

**Project Title: Using wireless technologies for
context sensitive education and training**

Project Number: 2007-1968

REPORT

WP7 Use of context sensitive technologies in language learning

Pedagogical and Didactic Characteristics

We present mlearning as a form of performance support system for educational and training purposes. The advantages for trainees are derived from providing learners with a job aid in the context of their work and more flexibility and choice in where and when they learn outside of the wired (or un-wired) classroom. Performance-centred approach has been proven to be more effective than the traditional lecture-practice-test (expository inductive) in training higher order skills, for preparing learners for self-learning, improving, adapting for changing jobs. Wireless mLearning performance support systems are similar to traditional PSS. mLearning solutions integrate mobile devices with the learning to help the student to perform a task by providing information, guidance, and learning experiences when and where they are needed. The advantages to apply performance support in mLearning to create knowledge are derived from providing learners with a job aid in the context of their learning. The disadvantages of mLearning are a combination of technical and education challenges. Some of these disadvantages disappear if we apply performance-centred approach to mobile technology enhanced learning. It means that performance-centred method is very appropriate for mLearning pedagogical solutions.

The courses are presented as tasks for performance. To support this performance, tools are available – task-specific training, references and additional information, instructions how to perform and examples, expert advices. Each task is presented to the learner with a task description – text and/or a file.



Fig.1. Task description and System's menu

Reference information describes the task that the user has to perform. This reference information supports the user by making immediately available information, which (s)he previously had to memorize or look for in a book or a manual.

Lifelong Learning Programme

The reference section allows the user to learn more deeply about a given task and is always available for her/him to read and *provides the theory behind the task it supports*.

Task-specific training reduces preliminary training by helping the user to learn while performing the task. This type of *training is learner-centred* because the learner asks for help when he needs it to perform a task, and the help gives him the specific information that (s)he requests.

Educational performance support systems contain specific advice on performing tasks and it is its greatest advantage.

The advice is usually provided by the tool Instructions how to perform and as expert advices for each task.

The learner selects the task, then clicks on “Learn Selected”. He can read the task description and look at the file with the graphical presentation. He can use all available instruments to perform the task: task-specific training, reference information, instructions to perform, expert advices.

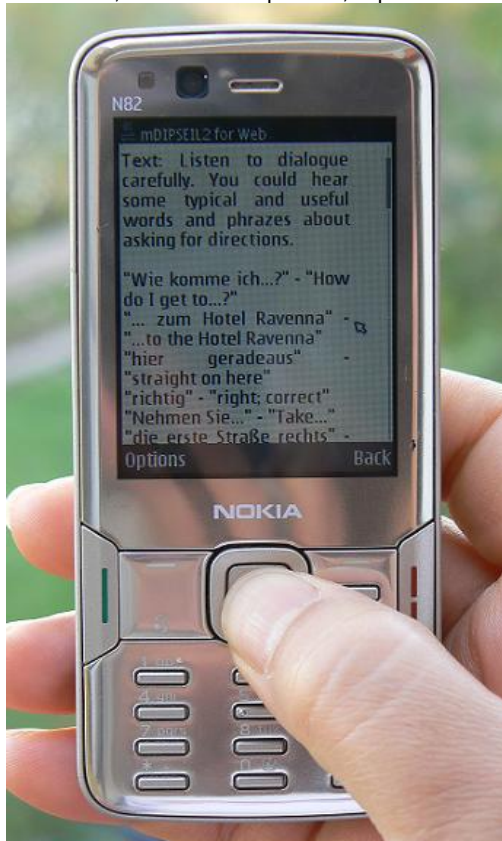


Fig.2. Task-Specific Training



Fig.3. Task-Specific Training



Education and Culture DG

Lifelong Learning Programme

EACEA

Education, Audiovisual & Culture Executive Agency

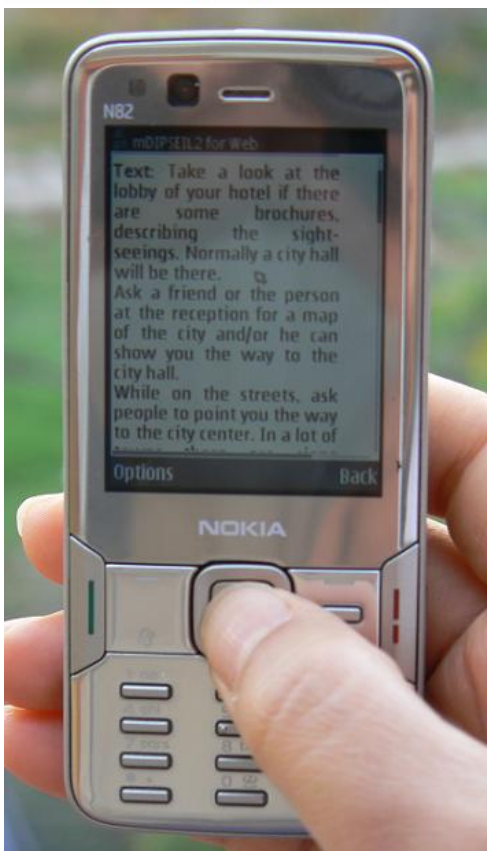


Fig.4. Instructions how to perform



Fig.5. Instructions how to perform



Fig.6. Instructions how to perform



Fig.7. Instructions how to perform

When the learner is ready with the performance, he/she sends the performance using “Send solution” to the server for a feedback and an assessment.

Structure of the Educational Content

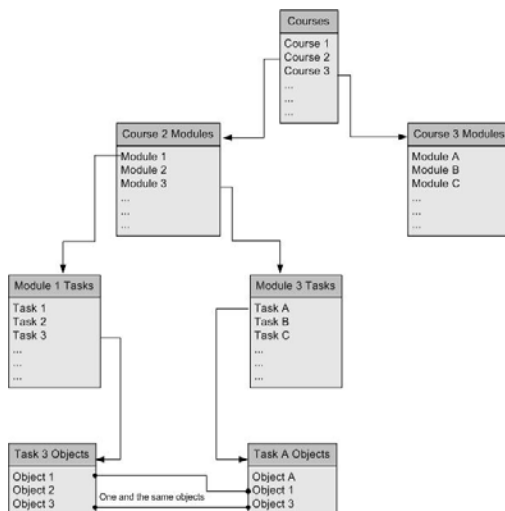


Fig.8 Structure of the Educational Content

This is the standard performance-centered educational structure: courses, containing modules, containing tasks. In mDIPSEIL a new level was integrated in this structure, called “Objects”. Objects are the building elements of the tasks. Objects can be: text, picture, sound or video. One task may have as many objects as the teacher want. One object can be used not only in one task, but in as many as there are in the system, not only in the same module or course, but also in others and by other teachers. This brings the greatest power of the system – the sharing of objects. This has two positive sides: if the student has already made a task from the module, he will find the same objects in the new task and thus it will be easier for him to study them; the sharing of objects will save time and resources of the tutor, and saves also the time of the student, because the system is not overloaded with one and the same information, so it needs less time to search and use its database. For security reasons objects cannot be edited or deleted while they are assigned to a task.

Content sensitive and location sensitive elements

Context sensitive and location sensitive elements

Upon start of the J2ME application on the student's mobile device it tries to determine the current client's location. Since not all mobile devices nowadays support GPS (Global Positioning System) it is possible, that this process is skipped. This will happen if the application cannot load the needed libraries or cannot find a supported hardware. Specially chosen criteria for the coordinate determination process, may force the usage of alternative positioning methods like: non-integrated GPS modules (Bluetooth modules), A-GPS (Assisted GPS) – obtaining coordinates using an active internet and base-station connection, as also other device and network specific methods. After the current coordinates of the user are obtained they may be used in the following two ways: 1) to determine all tasks related to objects (specific for the task), which are near the student; 2) to show only tasks in the language, which is spoken in the country the client currently is. For example if the learner is studying in a German speaking country, the system will recognize this and will suggest to the learner our “German for beginners” course.

With the fast development of technologies nowadays users request more and more media rich content. Mobile devices are the perfect platform to offer interactive multimedia experience and educational content on the go. But still devices with small screens like the legacy phones or new and tiny ones cannot (and should not) display large images or video materials. That's why (and also to support more mobile devices) images are made smaller and only specific, widely-supported formats are used in the system. Video size is also reduced and a mobile compression format called 3GP is used. When the teacher uploads the educational content to the system, he/she specifies which of the materials are for advanced and which for legacy devices. When the learner connects with his device the using mobile learning management system (Plovdiv University case) mDIPSEIL determines what functions it supports and what characteristics it has. Then it presents the learner with the materials specified for his/hers device. Since the best mobile device nowadays is the Apple's iPhone, we have developed a special module, which works with it. The special headers sent to our system from the iPhone are used to detect the operating system and video and sound materials are accordingly converted and presented to the learner.

Another important criteria for mobile devices is the internet connection speed. Since this is a Web-Based educational system, educational content is presented using web services. The faster connection speed, the better multimedia features the device may present. This determines the type of device the client is using and thus determines what type of content the learner will be presented with. It is inappropriate to „isolate“ modern devices from rich multimedia content and it will be terrible for the learner to wait a lot of time if he uses a slow internet connection.

In mDIPSEIL there are two roles of persons – learners and teachers. Teachers use a specially developed Web-System, which directly communicates with the Web-Engine, to upload educational content to the system. Using this Web-System they may create and/or delete courses, modules, tasks and objects, assign objects to tasks or remove assignments, but only for tasks created by them. They could also specify how objects are used inside of tasks. For proper view of educational content teachers must also specify coordinates for the tasks and/or country for the task.

Learners are actually the direct user of educational content through their mobile devices and thus the system is specially developed for them. In order to use the system, they must download and install a JAR file to their phones. Learners are identified with unique e-mail and password from the DIPSEIL system. Once logged in, they may view all tasks, which they have chosen or use the special positioning features to show only specific tasks. Learners are



Lifelong Learning Programme

presented with the educational content using the standard performance-centered learning objects – the simply organized menu in the task screen allows them to browse through “Task Description”, “Task-specific Training” and so on. According to the specification of their phone and its features they may view advanced content (such as video or sound), or else they will only see text and images.

Content sensitiveness and location sensitiveness from the learner point of view

We developed under the second scenarios:

Mike is a learner (trainee/master degree student/working person). He has a registration and login to a mobile Learning Management System, which he accesses via the web browser on his mobile device. The LMS recognizes Mike's location, and which country he is accessing the system from. This recognition can be carried out by using mobile positioning, or GPS. The system then offers the learner content that has been designed to match the specific language of that country.

The system also interrogates the mobile device to identify its characteristics, the quality of mobile services at Mike's location and will then present the learning material according to the results from this interrogation. For example, when the mobile device of Mike has characteristics of an advanced mobile device, the learner may be offered streaming video / text / voice, whereas for a lower quality connection and a legacy GSM, he may be only offered text and voice.

Developing context sensitive and location-based content (Content sensitiveness and location sensitiveness from the course developer/teacher/tutor point of view)

Creating context sensitive and location-based content is done through the web-based teacher environment. When teachers log in with their username and password, they will be presented with an educational content tree structure, containing all courses, modules and tasks created by the teachers. Using the menus at the top of the screen new course elements could be created. Once the basic course structure is developed, the teacher should choose a task and select the edit button.

On the „Edit Task“ screen the educational content developer sees again the courses structure, but this time not only developed by the teacher, but from the whole system. This way he/she may use course elements, developed from other teachers, for building his task. A second tree structure is now shown, which displays all the uploaded, but still unused objects.

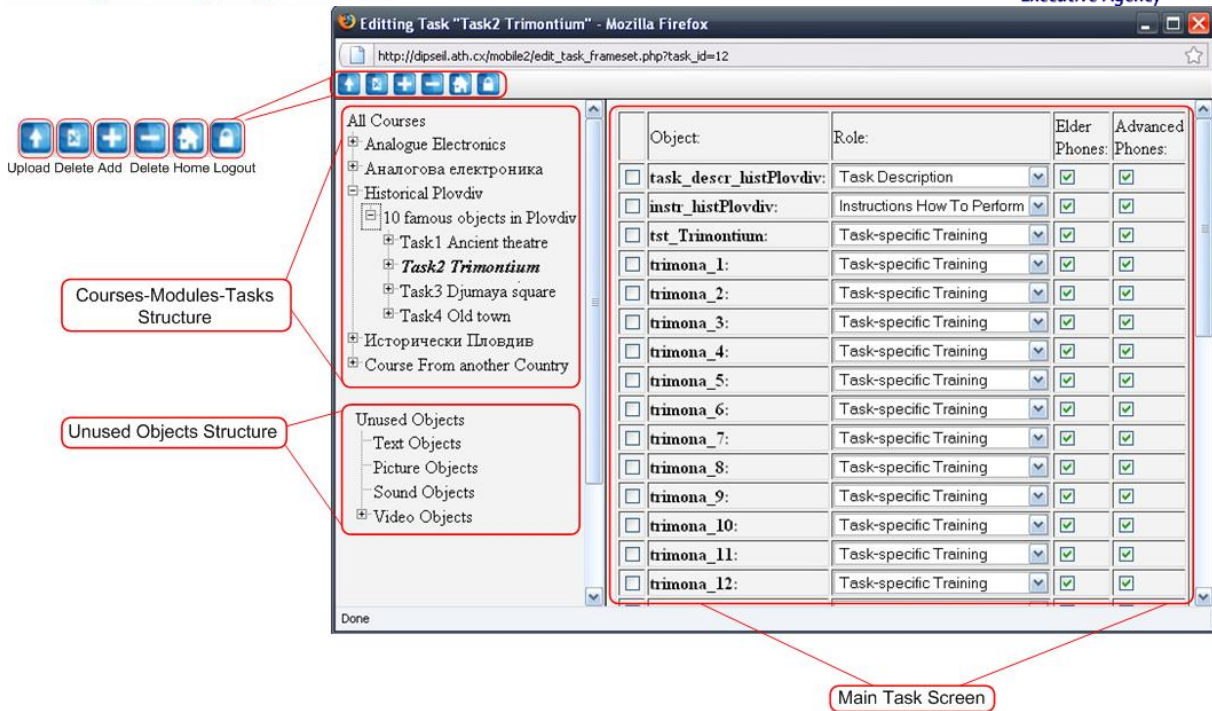


Fig.9 Task Edit Screen

Objects are the building parts of tasks. So at first the educational content developer should upload all objects needed for the given task, using the menu at top of the screen. *This is the first step to build the context sensitive course – objects could be video, sound, picture or text. It is important to develop two kinds of materials – for advanced and for legacy devices.* The second type could not (or could, but poorly) display rich-multimedia content, but it is unpractical to display a lot of text on the first type, than a good describing video with a lot of explanations as sound objects. After the objects are uploaded, they should be added to the task. Selecting them from the unused objects tree and clicking on „Add object to task“ button, will import them to the task. The main task screen shows a table with all imported objects, in which the teacher should select the role of each one. This could be – „Task description“, „Task-specific training“, „Reference Information“ or „Instructions how to perform“. In this table there are also checkboxes to select for which type of device the chosen object is – for advanced or for a legacy mobile device. Choosing „Advanced phone“ for a given object, it will be displayed only on mobile devices, supporting video content (this is the *.3gp mobile video format) and higher-speed internet connection. After this „Objects table“ there are some settings for specifying location-based content. First, the teacher should select in which country this task should be shown. Using a drop-down a list he/she is presented with a list of all inserted to the database countries. When this is specified, if the learner selects „Current Country Tasks“ from the mobile learning environment and if he is in the selected country, this task will be shown, or else hidden. The next task option is coordinate selection. The teacher may specify a matrix of coordinates determining the position for the current task. This way if the learner clicks on „Current position tasks“ in the mobile environment and correct coordinates were obtained, this task will be shown. Using this two location-based options the teacher has the full control over location-based content – tasks are specified by country (and thus also by language) as also by position (for displaying tasks or tourist for example). Using the task table, teachers have the full control over, which content is displayed on which type of mobile devices

Course content

The title of the course

- „German for beginners“ for adults/tourists/visitors, learners in German
- September 2009



Lifelong Learning Programme



Course content

Task 1 Find the city hall

Task description:

Every city has a city hall. It is usually, but not always, at the city center. Find the city hall in the town you are currently in. Take a photo of it and submit it as a task solution.

Task 2 Order in restaurant

Task description:

Find a typical restaurant nearby. Go to it and order the following meals to eat and drink:

- 1) Green Salad;
- 2) Vienna steak;
- 3) Apple cake;
- 4) White wine with soda.

Take a photo of the meals ordered and upload them as a task solution.

Task 3 Introduce yourself

Task description:

One of your friends comes to the restaurant, where you are eating. He brings a friend with himself, who doesn't know English. Introduce yourself to him in German.

Write a short dialogue, like the one you can here, in German and submit it as a task solution.

Course outcomes

We asked five young people to perform three tasks from the course “German for beginners”, using their own mobile devices. They had 1 day around Graz, Austria to perform three tasks.

Who were our learners?

Five people from two SMEs from Bulgaria were on a specialization in Graz, Austria, according to the plan of an European project.

Two of them are from TEPOLSofts Ltd. TEPOLSoftS Ltd. works in the field of computer technologies. Its main task is the development of learning systems, which can be used in high-level education, as well as in corporate training practices. Nowadays technologies take a big part in our life, but still very few organizations use them as a main tool for education. The solutions developed by TEPOLSoftS Ltd. offer interactive, easy to use, modern way for training. A specially developed methodology and personalized approach make our systems highly productive and cost-effective. Developers working at TEPOLSoftS Ltd. are with experience in software development and server administration. They have worked on several projects in the field of e- and m-Learning.

Two their workers are with informatics and computer technology background. They speak English. They don't speak German.

The other three learners are from Romit Ltd. The company works in computer technology, computer and software services, security systems, computer assembly.

Three their workers are with physic-engineering background. They speak English. They don't speak German.



Lifelong Learning Programme

We pictured the process of performing during the day and we present in this report pictures from three tasks performance as attachments (see Attachment)

We gave them the Mobile survey (the same as in WP6) after all tasks performance and collect their opinion. We used as well the information from their comments and their reactions during the conversations and the discussions. We use Survey Monkey system to design the survey, to collect results and analyze the data. We present here the survey and the data analysis from Survey Monkey (see Attachment)

Results from the survey analysis

- We have three male responders and two female responders
- Most of the users have an own mobile phone. Our observation during the experiments in CONTSSENS project, give us an impression that a lot of learners, working people, adults, have two mobile devices.
- All users use the mobile device mostly for phone calls. We think that this question needs to have more than one answer, or is not correct, because the users use their mobile devices mostly for phone calls, which doesn't exclude the usage for Internet and SMS and chats.
- No one thinks that the mobile learning is necessary. They think that it is interesting, or optional. This is absolutely identical with our opinion that to use and develop mobile learning is not necessary, but optional to e-learning. The answer to the question "Do we need a mobile learning?" is "Why not!!!"
- All users answered to the question for where they have studied the material, "other place" because they were on the streets of the city, in the restaurants.
- Most of our users answered that they will recommend the mobile learning as a method of study to others and that they will take another mobile course if it answers to their training needs.
- The most important questions were "was it easy to study the course" and "accessing course content was easy". All answered "agree" and "strongly agree", which means that the location-based and content sensitive characteristics of the course presentation and system, is something very positive and useful for the mobile courses. It is no necessary to navigate and select to reach the exact course, and sometimes this is very important when you are on the streets, you have not a smart phone etc.
- No one agreed with the statement that the mobile learning increases the quality of learning. They disagreed or were uncertain. This is true and logical if we return to the question for the necessity of the mobile learning. The result is that the mobile learning is an option to e-learning!
- Most of our learners were uncertain if the learning objectives were met or not. We think that this question was unclear for most of our learners.
- Most of the users were uncertain for the communication with the tutor. We think that in this experimental case, we couldn't make a conclusion about the effectiveness of tutor-student communication and student-student communication in the mobile learning
- All agreed that we need more illustrations, graphics and multimedia in mobile learning, and less text.
- All were uncertain about the evaluation and questioning in the mobile learning course. The method of learning that we used is different from the traditional: materials for learning, exercise and questions for the assessment. So this last questions is not adequate to the performance-centered learning method.

Some conclusions from the discussions and conversations:

- It is difficult to guarantee that the using file-format for content presentation will be opened on all kinds of mobile devices.
- While small screen size and the lack of a keyboard were noted as limitations, they did not generate the level of dissatisfaction that the poor wireless network functionality did
- Learners prefer to work with their own mobile devices
- Almost all are satisfied
- Interface for all is good

VET focus



Our VET focus in CONTSSENS project, in WP4, WP5, WP6 and WP7 development, is connected to the performance-centered method application in the mobile learning. Performance-centered mobile learning is the right educational method for mobile learning for VET!

The view of learning process, as a performance-centred is *highly effective* as a means of providing students in professional education timely and relevant information. As a new technology, performance-centred educational systems will move the traditional teaching systems to training closely related to the job. These systems have a strong potential to help students mastering job-related skills. The message to the teachers, to consider the impact of teaching on results, good performance and competitiveness, is another perspective of this innovation.

Performance-centred approach in professional education integrates a wide range of technologies in its three components – content, information component and user interface. This integration gives advantages over the technology, traditional Web-based educational programmes and multimedia presentations. The integration of learning objects with job aids gives the students possibility to gain an understanding of the content of the job aids. And in this way – minimises the main limitation of the job aids – the stage of understanding of the content. The information component provides the necessary knowledge for performing the task at the moment of need. The content is very focused, using the smallest unit. The timing, location and scope of the training integrates the learning experience with the task performance. *This minimises the lag between the content presentation (or learning the content) and execution of the learned information.* The student learns the content when it is needed for performing the task and there is no learning degradation.

The main advantage of performance-centered application in m-learning is to contribute to the continued development of mobile learning and to address the imbalance between the availability of mobile devices and the lack of education and training provision on the sophisticated communications devices which every student and actively working person carries and uses constantly – except in education.

The advantages for trainees are derived from providing learners with a job aid in the context of their work:

- puts training and performance support where the actual work takes place
- allows new skills or knowledge to be immediately applied
- enables training when it is needed
- allows use of rich media when appropriate

The advantages for students:

- students have more flexibility and choice in where and when they learn outside of the wired (or un-wired) classroom.
- students use the technology in their study that would enhance their readiness for tomorrow’s workplace where employers want graduates who know how to use technology for learning and working.

Given the trend to lifelong learning, many “students” are working adults with full- or part-time jobs. Mobility offers them an opportunity to maximize learning time.

The advantages to apply performance support in mLearning to create knowledge are derived from providing learners with a job aid in the context of their learning. Of course, these job aids can be greatly enhanced depending on the device. The device can be wired so as to get the latest information, and it can use visuals, text, and audio to deliver performance support. The advantages of this approach are based on constructivist theories of learning. The advantages of m-learning as communication stem from learners and experts constructing knowledge in an authentic context.



Education and Culture DG

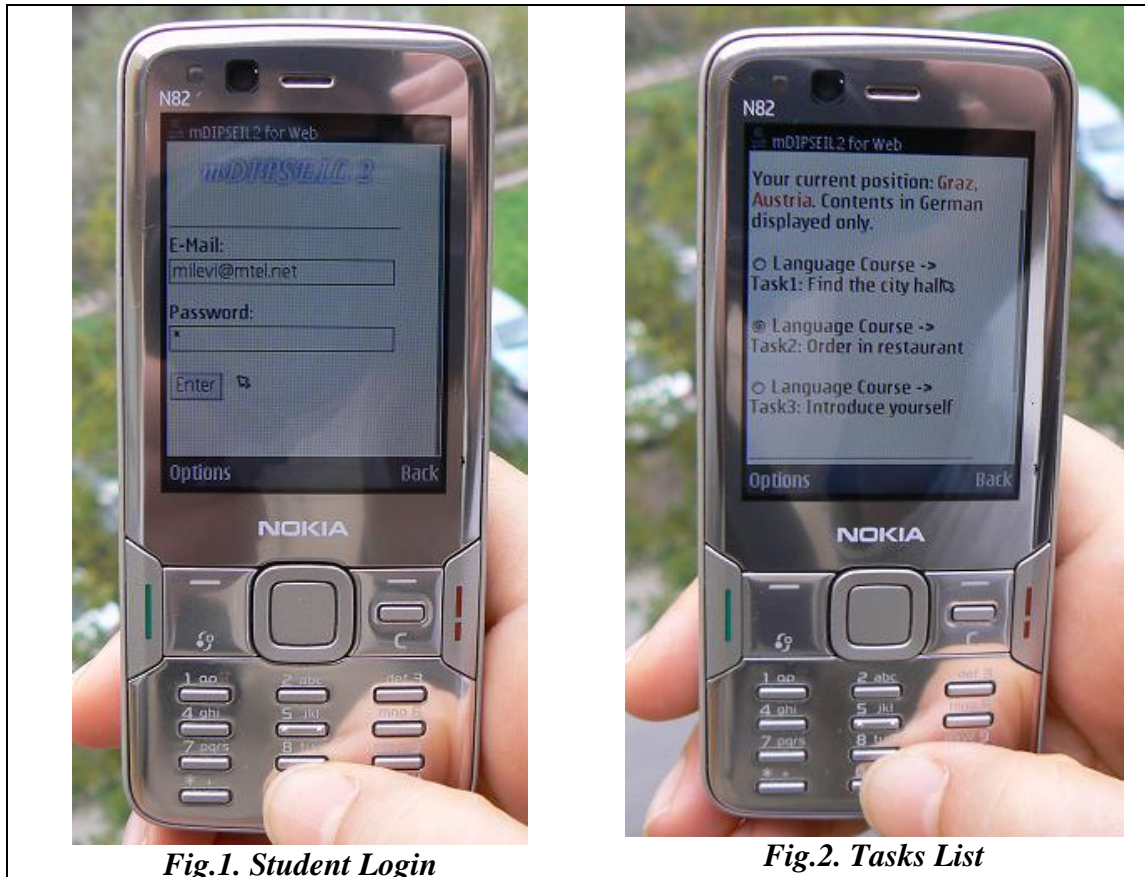
Lifelong Learning Programme

EACEA

Education, Audiovisual & Culture
Executive Agency

Attachments

Course: **Language Course**
Task2: **Order in restaurant**





Education and Culture DG

Lifelong Learning Programme

EACEA

Education, Audiovisual & Culture
Executive Agency

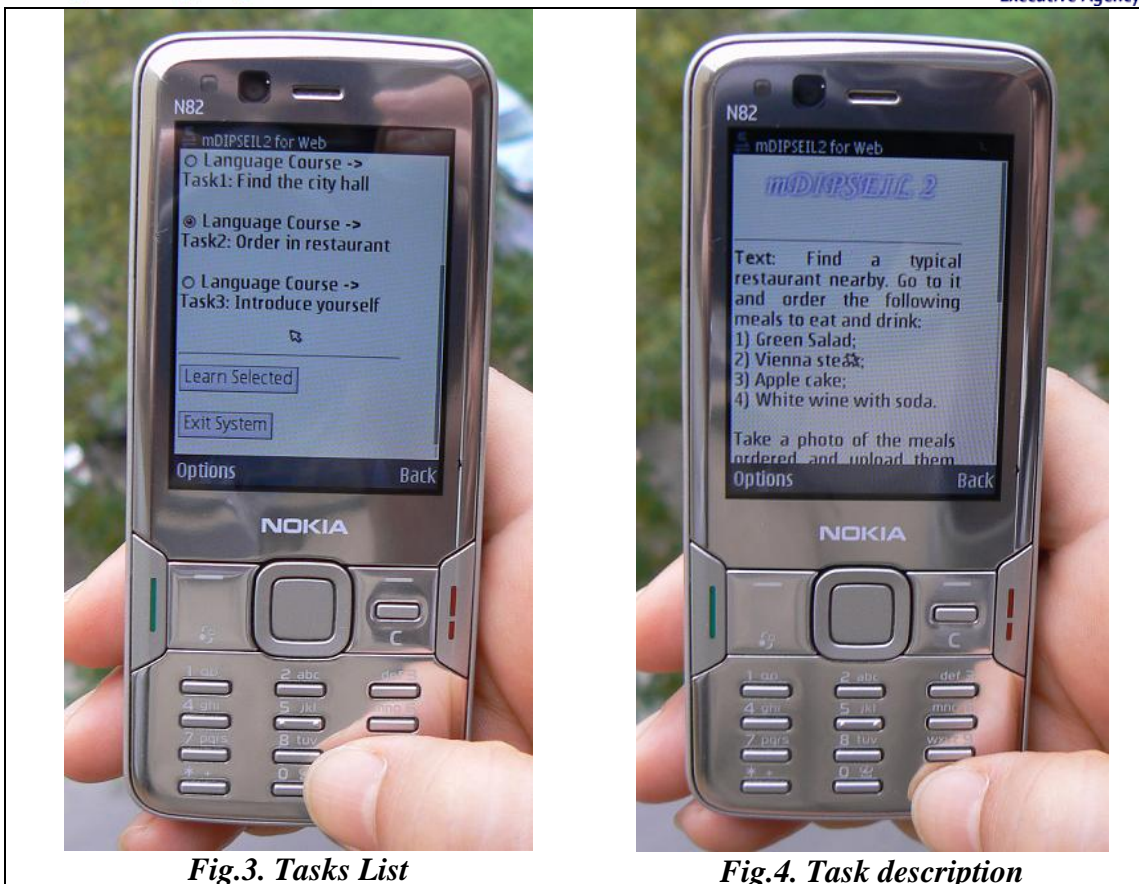


Fig.3. Tasks List

Fig.4. Task description

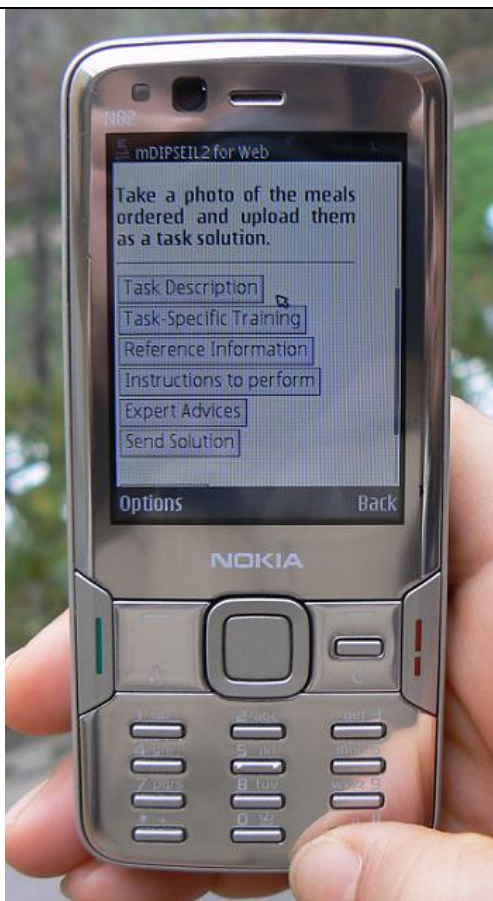


Fig.5. Task description and System's menu

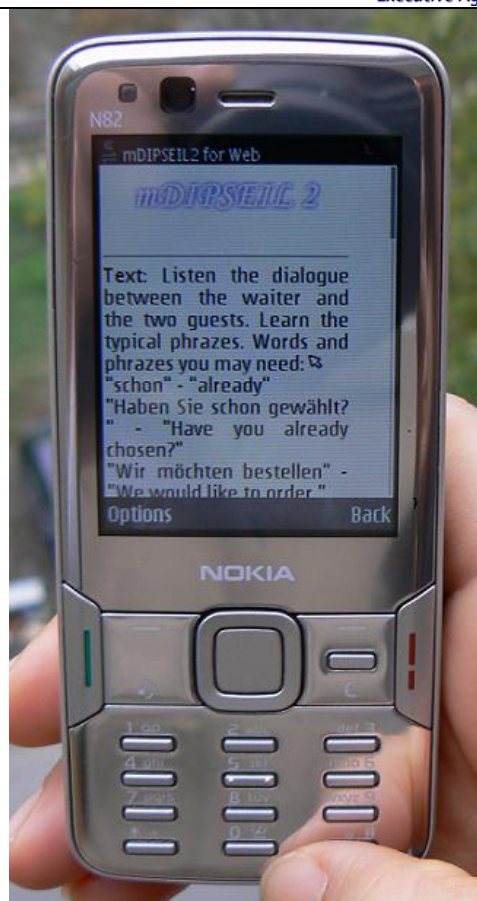


Fig.6. Task-Specific Training: Text

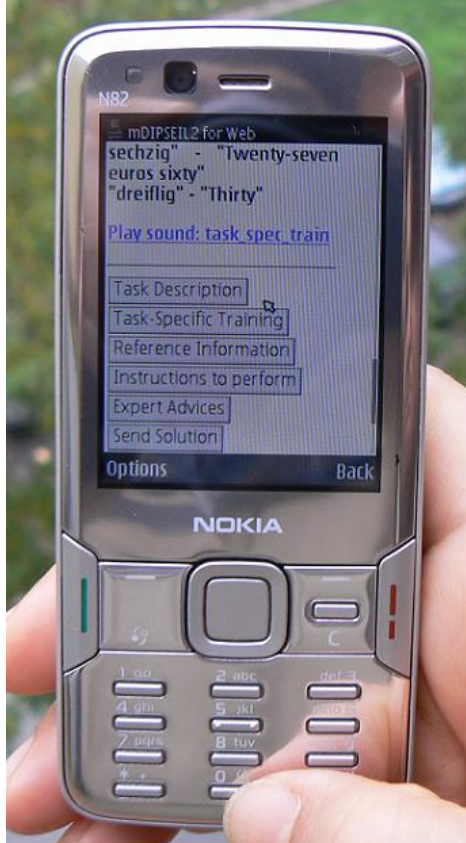


Education and Culture DG

Lifelong Learning Programme

EACEA

Education, Audiovisual & Culture
Executive Agency



**Fig.7. Task-Specific Training:
Select media file and download**

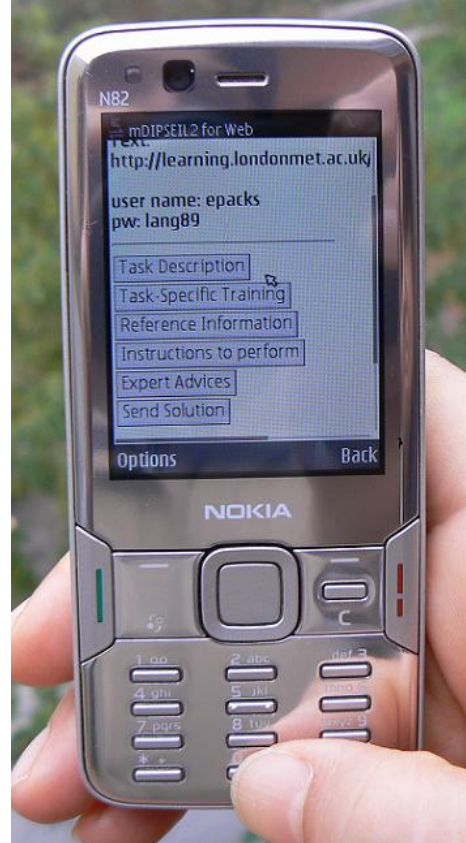


Fig.8. Reference Information



Education and Culture DG

Lifelong Learning Programme

EACEA

Education, Audiovisual & Culture
Executive Agency



Fig.9. Instructions how to perform: Text



Fig.10. Instructions how to perform: Picture



Education and Culture DG

Lifelong Learning Programme

EACEA

Education, Audiovisual & Culture
Executive Agency



*Fig.11. Instructions how to perform:
Picture*



*Fig.12. Instructions how to perform:
Picture*



Education and Culture DG

Lifelong Learning Programme

EACEA

Education, Audiovisual & Culture
Executive Agency



*Fig.13. Instructions how to perform:
Picture*

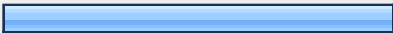



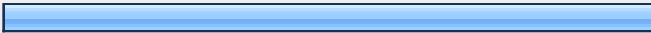
*Fig.14. Instructions how to perform:
Picture*

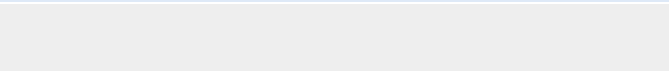
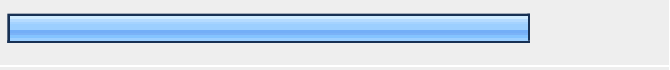
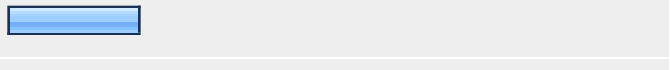
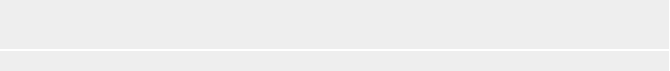
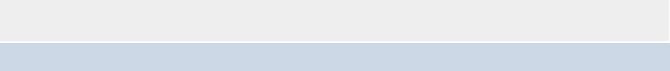
1. Gender?			
		Response Percent	Response Count
Male		60.0%	3
Female		40.0%	2
		answered question	5
		skipped question	0

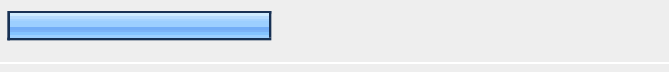
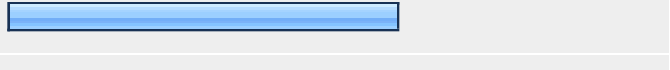


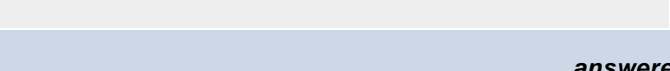
2. Mobile device ownership			
		Response Percent	Response Count
Do you own a mobile phone?		80.0%	4
Do you own a PDA (personal digital assistant), pocket PC or palmtop?		0.0%	0
Do you own both a mobile phone and a PDA?		20.0%	1
		answered question	5
		skipped question	0



3. You use a mobile devices mostly for:			
		Response Percent	Response Count
Phone calls		100.0%	5
Chat, SMS		0.0%	0
Internet		0.0%	0
Other		0.0%	0
		answered question	5
		skipped question	0



4. You think that to use mobile devices for learning is:			
		Response Percent	Response Count
Necessary		0.0%	0
Interesting, funny		60.0%	3
Optional, why not		40.0%	2
		answered question	5
		skipped question	0


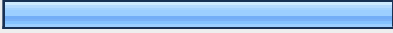
5. Where did you study the mobile learning course?			
		Response Percent	Response Count
At home		0.0%	0
At the office or work		0.0%	0
While travelling		0.0%	0
Other		100.0%	5
		answered question	5
		skipped question	0



6. I would recommend mobile learning as a method of study to others			
		Response Percent	Response Count
Strongly agree		0.0%	0
Agree		80.0%	4
Uncertain		20.0%	1
Disagree		0.0%	0
Strongly disagree		0.0%	0
		answered question	5
		skipped question	0



7. It was easy to study this mobile learning course			
		Response Percent	Response Count
Strongly agree		40.0%	2
Agree		60.0%	3
Uncertain		0.0%	0
Disagree		0.0%	0
Strongly disagree		0.0%	0
		answered question	5
		skipped question	0

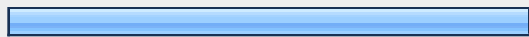
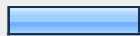
8. This mobile learning experience was fun			
		Response Percent	Response Count
Strongly agree		80.0%	4
Agree		20.0%	1
Uncertain		0.0%	0
Disagree		0.0%	0
Strongly disagree		0.0%	0
		<i>answered question</i>	5
		<i>skipped question</i>	0

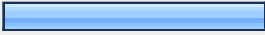
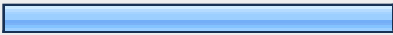
9. According to my experience I would take another mobile learning course if relevant to my learning needs			
		Response Percent	Response Count
Strongly agree		20.0%	1
Agree		80.0%	4
Uncertain		0.0%	0
Disagree		0.0%	0
Strongly disagree		0.0%	0
		<i>answered question</i>	5
		<i>skipped question</i>	0

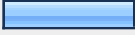

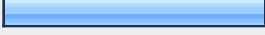
10. Mobile learning increases the quality of e-learning			
		Response Percent	Response Count
Strongly agree		0.0%	0
Agree		0.0%	0
Uncertain		40.0%	2
Disagree		60.0%	3
Strongly disagree		0.0%	0
		<i>answered question</i>	5
		<i>skipped question</i>	0

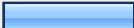
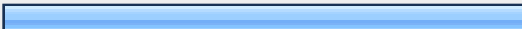
11. Course learning objectives can be met by mobile learning			
		Response Percent	Response Count
Strongly agree		0.0%	0
Agree		20.0%	1
Uncertain		80.0%	4
Disagree		0.0%	0
Strongly disagree		0.0%	0
		<i>answered question</i>	5
		<i>skipped question</i>	0

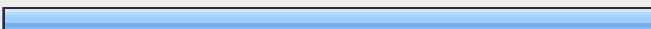
12. Accessing course content was easy			
		Response Percent	Response Count
Strongly agree		60.0%	3
Agree		40.0%	2
Uncertain		0.0%	0
Disagree		0.0%	0
Strongly disagree		0.0%	0
		<i>answered question</i>	5
		<i>skipped question</i>	0

13. Communication with and feedback from the tutor in this course was easy			
		Response Percent	Response Count
Strongly agree		0.0%	0
Agree		0.0%	0
Uncertain		80.0%	4
Disagree		20.0%	1
Strongly disagree		0.0%	0
		<i>answered question</i>	5
		<i>skipped question</i>	0

14. Mobile learning is convenient for communication with other course students			
		Response Percent	Response Count
Strongly agree		40.0%	2
Agree		60.0%	3
Uncertain		0.0%	0
Disagree		0.0%	0
Strongly disagree		0.0%	0
		<i>answered question</i>	5
		<i>skipped question</i>	0

15. Navigation through the mobile learning course was easy			
		Response Percent	Response Count
Strongly agree		20.0%	1
Agree		40.0%	2
Uncertain		0.0%	0
Disagree		40.0%	2
Strongly disagree		0.0%	0
		<i>answered question</i>	5
		<i>skipped question</i>	0

16. For mobile learning to be effective it is necessary to use graphics and illustrations			
		Response Percent	Response Count
Strongly agree		20.0%	1
Agree		80.0%	4
Uncertain		0.0%	0
Disagree		0.0%	0
Strongly disagree		0.0%	0
		<i>answered question</i>	5
		<i>skipped question</i>	0

17. Evaluation and questioning in the mobile learning course was effective			
		Response Percent	Response Count
Strongly agree		0.0%	0
Agree		0.0%	0
Uncertain		100.0%	5
Disagree		0.0%	0
Strongly disagree		0.0%	0
		<i>answered question</i>	5
		<i>skipped question</i>	0