Enhancement the teaching and learning methods of some zoological courses (invertebrate, parasitology and animal physiology) in Taif University, KSA

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Abstract: The main objective of this study is to outline specific manners by which learning and teaching processes can be enhanced in the university campuses for the sake of superior learning capabilities and experiences. This paper describes the advantages of various approaches of improving the teaching of some biological courses (invertebrate, parasitology and animal physiology), including the disciplinary, the problem-oriented and combined approaches. In the disciplinary approach, the previous courses are taught in the classical manner as a coherent subject, covering classification of invertebrate, biology of invertebrate and parasites, molecular biology, pathology and immunology, as well as clinical manifestations, diagnosis, therapy, control and prevention of parasitic diseases. Animal physiological course included the description of different systems in the human body and compared with the other animals. Problem-oriented teaching approaches the subject, starting from diseases in animal species or from organ systems; it also tackles training of skills for problem solving and self-learning. Combined approaches include elements of the disciplinary approach and those of other methods. A list of the developed courses and the way of presentation has been discussed. The course syllabus put in student guide to be given to the student in the beginning of the semester. Improving the practical courses has been done by recording them in video. The strategy in the lectures has been changed with the students to minimize the distance with them. Moreover, three workshops have been hold during improving the courses to enhance the efficacy of the technician in the using the computer and modern equipments. Based on the observations and experiences regarding teaching biological courses (branch of zoology), some suggestions have been made which may be helpful in the development of curriculum of zoology in Taif university, KSA to approach to online biological programs (E-learning) at leading research universities.
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1. Introduction

During the past few decades, the zoological profession has been exposed to numerous new developments in science, agriculture, animal husbandry, disease control, public health and other relevant fields. Zoological education has to respond to new challenges, particularly in KSA, where E-learning comprises all forms of electronically supported learning and teaching. The Information and communication systems, whether networked or not, serve as specific media to implement the learning process (Tavangarian et al., 2004). Saudi Arabia spent some $15bn on educational development in 2007, mainly to fund existing and open new universities as part of a priority programme to develop higher education (Zahrani, 2010). The aspects of higher education; Saudi students studying abroad, foreign students studying in Saudi Arabia, female education, the role of the Ministry of Higher Education and the financing of higher education have been examined (Saleh , 1986; Sohail and Shaikh, 2003).

Quality in education is becoming a requirement and a demand by the market. Employers are becoming more and more selective in their choices of new graduates. Educators are challenged by the strong and growing global economic forces, rapid developments in technology and its impact on products and processes, and conflicting values. Students are more engaged with their learning and perform better if they know what is or will be expected of them (Huba and Freed, 2000).

E-learning is essentially the computer and network-enabled transfer of skills and knowledge. E-learning applications and processes include Web-based learning, computer-based learning, virtual classroom opportunities and digital collaboration. Content is delivered via the internet, intranet/extranet, audio or video tape, satellite TV, and CD-ROM. It can be self-paced or instructor-led and includes media in the form

of text, image, animation, streaming video and audio (Allen and Seaman, 2003). The worldwide E-learning industry is estimated to be worth over $48 billion US according to conservative estimates (EC, 2000). Developments in internet and multimedia technologies are the basic enabler of E-learning, with consulting, content, technologies, services and support being identified as the five key sectors of the E-learning industry (Nagy, 2005). By 2006, 3.5 million students were participating in on-line learning at institutions of higher education in the United States (Allen and Seaman, 2008). There has been an increase of around 12–14 percent per year on average in enrollments for fully online learning over the five years 2004–2009 in the US post-secondary system, compared with an average of approximately 2 per cent increase per year in enrollments overall. Allen and Seamen (2008) claim that almost a quarter of all students in post-secondary education were taking fully online courses in 2008, and suggests that in 2009, 44 per cent of post-secondary students in the USA were taking some or all of their courses online, and projected that this figure would rise to 81 per cent by 2014. Thus it can be seen that E-learning is moving rapidly from the margins to being a predominant form of post-secondary education, at least in the USA.

Many higher educations, for-profit institutions, now offer on-line classes. By contrast, only about half of private, non-profit schools offer them. Private institutions may become more involved with on-line presentations as the cost of instituting such a system decreases. Properly trained staff must also be hired to work with students on-line. These staff members need to understand the content area, and also be highly trained in the use of the computer and Internet. Online education is rapidly increasing, and online doctoral programs have even developed at leading research universities (Hebert, 2007).

However, it should be noted that many early online courses, such as those developed by Murray Turoff and Starr Roxanne Hiltz in the 1970s and 80s at the New Jersey Institute of Technology (Hiltz, 2005) and the online distance courses at the University of British Columbia (where Web CT, now incorporated into Blackboard Inc. was first developed) (Bates, 2005) have always made heavy use of online discussion between students.

Biology is a fascinating subject to study and can lead on o a variety of rewarding career paths. Biology is the 'science of life' and as such involves the study of areas such as animals, people and plan life. The subject is therefore essential for those who wish o pursue a career in medicine or in veterinary professions. The topics studied within the broad title of biology can include; environmental issues, genetics and zoology etc. Currently, there is a broad agreement that (a) future

zoology education should produce competent graduates, who are able to act both professionally and effectively, and flexible enough to respond to changes in the zoology profession (Zahrani, 2010); (b) all students should graduate from their courses with the same general certificate that will be a qualification to practice in all fields of zoological science; and (c) zoological specialization should occur after the primary qualification has been obtained. This means that future undergraduate education in zoology has to provide the basis for obtaining a universal certificate which confers the right to practice, as in the past, but should offer more flexibility and improved options for postgraduate specialization and continuing education.

There are eleven standards that have been identified for self evaluation scales provided in different documents for institutional evaluations and for assessments of the quality of programs (Web 1 and 2):

Mission and Objectives
Governance and Administration
Management of Quality Assurance Processes
Learning and Teaching
Student Administration and Support Services
Learning Resources
Facilities and Equipment
Financial Planning and Management
Faculty and Staff Employment Processes
Research
Institutional Relationships with the Community

Learning and teaching one of the most important points for institutional evaluations and for assessments of the quality of programs. Therefore, the learning, teaching subjects and methods have to be reconsidered and more emphasis has to be laid on flexibility, understanding and solving problems, and on self-learning of students in order to impart skills to cope with new challenges in their professional lives. Keeping in view these challenges, many biological institutions around the world are restructuring their undergraduate teaching programmes, and some have modified the curriculum using or evaluating various teaching approaches, including new methods, such as computer and internet-assisted learning (Maki, 2002).

2. Objectives

In this paper, various approaches used to teach invertebrate, parasitology and animal physiology have been discussed. The second aim of this publication is to stimulate discussions on teaching approaches and methodologies for some zoological courses and to provide information about appropriate educational strategies for teaching zoology. We would like to make most effective use of the internet to improve education about zoology, and help to ensure the accuracy of zoological information on the internet. This

information would be helpful to give considerable advice in the complicated process of changing and improving curricula for education in some zoological courses. The developed courses will be the first courses on line in Taif University for E-learning programs in biology department. This can be used as a guideline/model for the development of revised zoological curriculum in KSA. The third aim concern about the change from what has been a traditional emphasis on rote learning and shifting to creative thinking and problem solving, and the development of personal attributes of personal and group responsibility, leadership.

3.   Analysis, Discussion and Conclusion

3.1 Teaching Approaches

There are several choices of teaching invertebrate, parasitology and animal physiology which have been discussed in detail earlier. These include the disciplinary approach, problem-oriented approaches focused on diseases of animal species, organ systems or other subjects, and combined approaches thereof.

3.1.1 Disciplinary Approach

In this method, invertebrate, parasitology and animal physiology are conventionally taught as a coherent subject, covering classification of invertebrate, invertebrate and parasite morphology, biology, molecular biology, epidemiology, pathology and immunology, together with clinical manifestations, diagnosis, therapy, prevention of parasitic diseases as well as covering the structure of different system in the human body and compared with the animal system. The same method has been applied in other project concerning the development the zoological courses (Adel Nabi et al., 2007). Using invertebrate and parasite taxonomy as a primary pattern, the disciplinary approach provides an effective and easy access for the students to gain an overview on invertebrate, parasitology and parasitic diseases and, most importantly, to understand the complex networks of epidemiological key factors, the parasite-host relationships and their clinical significance. In this regard, it has to be emphasized that many of the invertebrate and parasitic infections involve several host species and several organ systems or in most cases the whole host organism. Experience gained during the last two decades has shown that the disciplinary approach can provide an adequate basis of knowledge and skills of invertebrate and parasitology for professional life if it is well structured, concise, focused to relevant parasitic diseases and well balanced regarding the depth and breadth of knowledge. This approach has certain disadvantages like insufficient integration between invertebrate, parasitology and

other disciplines, overlapping between disciplines, lack of training of the students for self-directed learning and for applying their knowledge to practical problems.

3.1.2 Problem-Oriented Approaches

The problem-oriented approaches have been applied during teaching the developed courses. Curricula based on problem-oriented teaching were first introduced in medical schools, e.g. at Harvard Medical School in 1985 and at Bowman Gray School of Medicine (USA) in 1987/1988 (Philip and Camp, 1990). At the latter school, 25 students were accommodated per year, six to eight students per group, each with a basic scientist and clinician as a supervisor. The students had confronted with clinical cases and patients already in the first year. The main objectives of the curriculum included training of independent learning, critical thinking, learning of problem solving skills, enhancement of understanding of disease mechanisms, training of team-work and life-long learning habits. Several veterinary schools or faculties have also introduced curricula using problem-based teaching, e.g. Cornell University, Ithaca, USA in 1983 and the Faculty of Veterinary Medicine, University of Utrecht, Netherlands in 1995 (Eysker, 2002). Such curricula have been focused on diseases affecting various animal species, on organ-oriented diseases or both. For many years, schools in Europe practiced some elements of problem-oriented teaching, especially in the clinical part of the curriculum, with relatively small groups of students having access to clinical patients under supervision of academic staff members. Similarly, in Pakistan, one credit hour course for parasitology clinic has been started in revised curriculum in 1998.

1. We believe that problem-based learning (PBL) provides a forum in which these essential skills will be developed. The basic principle supporting the concept of PBL is older than formal education itself; namely, learning is initiated by a posed problem, query, or puzzle that the learner wants to solve (Boud and Feletti, 1998). In the problem-based approach, complex, real-world problems are used to motivate students to identify and research the concepts and principles they need to know to work through those problems. Students work in small learning teams, bringing together collective skills at acquiring, communication, and integrating information. Problem-based instruction addresses directly many of the recommended and desirable outcomes of an undergraduate education: specifically, the ability to do the following:

2. Think critically and be able to analyze and solve complex, real-world problems.
3. Find, evaluate, and use appropriate learning resources.
4. Work cooperatively in teams and small groups.
5. Use content knowledge and intellectual skills acquired at the university to become continual learners.

3.1.3 Combined Approaches

Another choice of teaching some zoological courses is a combined disciplinary and problem-oriented approach (Eckert, 2000). In this approach, various disciplines should initially present concise overviews on invertebrate or parasitic or physiological function and other infectious diseases, including all aspects from etiology to control. Enough time has to be reserved for practical training and self-learning of the students, who should have access to computer-based and interactive learning facilities. General principles of diagnostic techniques can be taught in an interdisciplinary approach together with structure various systems and pathology. In this period, some modest options for specialization may be offered as electives, e.g. tropical parasitology or parasitic diseases of wild and zoo animals. In the clinical part of the curriculum, cases of infectious diseases should be presented in a problem-oriented approach predominantly focused on animal species. Ideally, these presentations should be interdisciplinary endeavors with participation of clinicians, infectiologists, pathologists, physiology and other specialists.

3.1.4 Region-Specific Approaches

There are certain parasitic diseases of animals which are specific for a particular area e.g. fascioliasis is a pertinent parasitic disease of marshy areas. Similarly, the diagnosis and control practices used by the local farmers are also equally important and helpful in field conditions. Other examples are concern about the present of certain invertebrate in certain place of world and some anemia are related to certain region. The knowledge on these area specific parasites and control measures should be gathered and be included after scientific validation. This approach will help the students to easily tackle with region-specific parasitic or physiological problems.

3.2 Computer-Based Learning in Classrooms Approaches

The use of computers in classrooms has not only enhanced the level of interest among students but has also opened new avenues for teachers to explore novel methods of student-centered teaching. Research confirms that computers aid collaborative learning environments in the classroom, enabling students to use audio-visual aids to understand core concepts (importance of computers in the classroom). Most importantly, computers have made it possible for learners to further their education through virtual or online learning courses, without having to sacrifice their jobs (Veletsianos and Kleanthous, 2009). Computers help students share important knowledge and help them build positive relationships which enhance their learning processes.

3.3 Preparation of Components of Comprehensive Course Syllabus

We prepared course syllabus for each developed course that contained the following items; basic information, course description and materials. Basic information include name of university, semester, year, course title, number, unit value, course meeting times and location, instructor and how to contact him. Course description included four points that are prerequisites, overview of course, student learning objectives and methods of instruction (lecture, discussion, group work, etc.). Materials concerned about primary or required books//readings for the course, supplemental or optional books//readings, websites and links, other materials (lab equipment, software, etc). The course syllabus put in student guide to be given to the student in the beginning of the semester.

3.4 Practical Courses

Some practical courses have been prepared in power point presentation also video for some practical courses has been made. The dissection of birds to prepared fixed slides for parasite, dissection of shrimp, some experiments for the hematological (hemoglobin determination, counting red blood cells, counting white blood cells and measuring the packed cell volume) have been recorded in videos. Kaltura (2010) and Loutchko et al. (2002) mentioned that the multimedia course for internet should depend on virtual education.

3.5 Minimizing the Distance Between the Students and the Teacher

During the developing the way of teaching the developed courses, we change our strategy in the lecture with the students to minimize the distance with them. The strategies include we arrive early and chat with students, show them a sample of exam, offer early assistance to students having difficulty, acknowledge students who are doing well in the course, mule topics for office hours, listen attentively to all questions and answer them directly (Gleason, 1986).

3.6 Recommendations for Administering and Analyzing Student Course Evaluations

Student course evaluations (or student ratings) are one source of data about teaching. Although departments may use any type of evaluation form to obtain student opinion, since 1975 it has been required that students numerically rate each instructor on the following question: considering both the limitations and possibilities of the subject matter and course, how would you rate the overall teaching effectiveness of the instructor?. During the project we make procedures for administering student evaluation forms as following: A set number of blank evaluation forms are distributed to each faculty member for each class. Sufficient class time is designated for students to fill out questionnaires (evaluations are best not distributed at the final exam, when students have other things on their minds, but rather during the last two weeks of the term). Students are informed about the purpose of the evaluation. The instructor designates a student from the class (or a staff person) to supervise the evaluation. Students complete the questionnaires while the faculty member is absent from the room. The designated student (or departmental staff person) collects the evaluation forms and places them in an envelope, noting on the outside the instructor's name, the course number, the total number of students present, the total number of forms collected and the date. The student the signs the envelope and files it with the department. Summary information (including statistical data and syntheses of open ended responses) should become a permanent part of the teacher's file (Johnson-Eilola, 2005).

3.7 Enhancement the Efficacy of the Administrators and Technician

During the project, three workshops have been organized; one of them to encourage the administrators to improve the practical class and they should encourage the students for the non curriculum activities. The second workshop for the technician

concerned about using the computer and how to work on the word program. The last one was concerned on training the technician on all the equipments and instruments in the department.

3.8 E-learning Services Approaches

The main objective from during this study was to approach to the E-learning service in Taif University. E-learning services have evolved since computers were first used in education. There is a trend to move towards blended learning services, where computer-based activities are integrated with practical or classroom-based situations. Bates and Poole (2003) and the OECD (2005) suggest that different types or forms of E-learning can be considered as a continuum, from no e-learning, i.e. no use of computers and/or the Internet for teaching and learning, through classroom aids, such as making classroom lecture Power point slides available to students through a course web site or learning management system, to laptop programs, where students are required to bring laptops to class and use them as part of a face-to-face class, to hybrid learning, where classroom time is reduced but not eliminated, with more time devoted to online learning, through to fully online learning, which is a form of distance education. This classification is somewhat similar to that of the Sloan Commission reports on the status of E-learning, which refer to web enhanced, web supplemented and web dependent to reflect increasing intensity of technology use. In the Bates and Poole continuum, 'blended learning' can cover classroom aids, laptops and hybrid learning, while 'distributed learning' can incorporate either hybrid or fully online learning (Bates and Poole, 2003). It can be seen then that E-learning can describe a wide range of applications, and it is often by no means clear even in peer reviewed research publications which form of E-learning is being discussed (Lowenthal et al., 2009). However, Bates and Poole argue that when instructors say they are using E-learning, this most often refers to the use of technology as classroom aids, although over time, there has been a gradual increase in fully online learning (Bates and Poole, 2003).

Technology enhanced learning (TEL) has the goal to provide socio-technical innovations (also improving efficiency and cost effectiveness) for E-learning practices, regarding individuals and organizations, independent of time, place and pace. The field of TEL therefore applies to the support of any learning activity through technology. The recent trend in the E-Learning sector is screen casting. There are many screen casting tools available but the latest buzz is all about the web based screen casting tools which allow the users to create it directly from their browser

and make the video available online so that the viewers can stream the video directly. The advantage of such tools is that it gives the presenter the ability to show his ideas and flow of thoughts rather than simply explain them, which may be more confusing when delivered via simple text instructions. With the combination of video and audio, the expert can mimic the one on one experience of the classroom and deliver clear, complete instructions. From the learner's point of view this provides the ability to pause and rewind and gives the learner the advantage of moving at their own pace, something a classroom cannot always offer. The E-learning system not only provides learning objectives, but also evaluates the progress of the student and credit can be earned toward higher learning institutions. This reuse is an excellent example of knowledge retention and the cyclical process of knowledge transfer and use of data and records.

In conclusion improving the contents, curricula, methods, structures of courses and improving the teaching were made. During the development the course everyone was thinking about how to make the teaching more effective. Each course has content, clarified objectives, establishes the expectations, lecture summary, quizzes and the new point that will be discussed next lecture. A lecture has been planned to cover less than the entire period. Briefly, we summarize the previous lecture; introduce the topic(s) for the day; present the material; summarize briefly; preview any homework and the next lecture. However it is a more substantial and difficult task to spread this commitment to a majority of teaching staff and to ensure they are able and willing to use appropriate teaching strategies to develop these abilities. Some resistance is to be resistance from faculty members who are not convinced of the need for these changes, or who lack the skills in different forms of teaching. Institutions are beginning to introduce training in teaching and a lot of attention will need to be given in institutions to management of change strategies.

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