

## DEVELOPMENT OF E-LEARNING OF ZONOTIC DISEASES

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Digital learning, i.e., e-learning, encompasses teaching tools, which enable a student to engage in self-learning, in and out classroom through access to a computer, mobile phone or tablet. E-learning can play a significant role in knowledge delivery strategies. Online learning courses available through the internet also appeal to wider audiences who wish to learn about One Health at their own pace anywhere in the world. In order to achieve the learning objectives, a learner is able to repeat lessons as and when required and trace own progress with or without the oversight of a remote instructor.

Knowledge of zoonosis is a fundamental component of veterinary expertise recognized by the World Organization for Animal Health (OIE), the intergovernmental organization focused on global standards for veterinary medicine and the control of animal diseases and zoonoses. OIE recommendations on competencies of graduating veterinarians ('Day 1 graduates') to assure national veterinary services of quality include a specific competency on zoonoses (including food-borne diseases) as well as related competencies on emerging and re-emerging diseases and competencies related to epidemiology, disease management and food hygiene that pertain to zoonoses as well. Current veterinary professionals working in many remote places throughout the world have limited access to traditional face-to-face continuing professional education. E-learning provides an opportunity for up-to-date and relevant continuing education at less cost with reduced time away from the workplace and the need for travel.

Current curricula at veterinary educational establishments (VEE) mostly focus on agents, pathogenesis, clinical signs, prevention and control. The pedagogy for teaching is primarily lectures, with assessments most commonly in the form of multiple-choice or true/false examination questions. From discussions with veterinary teaching staff across

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Southeast Asia, it is clear that an understanding of dynamics of disease transmission, their ecology, determinants for emergence and re-emergence of zoonoses, and policy on associated with zoonoses prevention and control are not covered as thoroughly, if at all.

A number of development projects in the last decade have focused on improving educational programs on zoonoses for veterinarians and other health professionals. The RESPOND project (20xx-20yy), a part of the Emergency Pandemic Threats initiative funded by the United States Agency for International Development (USAID), supported the formation of a regional university network, the South East Asian One Health University Network (SEAOHUN), with one of its goals being the sharing of best practices on teaching and support for strengthening zoonoses-related curricula medical education, including veterinary education. OIE inaugurated veterinary education twinning programs in 2013 with the express purpose of enhancing content and pedagogy of veterinary education related to Day 1 competency recommendations, including zoonoses. Twinning projects to date have joined veterinary faculties in Vietnam and Thailand with veterinary faculties in Australia and the United States, respectively. Recently, USAID's One Health Workforce (OHW) project expanded on the accomplishments of RESPOND and further supported zoonoses education in the health professions. These funded projects supported the authors' use of e-learning through development of animated infographics to explain concepts, such as zoonoses and emerging/re-emerging diseases, and the design of a web-based e-study module that combined different types of resource materials, e.g. Pachyderm<sup>®</sup>. These projects also supported creation of more traditional learning materials, such as a set of One Health Short Course (OHSC) modules, consisting of seven technical modules and seven core competencies modules designed for face-to-face delivery. The modules are flexible enough to incorporate field experiences with emphasis on One Health.

Our most recent project was to develop an e-learning course on zoonosis with support from THOHUN. Two target audiences were identified for the e-learning course, namely, the current One Health workforce seeking continuing education and the future One Health workforce currently studying at universities. The objectives of this project were to (1) develop an e-learning course to supplement classroom instruction of university students and an e-learning continuing education course fulfilling license renewal requirements for working One Health professionals; (2) to emphasize One Health strategy to zoonoses; (3) design e-learning modules to be compatible with both mobile phones and computers as learning devices; and (4) fulfill requirements for obtaining continuing

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education credits of the Center for Veterinary Continuing Education of the Thailand Veterinary Council and also be suitable for incorporation by faculty into a university course for credit.

Development of the e-learning course on zoonosis employed a team approach, composed of veterinarians from the Faculty of Veterinary Medicine (FVM-CMU) and computer graphic design specialists with an interest in e-learning from the College of Arts, Media and Technology (CAMT-CMU), Chiang Mai University. The veterinarians on the team came from several different disciplines and each brought expertise to the project in terms of knowledge of zoonosis and experience working with both animal and human aspects of the disease. The team convened regular workshops to bring together numerous stakeholders including current veterinary students, FVM-CMU staff and veterinarians from both public and private sectors. Their diverse perspectives led to more complete understanding of the complexity of zoonosis in a community. The overall project flow is depicted in Fig 1.

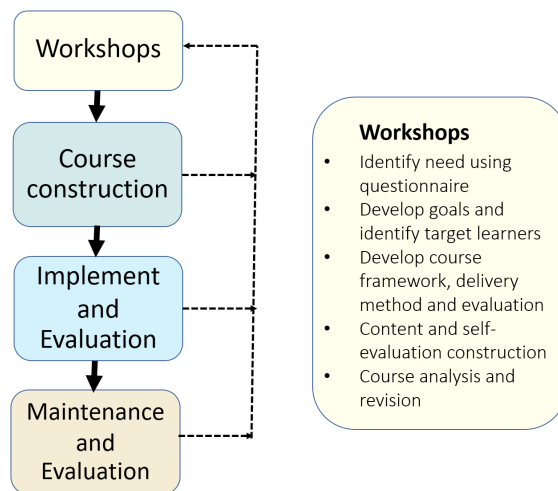


Fig 1 – Flow-chart of e-learning course design and construction program, Chiang Mai University.

The instructional design of this course followed the classical ADDIE (analysis, design, development, implementation and evaluation) model. Each step was hammered out at 'brainstorming' meetings for course framework, content and delivery methods. The facilitating team of designers from CAMT-CMU shared their experiences in online material construction and delivery methods suitable for new generation of learners. For example, they explained that graphics were easier for younger learners to comprehend. Specific knowledge content, when included, was conveyed most easily through bullets. Workshops were held on every phase of the project, from gathering user needs to design and finally to evaluation of the pilot implementation.

This approach was used to create two separate e-learning courses, one for students who represent future OHW and the other for current OHW professionals. The learning objectives for the future workforce design were gathered from faculty members, while a survey of the current OHW participants revealed that they received basic knowledge of zoonosis during their professional training but limited information of One Health strategy, indicating the need for integration of learning materials on One Health and on zoonosis to demonstrate both relevance and application. The content design, sequence, delivery methods and assessment of the online e-learning courses also were different for adult learners compared to the younger group preparing to join the future OHW.

The course for the future OHW was designed to accommodate an optimal attention span of 30 minutes based on the experience of CAMT-CMU designers. Each 30-minute module emphasized the One Health strategy to zoonosis. Facts on agents, pathogenesis, treatment and control were considered to be better imparted in a classroom setting using classical teaching methods. Contents of the on line course consisted of infographic charts and animated infographic clips, with minimal and concise texts. Infographics exploit the sharing of information through graphics rather than words and are recognized as an effective learning object for the young learners. The infographic helps students recognize the core knowledge and its inter-relationships in the context of One Health. Students were encouraged to seek more information according to their particular interests via the internet. An on line self-test was included with the option to share their scores with colleagues via social media.

Evaluation of e-learning courses and a commitment to continuous improvements are important to enable the e-learning courses to remain up-to-date and interesting to learners. On line evaluations were used to assess learning and gather feedback for course improvement from the learners. The student-focused e-learning course initially

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was taught to 60 students who accessed the course from their own devices (laptop, tablet or smart phone). The evaluation confirmed that the time spent on each study module was approximately 30 minutes. The evaluation also collected learner perceptions of their ability to gain knowledge from the course and their satisfaction with the course. A Likert Scale was used to quantify the replies, where a score of 1 reflected strong disagreement and a score of 5 reflected strong agreement. The results indicated most students considered the course improved their knowledge of zoonosis, with 72% agreeing or strongly agreeing.

The evaluation also queried students regarding their use of electronic learning devices. Most students used up to two devices for studying a class, such as a smart phone and/or a computer. Almost an equal percentage of students primarily used a smart phone (46 %) or a personal computer (41%). Interestingly, student use of a tablet (or iPad®) was low (9%). These results suggest that the e-learning course-display design should be compatible both smart phones and PCs.

The course contents for current OHW personnel were based on case studies and problems rather than simply relating fundamental knowledge about zoonosis. The web-based design contained fewer graphics than the course for future OHW (students). Additional links were provided for learners interested in obtaining more details. Current OHW members were more comfortable reading reference papers and other comprehensive literature compared to future OHW learners whose attention span was more limited.

Case-based problems based on actual events and experiences provided better learning material for current OHW. These cases required the learner to make decisions on complicated problems. Current knowledge, such as guidelines for rabies control and vaccination were needed for learners to address problems posed in the case studies. The learner could exit the case, gain the needed information through additional links and then return to the case study with an appropriate solution. The cases reflected the complexity of current issues from a One Health perspective where cultures and beliefs of animal owners and affected people affecting the ways in which problems need to be handled are taken into consideration. The cases also required core competencies in other areas, such as communication skills and leadership to arrive at a solution that benefits the whole community. The cases were built on current OHW experiences to assist the learners make the connection between factual knowledge and the need to consider the situation and solutions in the context of One Health.

One important target learner group is that of graduate veterinarians as the 2002 Veterinarian Act of Thailand requires all veterinarians to renew their licensing certificate every five years by completing 100 credits (equivalent to 100 lecture hours) of continuing education (CE). This online course provides veterinarians an opportunity to earn CE credits. Online courses could be designed to accommodate the needs of different learners, such as small animal practitioners focusing on individual treatment and livestock practitioner who must consider economic concerns and the population as a whole. Case studies of zoonosis in urban areas can be provided for small animal veterinarians to demonstrate the relevance to their situations, while outbreaks of trans-boundary diseases affecting food animals would be of greater interest and importance to livestock practitioners working in rural areas.

The e-learning mode is best suited for sharing concepts such as the interconnections among agent, host and environment rather than factual knowledge and details. Up-to-date knowledge can be gained anywhere from the internet. Integration of concepts is more difficult to understand simply from using internet search engines or, in some cases, from a series of lectures. Today's generation of learners prefers learning through interactive on line tools such as social networking.

However, ease of student access needs to be balanced with measures that protect student privacy and security. Providing students an opportunity to utilize the e-learning course on an individual basis can be complemented by providing options for sharing their progress with friends and colleagues through social media.

One goal of the course was to convince learners that they can control and manage zoonosis better through One Health. The strategy may be difficult for some learners to understand through a single lecture or reading of a manual. The e-learning platform allows the learner to review materials are not immediately understood and to access supplemental materials that provide more in-depth information. An online teaching platform should supplement face-to-face classroom teaching, as each serves the learner in different ways. Large volumes of factual information usually are too complicated to deliver through an online platform only. The two-way communication between student and teacher is a necessary part of the learning process.