EU COMMUNITY

LIFELONG LEARNING PROGRAMME

KEY ACTIVITY 3 – ICT

E-modules on HistoPathology: a valuable online tool for students, researchers and professionals - HIPON

Project Co-financed by the European Union

01 January 2013 – 31 December 2015

Work Package:	7 - Assessment Strategy
Task:	7.5: Evaluation report of HIPON System
Deliverable:	D7.5: Evaluation report of HIPON System
Scientific Coordinator:	Ss. Cyril and Methodius University (UKIM) - P5
Partner Responsible:	National & Kapodistrian University of Athens (UoA) – P1 & Centre for the Advancement of Research & Development in Educational Technology (CARDET) – P4

Submission Due Date: 31.08.2014

Actual Submission Date: 23.12.2015

Distribution: Public

Nature: Report

Document Information Summary	
Deliverable Number:	D7.5
Deliverable Title:	Evaluation report of HIPON System
Editor:	Andreas Lazaris - P1
Contributing Authors:	P1 - UoA - Andreas C. Lazaris, P4 - CARDET - Charalambos Vrasidas
Reviewer(s):	All partners
Work package no:	7
Work package leader:	P5 - UKIM
Work package participants:	P1 - UoA, P2 - UZSM, P3 - RUNMC, P4 - CARDET, P5 - UKIM
Distribution:	Public
Nature:	Report
Language Version:	English

Log Table

Issue	Date	Description	Author/Partner
V1.0	27.11.2015	1st draft of the evaluation report	P1/UoA - prof. A. Lazaris
V2.0	22.12.2015	2nd draft of the evaluation report	P4/CARDET – Dr. C. Vrasidas
V3.0	23.12.2015	Final version of evaluation report	P1/UoA - prof. A. Lazaris

Document Approval

Approved by	Date
Prof. A. C. Lazaris	23.12.2015

Abstract:

This report describes the evaluation of HIPON system that was developed during the project. P1 and P4 evaluated the educational and technological part of the system and the template construction. The main results from their evaluation are described in the following text.

Table of Contents

1 Evaluation of the educational part of HIPON

It is indisputable that nowadays one of the hardest and most important tasks in medicine and especially in medical education, is the conversion of the extensive amount of available data, into medical experience, after a proper analysis. To achieve this goal in medical education, the prospect of illustrating professional experience through an e-learning toolkit was proposed as a new teaching strategy. An educational project on histopathology entitled "ICT eModules on HistoPathology: a useful online tool for students, researchers and professionals – HIPON", co-financed as a project of the Lifelong Learning Program of the European Commission, was launched at the beginning of 2013. The whole project aspires to be recognized as of high pedagogic value, creating an online environment that speeds up the ability to learn and achieves to transfer, step by step, the way of expert diagnostic thought in Pathology to its users, so that the latter increase their professional experience and not just be provided with plain information of encyclopedic type. HIPON mid-term report was favorably evaluated by the EACEA experts who appreciated the potential of our teaching tool in providing the opportunity and the means to acquire medical experience. The more recent test users' evaluations are in line with the above considerations. According to the evaluations results, HIPON project achieves its first aim that is to convey, among the extensive amount of available data, the essential information which can be transformed into medical experience, and thus to promote professional thinking in pathology.

1.1 <u>Introduction</u>

Being part of fundamental medical knowledge, pathology is currently taught, mainly on a theoretical basis, from the undergraduate level of medical studies. Attending lectures and taking advantage of excellent textbooks and atlases, students are supposed to learn how to recognize state of disease and describe main patterns of tissue injury. In their professional life, pathologists and researchers are requested to evaluate microscopic diagnostic features in patients' tissue sections so that a definite diagnosis is set. It is indisputable that nowadays one of the hardest and most important tasks in medicine and especially in medical education, is the conversion of the extensive amount of available data, into medical experience, after a proper analysis.

Based on the above, an educational project on histopathology entitled "ICT eModules on HistoPathology: a useful online tool for students, researchers and professionals – HIPON", co-financed as a key activity 3/ ICT project of the Lifelong Learning Program of the Education, Audiovisual and Culture Executive Agency (EACEA), The Commission of the European Union (reference number: 531203-LLP-1-2012-1-GR-KA3- KA3MP) has been launched at the beginning of 2013. The whole project aspires to be recognized as of high pedagogic value, creating an online environment that speeds up the ability to learn and achieves to transfer, step by step, the way of expert diagnostic thought in Pathology to its users, so that the latter increase their professional experience and not just be provided with plain information of encyclopedic type.

The project has hopefully resulted in a well-structured and user-friendly, open resource, multi-language e-learning platform which integrates the new virtual microscope/e-learning

environment in multiple educational units/chapters of pathology, specifically tailored to the needs of students (undergraduate, graduate, and postgraduate students), researchers, and professionals. After a first module dealing with General Pathology aspects such as inflammation and neoplasia, a second one, on Systemic Pathology, reflects the participating pathologists' professional experience on the various organs – systems of the human body. Through the use of virtual slides, educative videos and microscopic, high resolution images accompanied by relevant questions and answers, HIPON project aims to make end-users able to think as experienced pathologists and become highly efficient in correlating pathologic data with other clinical-laboratory information.

1.2 Evaluation

In September 2014 the mid-term report of HIPON was evaluated by the EACEA experts. Several criteria, such as objectives, results and products and coherence between work plan and activities carried out during the life of the project, were considered. For each of the evaluated criteria, comments were made and a score was assessed. In conclusion, an overall evaluation was provided.

Recently, HIPON "end-product" has being tested by groups of students, researchers and professionals in all partners' countries, and learners' perspectives have being assessed using both quantitative and qualitative measures. The platform, the General Pathology section and the Systemic Pathology section were evaluated separately. An initial platform evaluation was focused on the visual and educational design/structure of the platform itself, as well as on the quality and usefulness of the provided educational tools. Before evaluating the General Pathology section, and then the Systemic Pathology section as well, users were asked to specify which chapters of the section they reviewed. There the features to be evaluated included texts, images, virtual slides and video tutorials. For each of the evaluated criteria, a score between "1" (not satisfactory) and "6" (excellent) was assessed. Furthermore, users were invited to write comments, remarks and suggestions. Also, we asked them to mention the technical problems that they had experienced, if any.

1.3 Results

According to EACEA quality assurance, HIPON's evaluation has been considered as most satisfactory; the mid-term report acknowledges significant and valuable project results.

The EACEA evaluators have asserted that: *the HIPON initiative remains highly relevant to the program in its very good address to supporting students and developing professionals in histo- and cyto-pathology. The project activities are completely in accordance with its aims. The HIPON architecture is highly appropriate to the project objectives, and can be seen to explicitly respond to the features evident in the needs analysis. Similarly, the initial content responds to user needs.*

The global HIPON score hovered around the level of 90%. The conclusive overall evaluation reported *no significant weakness* and outlined HIPON strong points such as the *realistic approach to user engagement*, the *good potential for uptake by a significant user*

community, and the *project directly addressing a health education area of high public interest with a practical and achievable solution*.

The test users' evaluations were in line with the above considerations. We have been delighted to note that there were no evaluation remarkable differences between users with different level of expertise: students as well as residents favorably evaluated HIPON platform and appreciated its potential in providing the opportunity and the means to acquire medical experience.

The platform and both the General Pathology and the Systemic Pathology sections were favorably evaluated. The HIPON testing main favourable comments included the *excellent organization of the educational material*, the *attempt of covering the full range of pathology* and the *widening study opportunities with the virtual slides.* The reported unsatisfactory results mainly concerned the presence of *some non-functioning weblinks* and *unresponsive eplatform buttons.* Also, an *unbalanced development of Systemic Pathology chapters* was reported.

The project overall evaluation was positive. HIPON was described as an *excellent program*, a *useful and enjoyable learning platform,* a *great tool not only for pathology students, but also for older students, residents and professionals who wish to have a thorough methodological approach to the diagnostic procedure.*

2 Evaluation of template construction

2.1 <u>Introduction</u>

Part of the success of a learning course is, apart from the quality of the content, the design of the learning experience and the presentation of the information, along with the ways learners are involved. To achieve the quality goals of the HIPON system, CARDET has contributed with templates to facilitate the e-learning development process.

The templates were developed following instructional design guidelines and principles, such as the ones mentioned above. It was agreed that images, resources and links would enrich the content and the activities. The high pedagogic value is reinforced through the design of the online learning space.

The Instructional Design process:

The idea behind the templates lies in important principles of instructional design and strategies. Specifically, successful instructional design happens when the structure of the content meets the set learning objectives and the learning needs of the audience. The design and development of a course are significant for a solid product.

At CARDET, a team of instructional designers met several times. The goal of the internal meetings was to identify the major aspects/categories within the templates, so that in the

end, they would be complete, covering all necessary aspects for the curriculum design and development. The way the templates were constructed was also based on the goal of helping the developers incorporate the content online effectively. The instructional designers tested the templates and provided feedback on improvements.

For the HIPON project particular templates were provided for WP3 – Feeding HIPON, which include objectives, glossary, indications for content to be organized, indications for feedback, images, resources, etc.

Content development based on the templates:

Content experts had used the templates to develop the content by writing the text and selecting images to use. The content was first developed, in which the images, links, resources, etc. were incorporated. Then, from the modules, the contents for the Virtual Portfolio were extracted. The structured content was then sent to the partners that were responsible for the online development, in order to transfer the content online.

2.2 Evaluation

The use of the templates has proven very useful for the development of the content, as they guided the content experts to structure the thematic areas in particular ways to help the developers transfer them online. The templates also facilitated the process of providing resources, links and images, which resulted in a large collection of those.

For the online game, the template also included a sample of a gaming scenario. This has helped the content experts and the developers structure the game online and understand the potential flow of the game. For this particular outcome, it was suggested that a narrative/backstory would be included. The content experts have decided make the game without a backstory, but in a laboratory format, where the players have to resolve several cases under each of the thematic areas of Systemic Pathology. Specifically, the learners are provided with the knowledge they need to gain within D3.2 (General Pathology) and D3.3 (Systemic Pathology). Each part of the module has a case study to solve that was designed in a game like scenario.

The case studies are the chapters of the game. Through the testing of the online game, feedback was provided to the developers regarding the following aspects for improvement:

- Visuals
- Feedback provided throughout the game, for each scenario
- Score-board
- Navigation

The developers have incorporated the feedback and created a functional online game for users to experiment and test their knowledge.

2.3   Results

The project activities have been created in accordance to the project aims, providing the relevant content to respond to the learning needs. In particular, the primary aim was to transfer medical experience in diagnostic practical issues of histopathology to medical students, trainees in Pathology and interested clinicians, in order to assist learners gain practical insight of the theoretical background they are traditionally taught, recognize basic patterns of injuries and correlate patterns with underlying mechanisms of disease and clinical data.

The results from the impact of the templates are reflected in the evaluation results of the educational part of HIPON. As shown from the evaluation of the educational part of the HIPON system, the outcomes the project are satisfactory. The templates have therefore provided useful guides for the content development. The received comments regard the excellent organization of the educational materials, which cover the broad range of pathology.

3   Evaluation of system's technological part

3.1   Introduction

According to the project proposal, the technology part of the project focused on developing an e-learning environment that would serve as a platform to deliver quality elearning and ICT tools for medical education.

The following are the main components of HIPON technological part which were developed for the project:

- Virtual Portfolio of actual medical case studies, identification of sample location (e.g. tissue sample etc), constant update of samples' status and information
- e-Modules on histopathology
- Online game
- Histo-book (social media component where all parties involved in histopathology research, study and practice are able to communicate via a spatially referenced 'histo-book' which will also act as a workspace as well).

HIPON offers a one way of applied lecturing tool, a two way communication between students and instructors, and a one-to-many communication in interactive collaborative courses. The HIPON system was designed and developed as an autonomous multi-language e-learning system providing practical training both for students and professionals.

The scope of the WP is to result in a dynamic easily expandable and user friendly learning system. The tasks which were completed as part of the project are listed below.

- Task 2.1 Needs analysis & specifications of HIPON

- Task 2.2 HIPON Architecture
- Task 2.3 Pre-HIPON (multilingual test version)
- Task 2.4 Internal test phase of Pre-HIPON by the consortium
- Task 2.5 Finalization of Pre-HIPON
- Task 2.6 Technical support through the project's lifetime until HIPON 'real life tests' are realized
- Task 2.7 Final HIPON System

3.2 <u>Evaluation</u>

During all the phases of the platform development quality and evaluation checks were in place to ensure that the platform developed and the supporting technology tools, would serve the aims of the projects.

The first stage of the technology development was based on a detailed needs analysis and specifications task. An extensive requirement analysis has been undertaken by all partners so as to allow HIPON to become an innovative and high quality e-learning environment of high usability both on national and international level (public higher educational institutes, private laboratories, public sector), producing diverse learning pathways. The needs analysis took place in all partner countries by meetings, phone conferences, on site interviews and online questionnaires. Other European countries also gave feedback via electronic polls. The target groups were undergraduate postgraduate students, young residents, academics and professionals who wish to keep their knowledge level up to date and have the chance to take advantage of a massive virtual portfolio and the rest parts of HIPON.

In order to get feedback from different target groups and be able to analyze that feedback in a structured was, an online questionnaire was created and implemented on the e-survey platform provided by the P5. The questionnaire consisted of 24 questions, both multiple-choice and open text questions. An example of this questionnaire is presented in the Annex I of the document D2.1. A total of 152 responses were received.

The next stage was the development of the HIPON architecture and the pre-HIPON multilingual test phase. The System Requirements Specification (SRS – D2.2) document describes what the system is supposed to do, and how the system will perform each of its functions. The purpose of this document was to present a detailed description of the e-learning environment that will be developed in the frame of the project and that will act as a distant learning toolkit and as an add-on component of real-class lectures so as to make the learning process attractive. It explains the features of the system, the interfaces of the system, what the system will do, the constraints under which it must operate and how the system will react to external stimuli.

The ultimate tool developed was MOODLE, a Learning Management System (LMS) which is a web based software application that is used to plan, implement, and assess a specific learning process. LMS provides instructors with a way to create and deliver content, monitor learner participation, and assess their performance. At the core of any LMS are the courses

that contain activities and resources. There are about 20 different types of activities which may be available (forums, glossaries, wikis, assignments, quizzes, choices (polls), SCORM players, databases etc.). The main power of this activity-based model comes in combining the activities into sequences and groups, which can help to guide participants through learning paths. Based on the architecture document, a pre-HIPON was developed and informally tested.

After the development of the HIPON e-learning environment, test version of the platform was published. During a period of 6 months all partners systematically tested the pre-HIPON version. In order to perform the testing in a more structured way, P5 has develop 21 Test cases which executed by all categories of partners' staff (professors, pathologists, researchers, trainers, technical staff). Each partner was given a user credentials in order to be able to thoroughly use the system with the role of test users for a sufficient time interval, so as to report all the problems and deficiencies, bugs, technical errors, delays and other characteristics they may consider restrictive for the System's scopes.

3.3   Results

During the multiple methods of data collection we found that overall the platform served well the aims of the project.

During the needs analysis, it was clear that medical students and professionals were not very satisfied with the traditional mode of instruction and that more innovative tools were needed to serve the needs of diverse users. So far, the most commonly cited resource used was the print book. The potential use of all the tools was very promising.

The virtual worlds designed provided opportunities for grounded experiences and situated understanding of practices and content, contextual simulations of medical practice. This is a safe way of experiencing practices, as learners experience the consequences of their actions and reflect on those in a safe way. Therefore, virtual spaces can function as exploration sandboxes that afford powerful learning. The flexibility of online spaces in terms of time and convenient access to information is a bridge to the barriers of medical professional development, supporting the social, practical, and professional development of doctors.

Regarding the use of images and virtual slides, we found that this were a real strength of the program since it provided real world context for students learning. They were able to review and evaluate images within cases.

There were some areas that we identified that could be improved for subsequent development of the project. For example, some of the units needed a bit more fleshing out and adding a few more images. One important aspect we would consider is the development of a full blown mobile app that will serve as a tool to help students and resident doctors have access to just in time learning and support.

4 Conclusions

It is common opinion that HIPON has resulted in a well-structured and user-friendly e-learning platform which, taking advantage of modern image technology, offers medical students, researchers, and professionals a valuable teaching instrument so that they can acquire professional experience in pathology. Making users active seekers of knowledge and not just passive participants, HIPON achieve its primary goal i.e. providing the opportunity and the means to acquire medical experience.

It thus claims to be in harmony with all four aims set by the "European Union strategic framework for education and training" ie, making lifelong learning and mobility a reality, improving the quality and efficiency of education and training, promoting equity and social cohesion and enhancing creativity and innovation, at all levels of education and training.

The overall process has been quite constructive, as the content of HIPON was developed in high quality. One significant strength of the templates is that they have facilitated the content development process, providing guidance to the content experts and helping them organize and include the different materials. The templates also ensured that the content is aligned with the learning objectives, the feedback is provided adequately, and the visuals are facilitating the activities and the overall understanding of the various topics.

The templates have been very detailed and informative. However, one drawback was that not all partners completed all parts. Therefore, there was a need for revisiting the different sections and making sure that partners sent content for each one.

Overall, provided the resources allocated to the HIPON project, a lot has been achieved that has potential for further impact. Games, histo-book, images, virtual slides, and all the tools developed are cutting edge technologies that have the potential to transform medical education.