Postgraduate education in ICT and media convergence: Development, teaching and assessment of new courses

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Abstract*: At the turn of the 21st century, most industries are experiencing radical changes due to the introduction of new technologies. Information Technology (IT) has become today vital for nearly all kind of businesses in order to remain competitive and accomplish their goals. The convergence between IT, telecommunications and mass media forms the basis for new possibilities for developing information and communication services. A Joint European Project (JEP) has been setup and is being carried out under the framework of TEMPUS programme of the European Commission aiming to create new postgraduate courses in ICT and media convergence to be taught in Jordan, to improve the understanding of this era, and to enhance the skills of the teaching staff. The courses' subject areas are: 1) Convergence Awareness, 2) Convergence Communications Infrastructure, 3) Convergence Regulations, Marketing and Business Models and 4) Mass Media towards Convergence. A thorough methodology was adopted aiming to cover all necessary phases for the final course production and their incorporation into existing postgraduate curricula. The consecutive phases carried out are the following: 1) Preparation and design of new courses, 2) Creation of new teaching material, 3) Implementation and accrditation, 4) Dissemination, and 5) Quality control and monitoring. Each phase consits of several distinguished activities. Regarding the structure of this paper, initially an introductory description of the ICT and media convergence issue is described. The second section is devoted to the methodology adopted, and the next one to the presentation of the new courses' contents. The assessment model used is presented in paper's fourth section. In the last section the conclusions drawn and the experience gained are outlined.*

Keywords: *ICT and media convergence, postgraduate education, assessment*

1. INTRODUCTION

Nowadays, almost ten years since the beginning of the 21st century, most industries are experiencing radical changes due to the introduction of new technologies. Particularly, Information and Communications Technologies (ICT) have become vital for all kind of businesses in order to remain competitive and accomplish their goals. The convergence between Information Technology (IT), telecommunications and mass media forms the basis for new possibilities for developing information and communication services.

Convergence refers to the ability to offer voice, data, video, and other multimedia services seamlessly over single or multiple infrastructures, as well as the capability to access such services at any time, anywhere, and with any device. On the other hand, the term 'convergence' is commonly used in reference to the synergistic combination of voice, data and video onto a single network [5]. These previously separate technologies are now able to share resources and interact with each other creating new efficiencies. It also means that competing infrastructure platforms will be able to provide essentially similar multimedia experiences. A converged communication infrastructure is expected to bring enormous economic benefits and improve the services offered to the consumers. Consequently, new business opportunities will be created. In addition, new training strategies and new courses

should be developed in order to qualify the human resources working in the fields of media and ICT to deal with converged networks [8].

A Joint European Project (JEP) has been setup and implemented under the framework of TEMPUS programme of the European Commission aiming to improve the understanding of this era, to create new courses in ICT and media convergence to be taught in Jordan, and to enhance the skills of the teaching staff.

Regarding the structure of this paper, next section presents the detailed methodology adopted for the complete development, teaching and assessment of four new postgraduate courses. The courses' concepts and main contents are described in the third section. Paper's fourth section is concerned with the activities carried out for quality control and assessment of the produced teaching material. Finally, work's conclusions and expected benefits are discussed.

2. METHODOLOGY

A detailed methodology consisting of appropriate successive phases and corresponding independent activities was carefully prepared for the development, teaching and assessment of the new postgraduate courses on ICT and Media Convergence. The corresponding project proposal was submitted to the European Commission, and was approved after peer review in August 2007 (approval rate 1:6). Table 1 presents the relevant work plan including the main phases and activities, as well as their planned duration.

Ref. N° / Sub Ref. Nᵒ	Phases / Activities	Duration (months)
1	PREPARATIONS AND DESIGN OF COURSES	
1.1	Selection of staff teams	1
1.2	Agreement on course design	2
1.3	Purchase of equipment	6
2	CREATION OF NEW TEACHING MATERIAL	
2.1	Preparation of teaching material	6
2.2	Preparation of exercises and case studies	2
2.3	Reviewing the material	1
2.4	Production of final material	1
3	IMPLEMENTATION AND ACCREDITATION	
3.1	Training the trainers	3
3.2	Running the courses	6
3.3	Evaluation of courses	6
3.4	Accreditation of courses	2
4	DISSEMINATION PROGRAMME	
4.1	Dissemination using the web	12
4.2	Dissemination seminars	3
4.3	Publicity document	1
5	SUSTAINABILITY	
5.1	Incorporation into curriculum	3
6	QUALITY CONTROL AND MONITORING	
6.1	Control of the material	1
6.2	Piloting of the material	1
6.3	Visits by the quality expert	1
6.4	Assessing the trainers	2

Table 1: The complete work plan

3. COURSES CONCEPTS AND CONTENTS

As the major outcome of the above methodology, four new postgraduate courses were developed starting from scratch, and subsequently taught in Yarmouk University of Jordan during the fall and spring semester of academic year 2008-2009. For every single course, a production team consisting of academics of two universities (EU experts and Jordanian members of academic staff) was appointed. Subsequently detailed course outlines were prepared including all details: course description and objectives – analytical course syllabus for every teaching week – teaching method – evaluation plan – attendance policy – references. The concepts and main contents of the new courses are summarized in the next subsections.

3.1. CONVERGENCE AWARENESS

This introductory course provides basic background about convergence, its meaning and importance in everyday life, and how is boarded from different disciplines. The main aspects that are tacled are the following:

- Convergence of users
  The users have to adjust to dealing with telecommunications and multimedia.

- Convergence of devices
  New "multimedia capable" devices (i.e. smart phones, PDAs, Pocket PCs, networked gaming platforms, etc) appear in order to introduce the common, well-known content but in a new form.

- Convergence of telecommunication networks and IT infrastructure
  It provides to the end users the ability to access a large number of applications and services according to their individual needs.

- Convergence of services and applications
  The "triple play" bundled offering of telephone, video and broadband internet access provided over a single IP network, is a threat to traditional telecommunication companies. Furthermore, the "quadruple play" adds wireless connectivity to the triple play and competes with traditional cellular operators.

In addition, the course introduces convergence applications such as: a) the triple play (the provisioning of the two broadband services, high-speed internet access and television, and one narrowband service, telephony, over a single broadband connection), and b) the quadruple play (a term that describes a blend of voice, video and data together with mobile services in a seamless environment encouraging subscribers to stay with a single service provider).

Finally, the course provides information about the design and deployment of challenges and possible approaches for future evolution of the convergence services and applications such as Telephony, IPTV, VoD, VoIP, Internet Access, Wireless Connectivity and Mobility. The course syllabus and the produced teaching material are based on the most recent relevant references [5], [9], [15].

3.2. CONVERGENCE COMMUNICATIONS INFRASTRUCTURE

This course first provides an introduction to voice communication (fixed or mobile) and data networking (mainly broadband and wireless technologies such as xDSL, cable, Wi-Fi, WiMAX, satellite internet and cellular broadband). Furthermore, the course provides technical background of the convergence of voice and data on the same network by extensively reviewing the available triple and quadruple play technologies. More specifically, the course offers a detailed analysis of the following technologies:

- Broadband Internet access (or high-speed internet)
  A family of technologies providing high-speed digital data transmission over the wires of a local telephone network (xDSL) or the cable television infrastructure (cable).

- Voice over Internet Protocol (VoIP)
  The routing of voice conversations over the Internet or through other IP-based network.
- Internet-Protocol Television (IPTV)
  The delivery of real-time streaming TV over broadband IP networks.
- Video on Demand (VoD)
  The delivery of video content at the time of user's choice over broadband IP networks.
- Wireless Connectivity and mobility
  The transfer of information to a mobile user by employing the following technologies:
  1. Worldwide Interoperability for Microwave Access (WiMAX)
     The telecommunications technology based on the IEEE 802.16 standard aiming at providing wireless data over long distances in a variety of ways.
  2. 3G and 4G cellular phone systems
     The third and fourth generation of mobile phone standards and technologies.
  3. Wireless Fidelity (Wi-Fi)
     The wireless technology that provides the ability to mobile users to connect to the internet through Wi-Fi hotspots, as well as to improve the interoperability of Wireless Local Area Network products based on the IEEE 802.11 standards.

The development of course's concept and the teaching material currently produced is based on recent textbooks and references [2], [4], [6], [7], [11].

3.3. CONVERGENCE REGULATIONS MARKETING AND BUSINESS

This course deals with content and policy issues of convergence and tries to link ICT convergence to aspects related to business, strategy, and environmental factors affecting customers, users and firms. The focus is to explore the ICT convergence era and its interactions with business aspects and society. Since convergence will lead to the emergence of new businesses, this course is needed to establish the required background of how business will be conducted in the convergence markets.

The main aim is to provide managerial insight into the various facets of convergence. It provides background of how business will be conducted in the convergence markets, and focuses to a better understanding of the requirements and challenges in the new convergence era. It also presents new business concepts and industry changes enabled by the application of wireless e-business considering the demand of technology and services and their affect on industry and business structures analysing the implications of wireless and terminal services, social networking and e-culture.

The course gives insights about the dimensions of convergence technology applications legislation and regulations. It also provides a better understanding of the marketing capabilities of the internet and related technologies, such as broadband and WiFi, GSM and 3G cell phone networks. Topics also include relevant elements of e-marketing, e-procurement, CRM, internet business models and strategies, as well as financial and commercial aspects of convergence. Consumer behavior and ethical and societal issues are also discussed, where social networks and new paradigms of ICT emerge to converge communication and computing in a way to serve better the consumers. For the production of courses' teaching material, several relative references were studied [8], [12], [14], [17].

3.4. MASS MEDIA TOWARDS CONVERGENCE

The course aims to identify the convergence implications in media. Areas tackled include on-line newspapers, digital newspapers and magazines, radio on the web, as well as satellite radio. New content delivery methods such as pod casting and video casting are also discussed. Other topics include personalization and interactivity. The course also

demonstrates skills related to the way of accessing and consuming mass media on web and mobile. The main objectives are to provide students with a solid introduction to the topic of convergence implications in media, to introduce to them the new delivery methods and to provide the basic convergence journalism skills.

For the preparation of the teaching material the most recent and acknowledged textbooks have been used [3], [10], [13], [16]. More analytically, the topics covered are the following:

- Introduction to media convergence
- The web and the new content delivery methods
- Online entertainment
- Mass media for the web
- The convergent journalism - essentials and guidelines
- Multimedia for journalism and public relations
- Web 2.0 as a casting media
- Web 2.0 converging with other emerging media
- Digital video photography and video casting
- Mass media and pod casting
- Mass media on mobile
- The semantic web as a media convergent facilitator
- Convergent journalism and future career
- The convergent media for education

The produced teaching material of every new postgraduate course consists of course's synopsis and syllabus, a large number of slides (over 400), accompanying lecture notes, essay questions, exercises, case studies and references.

4. ASSESSMENT

Quality control and assessment of the new courses have been considered as main priorities of the developed postgraduate education. A collaborative process consisting of the following successive activities was planned and carried out for this purpose:

- Selection of specialized production teams (consisting of specialized academics from the participating universities)
- Design of detailed course syllabuses (based on the most recent research work and textbooks in ICT and media convergence)
- Design and implementation of a common template for all courses (consisting of all the necessary issues and items for the development and teaching of the new material)
- Training of the courses' instructors (by experts of the participating EU universities)
- Peer review of the produced teaching material (by experts of the participating EU universities)
- On site visit and submission of a 'quality report' for every course (by an external quality expert employed for this purpose)
- Assessment of the courses and the corresponding trainers through specially designed survey tools addressed to the students who attended the courses

The experience in building new postgraduate courses and in the assessment process based on interviews, questionnaires and observation is reported extensively in a relevant paper [1].

5. CONCLUSIONS

This paper dealt with the concept of ICT and media convergence and analyzed the development of completely new postgraduate education in this field. The methodology adopted, as well as the assessment model used have been also presented.

The experience gained has been substantial for all participants. The present benefits are multiple and addressed to many recipients: Jordanian students gained knowledge in a totally new subject; academic staff was trained in a new scientific field; Yarmouk university of Jordan acquired specialized equipment and new fully competitive postgraduate courses. The synergetic nature of the activities among EU and Jordanian scientists having overcome cultural and educational differences has also been extremely beneficial. Last but not least, fully assessed and accredited teaching material has been produced, ready to be, along with trainers, appropriate equipment to be the weapons for the expected significant future benefits.

6. ACKNOWLEDGEMENTS

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