious and commercial. The students had to follow separate learning paths that corresponded to each of the three aspects. At the end of the tour the three different groups gathered together and presented the results of the games to each other.

Activities after the visit

A few days after the visit the students were engaged in activities that motivated them to reflect on the visit and the experience they gained. They visited the logbooks they have created on the COLLAGE platform as point of reference of how they played the game. They were also encouraged to visit relevant web sites in order to clarify the mistakes and misconception identified through the logbooks. Finally, the students were asked to give their opinion concerning the pedagogical and the technological features of the scenario as well as the project's platform through interviews and questionnaires.

Mozart Scenario in Salzburg

In the framework of the "Interpaedagogica", the greatest fair of education in Austria The students designed and implemented a new learning path named . "Mozart is back!". The number of participants were 10 secondary school students, 2 teachers which were using 3 PDA dev ices The game took place in only one day. The high schools students at BGS school (Schwechat, Austria) were introduced to the ideas and aims of COLLAGE and then started without the teacher to explore the old city of Salzburg in order to create a learning game called "Mozart is back" in which Mozart comes to live and visit the city of Salzburg. The game was to find things Mozart would be interested in now in the city. In the very same day, students started uploading their game items to the platform: they designed 12 questions/tasks, translated it in English and finished the German as well as the English path.

Two more scenarios were implemented in Denmark and Estonia respectively. Because of the technical problems phased during the implementation of these scenarios less data were acquired from the teacher and students involved. Nevertheless the scenarios they introduced are worth presenting as case studies. .

A Study tour scenario by Danish college students

Two scenarios were developed for supporting the activities of the innovation business study programme at Vejle Business College (Denmark). Part of this study programme is the participation in study tours, such as a tour to Barcelona and a tour of the St Paul's Cathedral. From the beginning the students were involved in authoring the game questions. The objective was to create this game for another team. As preparation for authoring the study tour scenarios the students studied text material and websites. The objective here was to encourage students to get familiar with the history and culture of the visited location, and practice the language (English and Spanish)

Running through Tartu, Estonia

A sports event was simulated in this scenario, where participants first learned about the city of Tartu. Two teachers organised the event with teams of 3-5 members and a total of 155 students participated. The teams were asked to identify specific locations (e.g. historic places, statues, etc.). Tasks and questions were presented about these places (e.g. to take a picture of a specific building in which cultural events are organised). Places are then to be identified, pictures to be taken and then to be uploaded to the COLLAGE server. The winner is the team which provided the most accurate answers quickest.

Chapter 5:

Evaluation of implemented scenarios

Members of the COLLAGE partnership consolidating the evaluation results

Pedagogical Framework of the Evaluation

Two are the pedagogical models that are combined in the COLLAGE project: mobile game-based learning and location-based learning. Both inform the evaluation in terms of methodologies and parameters to look at.

Mobile game-based learning takes advantage of the opportunities of mobile technologies for providing rich contextual information during the learning experience, as well as communication among learners separated geographically.

In mobile game-based learning scenarios, we have to take into account what determines the natural development of the activity, whether the activity is in real time or not, obstacles to performance, what may define the kind of narrative that better fit learning goals, motivation strategies, etc.

Location-based learning is a type of scenario-based learning; it takes place in special physical locations. It's based on the concept of situated cognition, which is the idea that knowledge can't be known and fully understood independent of its context.

In COLLAGE project the locations are mediated by mobile communication devices. Location-based learning involves a process of thinking carefully about a space and what it is important to learn from, thinking of what is special to learn about that space and then deriving a narrative for learners about that space. In general it is important to take into account in the evaluation the following questions:
- What can be learned from a location
- What is worth learning from a location
- How that might be transformed into a narrative
- How that story might contain (game) challenges

Above all, it is of capital importance to envision to what extent the technologies involved, mobile and desktop ones, will enhance the potentialities of learning in the specific locations, as well as the engagement of the game strategies. Another key aspect is to what extent the learning experience (which includes the development of students' own learning resources) fits with the school curriculum. Finally, a key aspect of these pedagogical models is to enhance communication and collaboration skills of the students.

Scope of Evaluation

Throughout the project implementation the new learning environment was evaluated in real situations and in real environments. Evaluation of pedagogical and technological aspects of the project were perfromed according to concrete and defined methodologies. The aim was to develop an accurate knowledge base on how different types of tools and instruments support different types of thinking, reasoning and understanding. The research process that was adopted included both measurements (subjective and objective data) and observations as well as an investigation of how the tool influences student's learning. The educational value of the COLLAGE learning environment was evaluated during the repeated cycles of student-centred work.

In parallel to the evaluation of the pedagogical value of the COLLAGE learning environment emphasis was given to psychological, social and ethical considerations. The intention of the partnership was not to impose an ethical view, but rather pursue participatory ethics. With regards the combination of pedagogy and technology the project raised awareness for issues like: what is the most appropriate mix of physical (equipment, toys etc) and virtual (PC, video game environment) objects in learning activities? From this accurate evaluation scheme arguments in favour of the need for wider spread of new practices in education are expected to arise, arguments that will be distributed through an extended dissemination.

Special emphasis was given to the development of the evaluation scheme in order to overcome difficulties associated with the relatively small number of users involved in different sites and the limited duration of the implementation of the project, which is the case for such pilot projects. Therefore, the research plan for the project's evaluation is based mainly on qualitative data, taking into consideration the following four key features:
- the exact determination of learning objectives

- the systematic data acquisition during the phases of implementation
- the introduction of a methodological reporting system
- the combination with the limited sample of the quantitative results

The evaluation of the didactic approach was performed on four aspects: evaluation of student's learning, evaluation of the underlying pedagogical framework, ethnographical evaluation and evaluation of the impact of the COLLAGE approach on social and psychological issues.

1. Evaluation of the student's learning. Pedagogical experts undertook the task of the development of methodology and empirical research to investigate processes of learning and knowledge acquisition in the framework of the COLLAGE application.
2. Evaluation of the pedagogical framework. The major theoretical issue underlying the COLLAGE project was whether the implementation of the emerging technologies (e.g. wireless communications) could offer a qualitative upgrade to the everyday teaching at the high school level. In such a case the introduction of technology would not act as a substitute of the conventional teaching but rather as an add-on that has to justify its introduction through the qualitative upgrade it offers to everyday school practice.
3. Ethnographic evaluation. The project took advantage of different school environments across Europe and studied the attitudes of students and teachers with different cultures towards the implementation of advanced technologies in education as well as the attitudes between students themselves coming from different countries.
4. Evaluation of the impact of the introduction of technology on social and psychological issues. A feasibility study was performed in the usability framework that systematically addressed these issues in order to provide the frame of reference for the technical implementation of the COLLAGE learning tool.

Evaluation Approach

The main evaluation activities in the framework of the COLLAGE project are related to the (1) pedagogical framework, (2) the learning environment and (3) the learning scenarios developed and tested during the project. This results in a measuring of the potentials of the tools developed for their effectiveness to school education improvements and learning, focused at the pedagogical framework, data collection and data analysis.

Heuristic evaluation approaches are applied for the identification of issues related to technologies and user-interface design (e.g. usability), qualitative approaches for pedagogical evaluation.

Phases of evaluation

Different phases and type of activities during the lifetime of the project were taken into account. The data collection process therefore coincided with the testing, implementation and validation stages.

- 1st phase: Pre-evaluation questionnaire on overall and specific pedagogical aspects of the selected scenarios (see Annex 1). Each participant was taking part in a survey relating to the pedagogical framework. Evaluation took into consideration the following aspects:
  - Institutional perspective
  - Technological perspective.
  - Organisational aspects
  - Pedagogical principles
  - Pedagogical approach
  - Details of the scenarios to be implemented

● Desired timing of evaluation
● 2nd phase: "Site visits": Visits to the sites; observation templates in both the sites and the classrooms; users' interviews; pedagogical evaluation; and usability evaluation.
● 3rd phase: Pedagogical evaluation: analytical phase, including analysis of the study projects, depending on the implemented scenario. Outcome: Interim report draft.
● 4th phase: Reporting, participation in the project dissemination and exploitation activities, including final conference with presentation of results and final evaluation report.

Target groups

The project identified the following groups as the main target groups of the COLLAGE project:
● Secondary school students at the ages of 12 - 16
● Secondary school teachers
● Project participants

Initial Parameters

The parameters of the pedagogical evaluation depend on the pedagogical framework developed by the project. These parameters include issues such as interactions (nature of feedback), communication processes, roles of learning actors, motivation, team work, learning outcomes, and assessment.

The pedagogical framework was defined by the following principles:
● **Match to the curriculum** (Clarity of objectives, relevance of content covered, appropriateness of student activities, nature of the assessment)
● **Learner engagement** (Does the material engages and motivates learners?)
● **Degree of Innovation** (Is it evident why learning technologies are being used, added value in comparison with traditional approaches?)
● **Effective learning** (e.g. as demonstrated by a range of approaches that allows the learner to chose a suitable one, or one that can be personalized to specific needs, that extends the learner's repertoire of learning approaches..
● **Formative assessment** (Features/opportunities for formative assessment; e.g. providing rapid feedback that supports learners' improvements, providing opportunities for peer assessment, with appropriate understanding of the criteria or standards of performance required;
● **Summative assessment** (Features/opportunities for grading and guidance for future educational or work opportunities; and for validating the reliability of methods and data)
● **Coherence, consistency and transparency** (Material must be internally coherent and consistent with objectives, content, student activity and assessment. It must be open and accessible in its design. This implies that the components should match and that the match should be transparent in its intention; for example the activities should be consistent with the objectives and the assessment should assess these objectives-and not un-stated or unknown ones. It should be clear to the users what they are expected to do.)
● **Ease of use** (Transparency of material in terms of openness, accessibility, intuitiveness of use for teacher and learner, provision of appropriate guidance, extent of training needed, appropriateness of assumptions about the ICT skills of users)
● **Inclusion**: (Is material applicable for different types and range of achievement, including special needs? Can physical disabilities be particularly supported by electronic material; e.g. visual impairment, and to what extent? Is there

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consideration for different social and ethnic groups, as well as gender difference?)

- **Cost-effectiveness**: (Are costs for ICT solutions-technology, software, provision, maintenance, training, design, development, deployment, etc.-justifiable, affordable and sustainable?

Instruments

The following instruments were planned to be applied during evaluation: questionnaires (disseminated in printed and/or electronic version), interviews with teachers, learners and scenario providers (developers), field visits and observation activities. Table 1 presents an overview of the evaluation design. An important questionnaire 'Information sheet about COLLAGE Scenarios' is inserted in the end of the Guide (p.91).

Subjects	Objectives	Methods	Target Groups
Technology/devices/interfaces	usability issues to identify malfunctioning matters, design improvements on interfaces, and devices, etc	- Questionnaires - Discussion groups	-Pupils -Teachers -Technicians -Developper
Learning outcomes	to identify the results of the learning activities in terms of learning achievements, appropriate summative assessment, etc.	- Interviews - Self-reports	- Teachers - Pupils
Learning scenarios: Classroom based activities	to verify the adequateness and effectiveness of developed scenarios	- Observation - Interviews - Self-reports - Field visits	- Teachers - Pupils
Learning processes: communication among actors, motivation, assessment, etc	To investigate the interacting among participating students and teachers, learning motivation	- Observation - Quant. Data/ Log.files etc.	- Pupils - Teachers
Organisational aspects of the implementation, cost-effectiveness	To analyse the organisation requirements in the learning scenarios, the cost-effectiveness, etc	- Interviews with administrators, costs analysis, etc	- School teachers
Ethical and cultural issues	Accessibility of students with disabilities, gender issues, cultural aspects, etc.	- Interviews - Observation	- Technicians - Teachers

Table 1: Overview of COLLAGE evaluation design

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Data acquisition

In some cases observation and interviews were carried out by project partners in the native language of the cultural school context. The activities were undertaken after preliminary instruction (e.g. in terms of guidelines) and under the supervision of the evaluation team.

Evaluation of implemented scenarios

The importance of the COLLAGE project's contribution relies on the teacher's involvement in creating mobile learning and game-based scenarios. All scenarios are associated with a visit to a place of interest, where the students are involved in tasks, and quizzes aiming to motivate learning by inquiry, observation and collaboration. In COLLAGE, teachers play a very important role in the implementation. They initiate mobile learning scenarios, apply gaming concepts and principles, implement them in a formal education context, and integrate them with their own curriculum objectives. The teachers involved in the creation and implementation of the COLLAGE scenarios dealt with issues related to

● Game based-learning
● Mobile and location-based learning
● Creation of educationally authentic content
● Motivating learning

These four areas are intermingled, often in a very creative way while teachers initiated and implemented their scenarios. Issues regarding these areas, from both the teachers' and the students; perspective, will be discussed in this section.

Overall, the project COLLAGE has proved to be successful, and achieved most of its goals, opening the door to integrate new learning strategies using mobile technologies, mainly PDAs, and cellular phones. The game strategies implemented have proved to be effective in location-based learning situations, while the game structure has been gradually improving thanks to the active participation of the teachers and students.

The learning approaches associated to the different scenarios were varied and matched the learning scenarios and learning outcomes: enquiry-based learning and narrative-based learning were, among others, the most successful ones. Strategies as role-playing, collaborative learning were successfully embedded within the scenarios.

Game based learning and location based learning

According to the JISC review on game-based learning (de Freitas 2006) there is great potential for tutors and practitioners to become involved with games development for learning. While discussions on the usefulness of game-based learning are widely reported the actual effectiveness is subjected to embedding games into the school practice, providing guidelines to practitioners, allowing for opportunities to practitioners in terms of time and effort allocated. The main difficulties related to tutor engagement with game-based learning refer to.

● fixed lesson duration and time constraints both for planning and
implementing game-based learning (Sandford et al., 2006)
● the particular context and manner a teacher is used to work, i.e.
their experience, their teaching style, and the wider context of the
institution (Sandford et al., 2006:3)
● the ability to link the game objective and possible learning outcome with the curriculum, in particular Sandford et al. noticed that
"While teachers needed a certain level of familiarity with a game to be able to use it in their teaching, achieving particular
educational objectives through the use of the game was more dependent upon a teacher's knowledge of the curriculum

The Carnunum scenario integrated educationally authentic content

with which they were working than it was on their ability wit the game"

● Lack of dedicated guidelines, toolkits and frameworks for supporting innovative practice, which may be produced by the research community of the game based learning (Williamson & Sandford 2005).

Many projects that support visits of places of educational interest with the help of mobile devices and games are reported: Such places may be museums, archeological sites, places of environmental (e.g. Facer et al. 2004) and cultural interest, virtual places defined by sound spaces (Joiner et al 2006), or mixed reality spaces where, virtual reality and physical visitors are allowed (Brown et al. 2003). In the reported projects the content of the scenario is provided either by the place of interest (e.g. museum) or it comes with the mobile learning platform. The production of **educationally authentic and valid content** is an important aspect in creating games. In many cases, people, other than teachers, are involved during the design of the activity and content; researchers and experts may be involved in the authoring and substantiation of the content (Facer et al. 2004; Luyten 2006), students as participant designers and programming course students to design multiplayer network games (Scanneblad and Holmquits 2003). The tendency to modifying existing games "moddying" is gaining ground in the educational gaming area. Furthermore, motivating factors in implementing games are not only related to students' motivation but also to the schooling context and assessments context. The question how game-based learning can be designed in a way that "recognizes particular contexts (e.g. schooling) and the value systems (e.g assessment frameworks, intended learning outcomes) that shape them" (de Freitas & Oliver 2006) is a critical one.

The mobile Game-Based Learning (mGBL) aims to design new learning game models for the young adult market, and to deliver true games that can be integrated into a taught programme to engage students in inquiry-based learning (Mitchell 2007). It is expected that users will be able to create their own games and so models in the form of authoring templates and guidelines are provided. Three models are reported, a hybrid of Quiz and Simulation, a type of board game with a '2D'dimension, and a decision making model dealing with crisis in real-world scenarios, identifying solutions and proposing solution. The models include specific stages:

'Wanting' - in-class game preparation:

'Doing' - real-world investigation

Problem-finding:

Solution-finding:
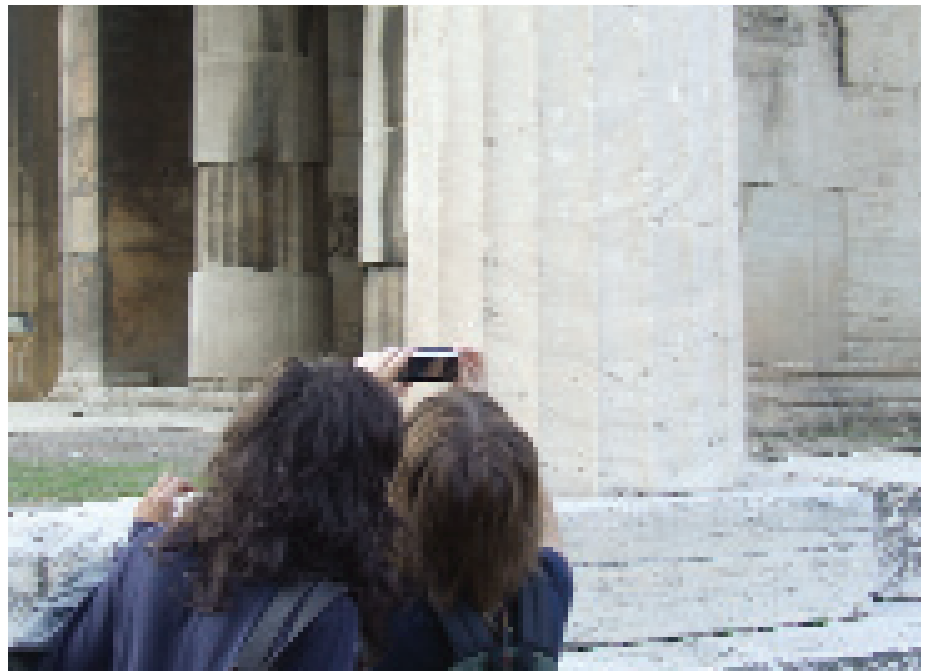
Students engaged in location-based learning

'Feedback'

'Debrief' (Mitchell 2007, p.96)

In the COLLAGE project the 'wanting' and 'doing' phases were met during the design of a scenario that deals with questions such as:

● What can be learned from a location

● What is worth learning from a location

● How that might be transformed into a narrative

● How that story might contain (game) challenges

As it will be shown later the feedback phase could be further enhanced with appropriate changes in the COLLAGE platform. Nevertheless, the COLLAGE logbook supports the 'Debrief' (Digesting) phase by encouraging reflection on decision-making processes and procedures that the students used when deciding on an answer and uploading complementary comments and media. It is believed that processes, such as students engaging in planning their investigation (pre-game) and in reflective process-es (post-game), will encourage them to take responsibility for conducting and evaluating their own learning in co-operation and collaboration with others, i.e. become autonomous learners (c.f. Kohonen, 2001)."

Finally, it can be argued that two are the main pedagogical models that prevail in COLLAGE: **mobile game-based learning** and **location-based learning**. Both inform the evaluation in terms of methodologies and parameters to look at.

Mobile game-based learning takes advantage of the opportunities of mobile technologies for providing rich contextual informa-tion during the learning experience, as well as communication among learners separated geographically. In mobile game-based learning scenarios, we have to take into account what determines the natural development of the activity, whether the activity is in real time or not, obstacles to performance, and what will determine the outcome; also, we have to define the kind of narrative that best fits learning goals, motivation strategies, etc.

Location-based learning is a type of scenario-based learning that takes place in special physical locations. It's based on the con-cept of situated cognition, which is the idea that knowledge cannot be fully understood independent of its context.

Implemented Scenarios

A variety of scenarios have been developed and tested throughout the projects. These are documented in the Internet-based project library (http://neseredete.forthnet.gr/collage/library_search.asp).

The ones which were taking into specific account during field observations and interviews were Knossos, Ancient Agora/Tholos, Fodele, Carnuntum, Mozart Scenario, Barcelona scenario and Tartu (see scenario descriptions, progress report and conclusions). Per country, the following Table shows the different scenarios and implementation phases:

	1st cycle Initial (before workshop training)	2nd cycle (after workshop training)		3rd cycle (co-design with students)
Greece	Knossos	Ancient Agora / Tholos		Ancient Agora /Tholos Students designing scenarios
		Fodele Inquiry based learning		
Austria	Airport Canuntum	Carnuntum with Luscius house (interdisciplinary approach)	Carnuntum 2, wit role playing (paths designed following roles)	Mozart scenario Students designing scenarios
Denmark		Barcelona		
Estonia		Tartu (validation)	Tartu(validation)	

First phase: Analysis of pre-evaluation questionnaire responses

In March 2006 questionnaires were distributed to the participating schools during the period of scenario development and before first tests were carried out.

All institutions involved considered the scenarios as relevant for their classes and lessons taught. Some relevance is also indicated for non-participating schools at a national level. As a consequence, this could mean that it is possible to achieve an overall added value in education at a national level in case scenarios turn out to be successful during tests. Inter-cultural issues are not mentioned as an important issue within the school environment.

It is mentioned that scenarios are related to the curricula in the countries concerned, some in a more direct sense (e.g. Greece), and others in a broader context (e.g. Austria) with general relevance given for various subjects taught.

The pedagogical strategies did match the pedagogical principles applied, as shown in the table below

Estonia	Greece	Denmark	Austria
No data	The pedagogical strategies that were applied in the design of the scenario activities are: ● Autonomous learning ● Contextual learning ● Experiential learning ● Interdisciplinary learning (Philosophy Ancient Greek Language, History) ● Playful learning	The methods will be location-based in Barcelona and involve the students actively in self-directed learning and making presentations based on the own studies of the relevant websites.	The following features were used: a) Game based b) Location based c) Exploratory learning d) Team work

Table 2. Pedagogical strategies The objectives and intended leaning outcomes were clearly established. The assessment of the learning success was also clearly defied in each scenario

Estonia	Greece	Denmark	Austria
Interactive quiz.	<u>During the activity</u>: percentage of the correct answers. <u>By the end of the activity</u> and after a period of time: questionnaire about perceived learning outcomes. Also students' projects, tests, etc.	After the implementation of the scenario, the students should be able to answer the questions of the uploaded quiz.	Success if the team manages to solve the game tasks and prove that they have learned different subjects during the process.

Table 3. Measurement of the learning success

The game scenarios designed included clear motivational approaches with embedded game mechanisms as mentioned in Table 3.

Estonia	Greece	Denmark	Austria
Miksike has found that very good motivation is healthy competition between not just individual learners but also schools and teams. Game mechanism fits Tartu scenario very well; kids like to compare themselves with others and if we also add time dimension (quicker the better) then we have good possibilities to create a good game.	The game mechanisms that will be implemented in the game are: Collecting Forming sequences Matching.	We intend to upload instructions for the students and relevant links so the students can prepare their presentations. A multiple-choice quiz that touches upon the aspects that the students have studied will be uploaded as a final assignment for the students.	The game is developed by teachers who have no special knowledge in designing games. The teachers participated in the one day workshop to learn about designing games. It is a role game: the pupils will explore the Carnuntum site in the role of a gladiator, of a soldier and of a young slave so they can learn about the different points of views of the inhabitants of Carnuntum.

Table 4. Motivational approaches and game mechanisms

The teachers were conscious that in the design of the scenarios the mobile technologies selected in the experiments match the pedagogical approach in each site. Special emphasis was made in making clear the motivational dimension of the games designed.

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Estonia	Greece	Denmark	Austria
regular mobile phones are used with SMS options. In 2-4 years, when most of mobile phones will probably be sold with GPS systems installed, we can speak of more technically sophisticated systems.	Greece The technologies that will be used within the framework of the activities allow and support the idea of autonomous learning. Using the collage platform students will have access to educational material (e.g. photos) related to the site that they will visit. Furthermore by the game questions they will be driven to observe different places of the Ancient Agora of Athens	The students are going to use the PDA-devices and the relevant information that will be uploaded to the Collage portal. In that way the students will have a compact and mobile device with which they can get access to the websites and collect information for their presentations.	Clients will be connected to the web portal where all necessary information is stored. The web portal is the scenario's "heart" where all information can be accessed and organized. The hardware to be used is HP IPAQ 6515 including GPS navigation and a GPRS connection to the Collage platform.

Table 5. Match of technologies and pedagogical approaches

Also the intended scenarios were also well described from a curricular point of view. All matched the pedagogical principles defined previously in WP1: match the curriculum, inclusion, learner engagement, pedagogical innovativeness, learning effectiveness, described formative and summative strategies, Coherence, consistency and transparency of the leaning scenarios, ease of use of technologies, a well as cost-effectiveness.

STUDENTS	Estonia	Greece	Denmark	Austria
Age	Grade 1-12 (but mostly middle level)	16 years old	18-19 years old	12-13 years old
Gender percentage	50%- 50%	100% girls	10 girls 13 boys	60% girls 40% boys
IT competence	Average	Very high	Good	Average
Primary curriculum subject	Social sciences	Ancient Greek Language and Philosophy	English	Languages, history
Other curriculum subjects	Sports	History	History, cross-cultural understanding	Computer science, physics

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TEACHERS	Estonia	Greece	Denmark	Austria
Subject	Social sciences, sports	Greek language, History	English	Latin, History
IT competences	Average	High	Average	Average
Experience	Average	5 years	15 years	Very experienced teacher
Primary curriculum subject	Social sciences	Ancient Greek Language and Philosophy	English	Languages, History Computer science,
Other curriculum subjects	Sports	History .	History, cross-cultural understanding	Physics

Table 6. Demographics data

The evaluators had the opportunity to make the teachers participate of the evaluation goals. The evaluation parameters were reached by consensus with the teachers and the researchers.

Explicit learning	Greece	Denmark	Austria
Match between the curriculum and the learning objectives of experiments	X	X	X
Learning outcomes, expected and unexpected	X		X
Assessment of learning outcomes	X	X	X
Teachers and students? satisfaction with the tools and interfaces	X	X	X
Game transparency	X	X	X
Connection between the outdoors and the classroom activities	X	X	X
Organizational and technical requirements	X		X
Satisfaction with the tools	X	X	X
Game suggestions for improvement	X		X
Implicit learning			
Communication processes (sites and classrooms, etc)	X		
Information and interaction overload	X		
Interactions among students	X	X	X
Game narrative	X		X
Interactions among students and teachers	X		
Teachers and students? perception of the game-based learning effectiveness	X		X
Usability problems	X	X	X
(new) roles of teachers	X	X	
(game) roles of students	X	X	X
Motivation	X	X	X
Attitudes of students towards the mobile technologies	X	X	X
Team work	X	X	X
Cultural differences	X	X	

Table 7. Evaluation parameters to take into account during the project

# Second implementation phase: field observations

Visits to most implementing sites were undertaken in Summer / Autumn 2007. The purpose was to observe the implementation of the scenarios in school class education taking into account pedagogical and usability issues. Furthermore, interviews supported evaluation activities in order to help clarify questions which had not been sufficiently covered by observations. Main conclusions are presented below.

Ancient Agora scenario

The scenario achieved positive results in terms of contents covered and outcomes reported. Participation was very inspiring both for teachers and students; the number of participants the scenario implementation was 2 teachers and15 students. The students used 3 PDA devices with GPS.

It appears that the students were very positive to the idea of using mobile technologies in learning. However, roles of actors were not sufficiently defined and the COLLAGE scenario was still not well enough linked with class activities before and after the scenario was "running". Furthermore, more game-like elements in the learning tasks could potentially support learning. Problem-solving and collaborative learning activities instead of fact-oriented knowledge would improve the scenario.

In conclusion, the developed scenario was strong in terms of content and technological implementation, however it could be improved in terms of pedagogical strategies.
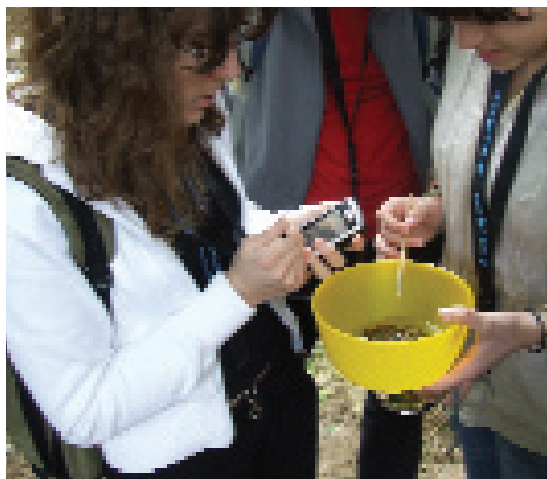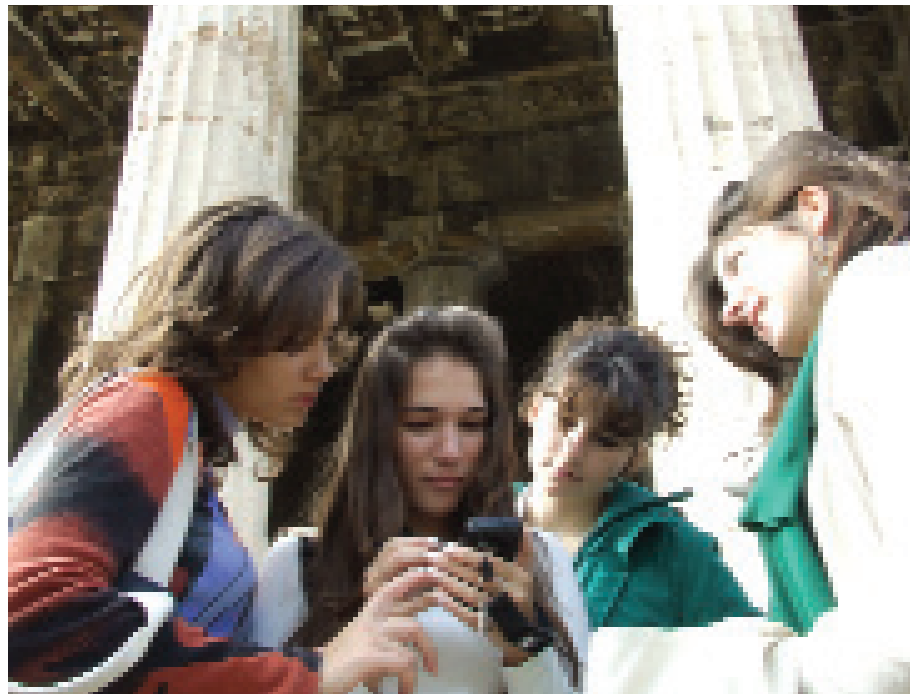
Fodele

Four teams of 5 to 6 students, age 13-15, a teacher, and two teachers supporting the activity participated in this implementation.

The intended learning outcomes of this scenario were: a) Presence of life and its variability; b) Dependence of the living creatures on their environment; c) Role of abiotic factors; d) Human factor interference.

Learning success was measured through the scenario as part of the game, as well as by a multi choice evaluation before and after the scenario. As in the case of Ancient Agora, game-like elements were still missing in the learning tasks prepared. According to the pedagogical principles defined, there was no feedback given during or after the responses were made. In order to ensure effective learning, this should be solved before the next phase, especially if summative and formative assessment are included in the implementation.

An important positive aspect to be noted is that the design of the scenario could be quite flexible in terms of its application within the regular curriculum in other knowledge areas. Seen from a content perspective this scenario can easily be adapted to other subject areas of the curriculum.

Scenarios implemented in Carnuntum

During last cycle of implementation, the students helped in the development of the scenario and suggested questions in the learning game. At the excavation area of the ancient Roman city of Carnuntum east of Vienna, the teachers designed a role game with three different paths, each one featuring one - fictional - person from the 4th century a.d. who walked along the streets of the city and explored different buildings and sites. Students followed these people, asking questions and performing tasks. A fourth path, situated at the amphitheatre, gave space to the students to create their own questions and tasks to be later uploaded in the COLLAGE platform.

The students were divided into groups of 2 or 3; each group got a PDA (MDA vario II) working with Windows Mobile 5.0 operating system and a 2MP-digicam inside. These devices were connected by Bluetooth to a GPS mouse (BeeLine GPS software); Connection to the Collage-Platform was by GPRS connection (UMTS was not available in Carnuntum). The teachers used a Siemens tablet notebook (Internet connection by PCMCIA card).

The number of participants was 17students, age 13, and 16 students age 17, together with 2 teachers. They used 10 PDA devices provided by the Ministry of Education.The implementation was very well prepared by teachers with sufficient knowledge of content area, pedagogy and technologies applied.

In terms of the pedagogical design, the scenario seems to be complex and daring especially with the role play approach. However, the implemented scenario appeared to be an extra activity instead of an integrated part of the lessons. Unexpected technical problems during the learning activities also contributed to decreased motivation and successful learning experiences.

Barcelona

Some technical problems were encountered in the test case of the scenario carried out in Barcelona. The lack of connectivity contributed to negative experiences in following the scenario instructions and use of the devices. Therefore, it was not possible to draw any further conclusion on the activities undertaken, but it is worth noting that extensive testing of devices and connectivity should be undertaken before such activities are carried out with students. Remarkably, the users involved remained very positive about future experiments and implementation at the school level.

The number of students was 23 (age 18-19) divided into 3 groups, and 2 teachers. They used 3 PDA devices

Limitations during the second implementation phase

There are a few concerns and recommendations to be given at different levels and various aspects:

Platform:

The platform worked well, with few failures. In general, a more effective use of devices and platform could be achieved if more training were provided on the handling of the technologies concerned. This would enable the users to get a better general idea about the functionalities and make navigation easier.

● Documentation (e.g. handbook) is needed related to the use of the COLLAGE platform which is not self-explanatory.

● Not all the features of the platform were used for the following reasons:

● They were difficult to implement within the game;

● They were not useful within the context of the given scenario;

● They were not fully available.

Games:

In general the game approach shows capacity for motivation and engagement (creating of different learning paths, allowing role playing, etc), but at the same time, and in most of the cases, it needs more sophistication at the time of creating the learning paths, breaking the actual linearity. Carnuntum is a good example of how to proceed. As with respect to concerns:

● The game-based approach is still basically developed (question-answer approach) and needs further reflection in the design to increase learning effectiveness.

● Furthermore, the level of difficulty of questions/answers proposed needs careful consideration in advance since it very much stimulates motivation as a positive and negative effect.

● Assessment features are not integrated into developments

● Motivational aspects such as awarding good grades (which should be presented immediately) need further work.

● Student collaboration among participating teams is not sufficiently reflected within the features of the game design. These features are needed in order to being able to realise pedagogical principles and to ensure learning effectiveness.

● More electronic interaction between teachers and students is needed. Teachers need instruments to provide instructions and support / feedback electronically.

Learning:

For most of the participants the difficulty level of the questions was average and in general they did not have much problems. The students used correctly the previous information given to them in the classroom and answered the questions. All participants found the "on location" learning very productive experience that helped the students to learn more things. The students liked the experience and they wanted to improve the experiment suggesting creating their own scenarios and questions. As with respect to concerns:

● Feedback is a key aspect for effective learning. As also postulated by the pedagogical principles, is not yet integrated in all scenarios studied.

● There is still a lack of consideration concerning the integration of activities into lesson plans before and after the activity was taking place.

● The added value of the use of mobile devices is not yet apparent in some cases. This will need further reflection during the scenario design phases, and each partner concentrate on how to integrate better the mobile aspect of the scenario into the general design of the activity.

Third phase of evaluation

According to the project proposal this phase runs parallel to the third round implementation phase in which the scenarios are re-designed based on the results of the previous ones. The other characteristic of this phase is that the students do participate in the re-design by introducing new learning tasks and in some cases, design new learning games.

Scenarios for the third phase

To some extend the scenarios coincide with those of the previous phases, However the scenarios have been improved from the pedagogic point of view.

The Ancient Agora scenario

The scenario took place in THOLOS., previousy described

Students of one class of EA (25 students) first visited the THOLOS Virtual Theater to watch the 3D film "Interactive Tour at the Ancient Agora of Athens" (http://www.tholos254.gr/en/index.html).

Then they went to the Ancient Agora to play the game that was authored and played last year. In a classroom session they were introduced to the concept of designing a new game with new questions and challenges around the theme of Ancient Agora. They were asked, first, to collect material (in digital format, text, photos, etc.) and to upload it in a content management platform (UNITE). They were organized in groups to work collaboratively.

They started to produce new questions in groups that will be assigned to different groups to answer in a later stage. The best questions for the game were sort-listed (evaluated by the teacher) to enter the final game (this will be done in the UNITE platform).

The students uploaded the question in the collage platform, and they went again to the Ancient Agora to play the game.

The scenario "Is Mozart back?"

This event took place during the Interpaedagogica, the greatest fair of education in Austria and lasted for 2 days.

During the first day, the students were introduced to the ideas and aims of the project and then they started, without any help by the teacher to explore the old city of Salzburg, to create a new game on the theme : "Mozart is back and is visiting the city where he used to live. Can you find things he would be interested in? Be care-ful not to get lost!". During this activity the students started to create new learning paths in their logbooks. In this way they drafted their questions while there were exploring new questions on location. When they returned to computer lab In Salzburg they were given author rights and accounts to upload the questions. They designed 12 questions/taks, translated it in English and finished the German as well as the English path.
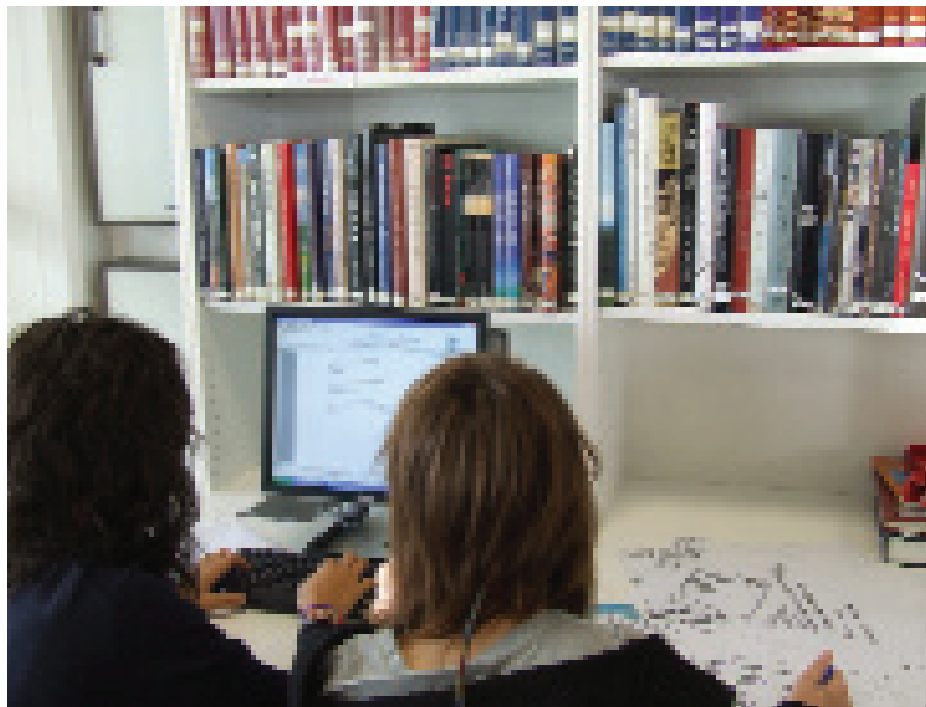
Student data

Data gathered from 12 students from three different countries that were directly involved in the third phase, indicate that their participation helped them to understand the learning contents in a better way in 75% of the cases, allowing for deeper understanding of the subject. The game-based learning activity with mobile technologies made it more agreeable to understand the content of the subject than the traditional methods in the classroom.

Learning in the mobile learning context was more motivating than the traditional learning in the classroom for all of them. At the same time for those student who participated during the different phases, they have demonstrated an evolution about their experiences in mobile learning. For an Austrian student "this has already been the second time our school has worked with Collage.

As with respect to the obstacles that appeared during the activity concerning the mobile learning interface and the technologies used, show that although most of the students were familiar with PDA devices, it happened that:

● There were Internet connection problems (after the collapse of the server, the teams lost their
 points and had to start again from the beginning of the game)

● There were problems concerning features of the PDA (uploading photos, changing size. etc.)

● There was not enough training concerning the use of the PDA-difficult to handle

● There was only one PDA for every team (not everybody had the opportunity to use it)

● Visibility of the PDA interface because of the sun light

● Students that didn't have experience with the PDAs were afraid to use them, afraid of damaging
 them.

Other remarkable obstacles that appeared during the activity concerning the learning scenario and the instructions given were:

● Some questions were much easier than others

● In all questions you had to follow the same process (answer, upload photo, add comment) which could be tedious

● There were some orientation problems in the setting, and students needed the guidance of their teachers in order to find
 their way.

The coordination and the instruction from the teachers were evaluated as very clear and positive by all students that answered the questionnaire.

To complete the overview of students' perceptions, here we have some comments of the students about the pilot test:

● "In my opinion this active learning is a great variety to the typical classroom teaching. The only thing that could be done
 better is that the students would have needed more experience with those PDA's. So I think that 2-4 lessons and maybe
 an outdoor practice will be pretty helpful"

● "For me it was totally new way of learning and I found it very interesting to manage all these tasks in groups and in
 different paths. I would recommend it because I think that in this way of learning the students will learn faster and easier"

● "I liked it very much because it was much funnier than the normal lesson. It is a nice alternative feature"

● "It was really interesting to learn in a different way. I really enjoyed interactive learning, taking photos and writing comments.
 It would be better if there were more paths. But anyway, I liked it and I think it is a good change for the students"

● "Generally it was an interesting experience. We need more time to find the questions. It was fun to design the questions
 with our fellow students"

● "I liked the experience. It shows that we can do things with computers and not depending only on the schoolbook.
 When we were asked to write new questions we had a lot of material that we can use. However, we would needed more

time to elaborate on this material"

● "It was a very interesting and new way to study the history of our University"

● "Perfect way to study and get to know your own hometown. And of course in fresh-air!"

● "I loved it! It was superb! Great to see and learn how to use a PDA. But the platform could be made for simpler mobile devices as well. I didn't hear any complaints from my fellow students"

● "It was fun to be outside the classroom and play a game that is related to school work"

● "I liked the fact that we could make our own questions but it was difficult to think of an interesting scenario that could be related to the questions"

Teachers' feedback

The number of participating school teachers in the third phase was five, from three different countries: one from Estonia, two from Greece and two from Austria

For four teachers the whole experiment helped to organize the learning contents in a better way than the traditional methods in class. They noticed that collaboration between the students was stronger during the experiment that usually is in the classroom. For them, the learning outcomes from the experiment were more complete in the experiment than the lesson in the classroom.

Comparing the COLLAGE experiment and the traditional teaching methods in class, for all the teachers there was a difference concerning the interest and motivation shown by the students. Furthermore, for four of the teachers the level of student participation in the Collage experiment and in the classroom with traditional teaching methods was significantly higher than those assisting only to class.

As with respect to the oobstacles that appeared during the preparation, elaboration and evaluation of the experiment concerning the technologies used, the teachers gathered the following:

● minor problems with the Internet connection, which was interrupted several times, probably due to the poor coverage at this area.

● The students had some problems (already mentioned) concerning the use of the PDA.

● Nokia mobile phones didn't have the necessary WAP-platform.

● Making photos with the mobiles was difficult.

Other technical obstacles that appeared during the preparation, elaboration and evaluation of the experiment concerning the Collage platform

● During the first experiment, the students lost their gathered points very easily.

● There was no connection with lower class Nokia.

● It was impossible to use cell phones to take pictures.

● Access (password, etc.) was complicated.

The teachers envision that the problems this kind of experiment will face concerning the integration in the school's curriculum would be:

● Teachers hesitation to try it; they are conservative.

● The PDAs and the SIM card needed are rather expensive, and very few schools can afford to buy more than 2 or 3 of them. This will eventually change.

● There are time constrains: more time is needed than what is allowed by the curriculum. Teachers had to borrow time from other courses.
● Overall the school is very positive towards such kinds of activities.

Other interesting aspects related to the game have arisen:
● As the games are designed, there is no feedback on the questions; this is arguable. Since immediate feedback is an important condition for learning, some feedback mechanisms would need to be considered in the design of the games.
● Partial scores could be accessible to the teams, not when the game ends.
● Avoid very easy questions/answers, or easy quizzes, since the game becomes less interesting.
● Pay attention to the collaboration mechanisms among the participating teams. Include if possible these features within the game. At least we need to have an experiment which includes collaboration among some teams.
◆ Games: More interaction among the teachers and the students' teams: sending messages teacher-students is good, for instance if they get lost, or need to get more instructions.

Chapter 6:
Conclusions and lessons learnt

Conclusions and lessons learnt

First of all it is clear that the mobile technology conditions the pedagogy and vice versa, as has happened in education. The technology platforms, the mobile devices, while allowing a new ways for motivating and engaging students and teachers, prove to be complex and, sometimes problematic in some aspects which remain to be reappraised and further studied.

The project COLLAGE has proved to achieve most of its goals, opening the door to integrate new learning strategies using mobile technologies, mainly PDAs, and cellular phones. The level of engagement of all actor has been very high, specially in those scenarios that were evolving in time. Teachers were enthusiastic in using the devise in situations in which learning takes place outside the classroom. The same can be said about students which were always very keen on "learning mobile" and using mobile technologies in the different scenarios.

A remarkable positive aspect of COLLAGE has been the evolution of the project scenarios in each of the participating sites, especially in Ancient Agora and Carnuntum scenarios. For instance, in the Carnuntum scenario, at the beginning one path was designed, and in the end three more were implemented, the last one with the help of the students. Furthermore, the same partner was able to engage their students in designing a totally new game within the platform, demonstrating the easiness of the technical system and the interface of the COLLAGE platform.

The game structure implemented was successful, as demonstrated during the third phase, in helping the teachers to create engaging learning activities adapted to the site visits. Teachers had the opportunity to improve the game strategies according to different leaning approaches: enquiry-based learning and narrative-based learning. Strategies as role-playing, collaborative learning were successfully embedded within the scenarios.

A pedagogical and technical handbook for using the system has been published as the COLLAGE implementation handbook, a good learning source. However, it is recognised that for taking full advantage of the possibilities of the platform, training sessions are needed, particularly for users as designers. For re-designing a learning path or creating new scenarios, students and teachers need also to understand both the game strategy used and the platform features. The identification of the added value of the mobile technologies in each scenario, including significant activities or aspects that cannot be done without, is a condition for mobile learning success and take-up.

In this sense, it is significant that the experiments have not used all the platform features. Three reasons are envisioned: a) they are difficult to implement within the game; b) they are not useful; c) they were not fully available.

Overall, in each of the sites the mobile learning scenarios gave the students the opportunity to see the lesson of history from a different perspective. Having access to other resources, both online and on paper, other than school text books, has been consid-

ered very positive. At the same time, though, a lot of effort and careful consideration is needed in order to integrate extracurricular material in the classroom. Teachers who create such scenarios need to think more about the contents they want to teach than for ordinary lessons, as demonstrated by the innovative scenarios created in COLLAGE by both teachers and students.

Here we have some final remarks for further future developments:

- The evolution of the technological system was complex, especially at the point of implementing new features, The interface needs to be more user oriented,. A stronger collaboration between technological and pedagogical developers as well as scenario implementers could contribute to a more coherent approach explaining a clear reason for each item needed and developed.
- A challenge for the future is to adapt the platform features for designing non-linear games according to the COLLAGE models suggested in the Implementation Guidelines. Then, the platform would need to include templates for designing other game-based designs defined in COLLAGE
- Teachers (and the students) need training sessions for using, and specially designing, game-based teaching and learning methods. The school environment is still very conservative, not open to game creativity and innovation.
- As with respect to transferability and validation, more experiments are needed, especially in knowledge areas other than history and archaeology.

Finally, the mobile learning technologies clearly have a lot of potential, as demonstrated by the project COLLAGE and for sure other successful mobile learning projects will come. We have seen that new learning approaches can be implemented in location-based scenarios, and there has been enough success in this project to warrant future experimentation and eventually, mobile learning innovation take-up in mainstream schools.

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Information sheet about COLLAGE Scenarios.

Please fill up this sheet to the best of your knowledge, and return it to us as soon as possible. Please answer the sections in order to help us to co-design both the objectives and the evaluation instruments of the COLLAGE experiments. The "Guiding questions" can help you in that matter; they do not need to be answered one by one.

NAME: _____

Institution: _____

Scenarios

1. Please, provide details on the intended scenarios from an institutional perspective.
Guiding questions:
a) To what extent is the scenario relevant for your (school) environment;
b) To what extent is it related to the curriculum
c) Can the experiment be generalised in your school? What are the
d) Will you plan activities with the participants in the other scenarios?

2. Please, provide details on the intended scenarios from a pedagogical approach.
Guiding questions:
a) like "What is interesting to learn about the place?"
b) What kind of pedagogical model(s) will be applied (game-based, location-based, other), mostly in your case?
c) What about the pedagogical strategy(ies)
d) What are the objectives in terms of intended learning outcomes and how can learning success by measured during/by
    the end of the activities

3. Please, provide details on the expected scenarios from a technological perspective.
Guiding questions:
a) What type of technologies should be used and, if relevant explain the media mix in terms of devices/hardware and
    software to be applied.
b) Why is the selection of software and hardware applications made for achieving project objectives (improved learning
    outcomes)
c) In your opinion, how the technologies match the pedagogical approach.
d) How the technologies help to achieve the learning outcomes,
e) Are there references/examples from previous experiments carried out related to these scenarios? If yes, please provide details.

4. Please, provide details on the intended scenarios from a organisational aspects.
Describe the primary and secondary target groups envisaged (according to the description
of work these are:
students, teachers, researchers, managers) and outline their role and degree of integration

Students	
Age	
Gender percentage (app.)	
IT competence	
Primary curriculum subject	
Other curriculum subjects	
Other (please specify)	
Teachers	
Subject	
IT competences	
Experience	
Other (please specify)	

5. In relation to COLLAGE pedagogical principles (which are mentioned in WP1),
Please describe to what extent these principles will be reflected in YOUR scenario:

Pedagogical Principles	
match to the curriculum	
inclusion	
learner engagement	
innovative approaches	
effective learning	
formative assessment	
summative assessment	
coherence, consistency and transparency	
ease of use	
cost-effectiveness	

6. From you point of view (i) in general and (ii) with reference to YOUR specific scenario,

- What should be the main goal of the evaluation?
- What should be the priorities of the evaluation?
- Which methodological approaches do you prefer? Please tick your preferences:

	YES	NO	I DON'T KNOW
questionnaires			
site visits by experts			
Observations by experts			
Personal diary made by the teachers involved in each site			
Analysis of log data in the server			
Other (please specify)			

Please select and suggest parameters that are important IN YOUR SCENARIO for the evaluation. Here is a list of some possible parameters:

	YES	NO	I DON'T KNOW
Interactions among students			
Interactions among students and teachers			
Communication processes (sites and classrooms, etc)			
Information overload			
(new) roles of actors			
Motivation			
Attitudes of students towards the technologies			
Team work			
Learning outcomes, expected and unexpected			
Assessment methods			
Ethical aspects (eg. Privacity)			
Parents views			
Usability problems			
Technical functioning and technical adaptation			
Other (please specify)			

7.   Evaluation timetable and cycles

- How important do you perceive evaluation for successfully completing your (a) (institutional) project work and (b) from a general perspective in relation to the intended implementations.
- With reference to the evaluation cycles to be implemented do you consider this frame as:
  (a) Feasible
  (b) Useful
- Please, describe the timeframe for the implementation of the intended scenarios for the whole project lifetime (amount of trials/test-runs, school activities etc.).

The evaluation approach distinguishes between different phases and type of activities to be taken into account during project life-time. The data collection process therefore coincides with the testing, implementation and validation stages.
1st phase. *"Usability questionnaire", according to an heuristic approach. Also evaluation questionnaire on specific pedagogical aspects of the selected scenarios*
2nd phase. *"Site visits": Visits to the sites; observation templates in both the sites and the classrooms, users' interviews; pedagogical evaluation and usability evaluation*
3rd phase. *Pedagogical evaluation of the study projects*

According to the project proposal the following time frame is set for evaluation (see below). Please, suggest modifications in case this cannot be applied for your case/in your country for whatever reasons (e.g. holidays, closing times). Look especially at the calendar for the Data collection.

Evaluation phase	
Design and development of evaluation instruments	Sep 2006
Data collection	Oct-Nov 06, "Usability questionnaire" Jan-Feb 07, "Site visits" Apr-May 07 "Pedagogical evaluation"
Data analysis	Nov-Dec 06, Feb-Mar 07, May-Jun 07
Evaluation report	

For all information provided in the questions above, please also take into account that your active involvement in evaluation activities (e.g. for translations, interviews, personal diaries) will be needed.

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