on-course® portal: a tool for in-service training and career development for biomedical scientists

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Successfully navigating through the jungle of biomedical postgraduate courses in Europe has recently been made possible by the release of an Innovative Medicines Initiative (IMI) funded project called on-course® (http://www.on-course.eu). on-course® lists all master, continued professional development (CPD) and PhD courses in Europe and hosts advanced search options designed by the pharmaceutical industry, academia and regulatory bodies allowing the course seeker to find courses that are most relevant for them. In addition, an IMI cross education and training topic task force has developed a set of quality standards that have been applied to CPD courses. The comprehensive nature of on-course® offers a new level of transparency to biomedical course provision in Europe that will help steer future education and training.

Background
The overall enhancement of life-long learning is an EU 2020 strategic objective designed to increase competitiveness, employability and prosperity in a rapidly changing economic climate (http://ec.europa.eu/education/lifelong-learning-policy/framework_en.htm). The Innovative Medicines Initiative (IMI), Europe’s largest public–private funding partnership for biomedical research, was established to speed up the development of better medicines for patients in Europe [1]. IMI education and training projects were funded specifically to address the skills and competency requirements needed by the biomedical sector in Europe. One of the barriers facing the biomedical sector had been the difficulty in accessing the right training programmes of the right quality. To address this problem the European Medicines Research Training Network (EMTRAIN) has developed the on-course® portal. This portal will enable scientists to navigate the ‘jungle’ of postgraduate courses, address education and training gaps/quality and enhance interaction between course seekers and course providers.

Providing a broader view of biomedical education
Today’s biomedical scientists need to keep pace with rapidly moving advances in information and technology in their research fields. While Europe has world leading course providers catering for the needs of researcher education and training, the vast numbers of courses on offer means that finding a course containing high quality content at the right price, time and location is largely left to luck. It is also argued that researchers require a holistic overview of systems and processes of medicines development, both biological and supporting research infrastructures, so that they can put into a broader context their often highly focussed areas. Effective development of the European biomedical scientist will be aided by the creation of a single biomedical postgraduate education and training platform that provides a ‘one-stop shop’ for their needs. In the development of the database four main challenges were identified: making it comprehensive; informative; quality assessed and able to identify education and training gaps. The on-course® development
Creating and maintaining an education and training resource centre

Offering a comprehensive postgraduate course platform where key information about courses is compulsory will promote choice, transparency and improve search efficiency for the course seeker, which in turn increases competitiveness among course providers. To achieve a comprehensive course catalogue text analytics approaches were compared against a manual search method. A comparison of the two methods was performed by searching for UK and Swiss courses. The manual search was significantly more efficient, finding 30% more courses than the text analytics approach. In addition, sorting through the web mining results proved more time consuming than the manual search method and the latter was adopted as the search choice.

Over a three-year period more than 1000 European course provider websites (991 universities in addition to private companies) were screened by on-course\textsuperscript{11} administrators who identified and recorded postgraduate biomedical courses in 430 of them. Courses have thus far been identified in 39 countries and 21 languages. Translation of course content was aided by Google translate software (http://translate.google.com) and all information was displayed in English which is the working language of the biomedical sciences in Europe. This mapping exercise extracted and displayed information from all biomedical science master courses and the individual modules that made up the course; all the modules from the master courses which were also available as short courses for CPD; an evolving list of other relevant short courses for CPD and advertised biomedical science PhD programmes. Initially, the League of European Research Universities (LERU), were searched for PhD programmes but subsequently the websites of the entire 991 universities used for the master courses database were mapped. Relevant biomedical science courses and programmes were defined by using a list of 65 scientific and therapeutic biomedical area topics that were provided by industry and academic partners. In spring of 2012, after more than two years of mapping experience the scientific and therapeutic areas used for definition underwent modification to better fit known European course content.

As of March 2013, 2249 master courses, 1220 short courses (CPD) and 980 PhD programmes were published on the on-course\textsuperscript{11} platform. The course tutors are presently being contacted and encouraged to register and maintain the course information for which they are responsible. Live feed updates from course providers using a course information standard field format called eXchange of Course Related Information (http://www.xcri.co.uk), developed by the UK based company JISC (http://www.jisc.ac.uk) is being explored. The XCR\textsuperscript{3} format is being used by more than 40 UK universities and conforms to EU standards for metadata and learning opportunities thus allowing it to be rolled out across Europe.

Development of IMI shared quality standards for CPD courses

After a broad consultation process with quality assurance organisations and professional and scientific bodies in Europe, a list of nine quality standards for CPD and IMI Diploma and master programmes was developed by the IMI education and training projects (SafeSciMET, PharmaTrain, Eu2P and EMTRAIN)\textsuperscript{[2]}. The quality standards were developed in alignment with existing European standards both in higher education (the European Standards and Guidelines for Quality Assurance in the European Higher Education Area) and vocational training (European Quality Assurance Reference Framework to promote and monitor continuous improvement of national systems of vocational education and training). These were incorporated into the short course/CPD sections of the on-course\textsuperscript{11} portal. Course providers were asked to provide a self-assessment, of which of these criteria they meet, and to be able to provide appropriate documentation to accompany the self-assessment when requested. If no assessment is provided this is shown as, ‘no quality criteria have been defined yet for this course’. Otherwise, the number and a list of quality standards met by each course accompany each course description.

Courses will not be excluded on the basis of the quality standards. We have instead opted for a transparent system, which allows course seekers to decide what is important for them. Our expectation is that over time, all courses will include an assessment and that the number of courses meeting all nine standards will increase.

The progress will be monitored. In addition, incorporating shared standards into on-course\textsuperscript{11} will provide a unifying system that will allow an individual’s knowledge and competences to be recognised within Europe by industry, academia, regulatory bodies and other employers. This aim parallels closely with the European Commission’s Strategic Framework for European Cooperation in Education and Training (http://eurlex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:C:2009:155:0011:0018:EN:PDF).

A separate set of quality standards for the PhD programmes in on-course\textsuperscript{11} is being worked out by the EMTRAIN PhD work package. The basis of these quality standards will ensure a high quality research education and will share some common ground with the standards for PhD education published by ORPHEUS. The quality standards for PhD programmes will be incorporated into on-course\textsuperscript{11} during 2013.

The on-course\textsuperscript{11} portal also allows professional and/or scientific bodies to indicate if a course meets their requirements and is recognised by them for CPD. This is designed to help the course seeker identify the most appropriate course for their CPD needs. Current professional and/or scientific organisations that have added their flag to courses include PharmaTrain, SafeSciMET, Eu2P, the Organisation for Professionals in Regulatory Affairs (TOPRA), the Swiss Association of Pharmaceutical Professionals (SwAPP), the Swiss Society of Pharmaceutical Medicine (SGPM), the Drugs Information Association (DIA) and the British Association of Research Quality Assurance (BARQA).

on-course\textsuperscript{11} has an intelligent search functionality and informative display

Having a complete record of all postgraduate biomedical courses in Europe in a single portal provides advantages to the course seeker. However, it could in itself prove challenging unless accompanied by both an intelligently designed search engine and an informative course content display. A standard keyword search in on-course\textsuperscript{11} is therefore accompanied by three categories of advanced search tick box options that allow the course seeker to refine their selection. The first of these comprises options for course type (masters, short courses/CPD, and PhD programmes); course schedule (full time, part time, on the job); learning context (face-to-face, blended or distance) and courses offered by IMI education and training projects (PharmaTrain, Eu2P and SafeSciMET). A second level of options gives a choice of 21 different languages and 39 countries. Finally, a third level of options allows...
the course seeker to select from 65 distinct scientific and therapeutic areas.

The search returns page provides a short description of each course along with ‘Sort by’ and ‘Refine search’ options. Courses of interest can also be added to a comparison page where key information on those courses can be aligned into an easy view table format. Search results can be saved by registered users. Selection of a course takes the course seeker to the main course information page where key information can be viewed along with a course description. Several short-cut icons are also displayed that link to a fees page, course homepage, course providers website for international students, required qualifications and if available a link to detailed course module information. In the case of master programmes a list of the individual modules is included in a table format below the course description along with module details on credits, duration and whether the module is core, elective or recommended. In addition, if the module can be taken as a stand-alone course, a link is provided that will take the course seeker to the short course and/or CPD page where more information is provided. The purpose of the main course information page is to provide a concise overview of a course that allows a course seeker to make an informed decision on whether or not that course is worth pursuing in more detail.

Identification of gaps in biomedical education and training in Europe

The development of a new medicine from bench to bedside takes on average of 12.5 years and 1.47 billion Euros. This huge investment needs to be complimented by skilled researchers who have received high quality and up-to-date training. Unfortunately, interaction centred around education and training is largely unidirectional from academia to industry with the companies filling the unmet gaps by in-house training that are generally recognised as bona fide occupational qualifications outside of the company. During the mapping of courses for on-course we have identified several very high quality courses in Europe where there is frequent interaction between the course provider and pharmaceutical industry advisors to make sure that course curricula meet industries’ immediate needs. However, the majority of course providers reported no industry involvement in their curriculum development. Transitioning from what lecturers feel comfortable teaching to what industry actually needs is an important challenge for European education and training.

To help identify gaps and create sustainable solutions on-course has created an IMI cross-project ‘Gap Team’ comprising individuals from industry, academia and regulatory bodies. The comprehensive nature of on-course allows the course seeker access to everything that is on offer and this in itself helps to fill gaps by bridging the ‘not knowing what’s out there’ issue. The ‘Gap Team’ will help complement this aspect of on-course by gathering information on current education and training needs directly from pharmaceutical industry, SMEs and IMI sources and interfacing with course providers to help produce sustainable courses based on known demand. on-course is also a promising communication platform for such needs and prominently displaying demand areas will give an opportunity for course providers to make immediate changes to course curricula and allow students to make better informed choices along education paths that have a greater likelihood of securing a career. A forum has been added to the on-course platform to aid this communication process by making it possible for the industry to advertise for partners to develop new courses or for course providers to communicate plans to develop new curricula and explore the industry interest.

The next steps

The master course catalogue is complete but will be updated regularly by a dedicated team comprising individuals from academia (including The University of Manchester, The University of Cambridge, The Karolinska Institute and The Medical University of Vienna), industry (EFPIA members) and regulatory bodies. The CPD course and PhD programme data sets will continue to grow during the next 12 months as more course providers and courses are identified. We are continuing to develop on-course and will be installing several major functionalities in the near future that include an online portfolio where a course seeker can record and track their education and training history, a ‘Tools and Methodologies database’ that will provide a comprehensive list of learning tools (including e-learning software) and learning methods used in adult education and training, and a media section for articles and videos. Google Analytic results of the on-course site and graphs showing course information such as the cross-sectional distribution of course types, costs, taught languages and quality and their changes over time will have their own on-course pages. Incorporation of additional scientific and therapeutic areas and future global expansion to new countries are being discussed. Finally, on-course will develop into a life-long learning platform for European biomedical researchers, where both academia and industry jointly post curricula requirements not only for graduate scientists but also for continuing professional education, turning it into a platform that allows European scientists to keep up-to-date and competitive. Ultimately, this will help foster innovation – better drugs and treatments.

Summary

It is recognised that rapid advances in technology and recently emerging data highlighting a greater complexity of human disease will require a rapidly updating and transparent education and training system. Recording all courses that are offered and making them easy to find will not only enhance the course seeker experience but act as a powerful tool for continuous gap analysis, thus keeping Europe in step with training opportunities according to emerging needs. These putative gaps will not only be content based but will also highlight gaps in quality, distance learning, choice, costs and flexibility. More courses need to be developed that address the new era of personalised medicine and that are taught in a flexible manner that meets the demands of industry. Enhancement of life-long training is an EU strategic objective designed to increase competitiveness in an increasingly turbulent economic climate. on-course is a major tool in helping reach this objective for the biomedical sector. on-course will become the reference platform for education and training in biomedical sciences, and will help to ensure that the biomedical education and training landscape is geared to keep Europe at the forefront of research. on-course will further strengthen the pan-European community of scientists in drug development by creating a network to integrate state-of-the-art education and training programmes, by helping European scientists to navigate the jungle of courses and quality indicators, by fostering mobility of students and scientists and by promoting pan-European standards in education and training in the field of medicines.

on-course has 3.5 years of IMI funded development time remaining. A sustainability group of 12 EMTRAIN members was assembled early this year to plan and ensure the long-term funding and development of the platform beyond 2016.

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