

ADVANTAGES OF USING ICT IN ZOOLOGY – POST DISSECTION BAN SCENARIO IN INDIA

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Abstract: Learning zoology will never be the same again. There will be no frog mouse or guinea pig to dissect in the laboratories. All these are being replaced by digital alternatives – ICT such as Prodissector Frog, Biolab Frog and Digi Frog Software. The virtual dissections are available in the form of various packages for under graduate and Post graduate classes as UGC has ordered ban on animal dissections. Digital alternatives are available in plenty on various platforms and market. They can be purchased from commercial sources and Internet. More important is development of multimedia techniques using MIPS and microscopes to build a digital environment in classrooms. Many of these digital learning devices are used as modules for testing in various institutes of India. Dissection monitoring committee of every college is making sure to purchase digital alternatives such as virtual dissections using these audio visual equipments. ICT competence is required in teachers to cope up with the current demands. Among the factors that influence success rate of these ICT in Zoology subject are teacher's attitude, computer efficiency, teaching experience, professional development and educational level. Many factors in school and colleges will influence the use of ICT in the coming scenario like technical support, accessibility and leadership support as lot of pressure is there to use these ICT methods as per UGC notification. New ideas and innovative approach can make the subject more interesting and applied fields have emerged out such as animal simulation sciences, computational Biology, Bioinformatics and Virtual Graphic Bioaids. Therefore ICT is playing a key role in behaving as back bone for the subject of zoology.

Keywords: dissection, digital alternatives, multimedia techniques, ICT, indiscriminate

Introduction

Zoology a subject with immense interest among students is losing the taste because of ban on dissections by the apex body UGC. In exercise of powers conferred by section 12(i) of the UGC Act, 1956, instructions were passed to all zoology/life sciences and allied disciplines of all universities including their constituent and affiliated colleges to stop dissection of all types with immediate effect i.e.; 01 august 2014 notification of UGC. Animal dissection as an aspect of zoology curriculum is in practice for a long time. Further, with increase in number of institutions, more than a million students undergo programs requiring animal dissections. Most of these animals are caught from wildlife. Their indiscriminate removal from their natural habitat disrupts the biodiversity and ecological balance. Thus, use of animal in dissection has come to be a factor compounded with habitat loss, pollution and climate changes responsible for the gradual depletion of animal populations. The pressure of depletion is increasing over some species with regular removal from the ecosystem and therefore the most cited example of frogs came to light with their diminishing populations and in coming time with thought of extinction lead to formulation of stringent laws by the apex body. Some alternatives suggested by UGC and other research institutes for dissections came into light which once again brought the subject in to focus as interest in context is one very important criterion for students. The alternatives include Digital sources, software's and electronic models and charts. Presently UGC had divided the notification in two parts one for colleges with under graduate and post graduate programs and other for research purposes.

Digital alternatives for Colleges

In colleges for teaching subjects pertaining to zoology such as biosystematics, biodiversity, adaptations, developmental biology population dynamics and physiology maximum use of museum specimens and microscopic p[reparation, photographs, video clippings model charts plastinated specimens should be used accompanied by field observations combined with photography and videography so on. Digital alternatives such as Prodissector frog, biolab frog digi frog dissection works etc are available in market as well as on internet. These have modules for testing and evaluation of students can be done easily by using these alternatives. For sure a good budget is required for the purchase of such high end equipment with latest options. The software giants have started investing a lot on these software's as per demand is very high in Indian markets.

Field visits are increased in the curriculum but no animal in the process should be hurt killed or removed from the natural habitat and importance of biodiversity and its conservation should be inculcated in students. A very new concept of skilled laboratories concept should be developed by institutions using electronic, fiber, and plastic models.

Alternatives for Research programs

For Research at PG level students have an option to dissect 'selected species' as per the curriculum or to have a project related to biodiversity/biosystematics. The PG student can use computer simulation and relative software for learning purpose. ICT learning tools such as FROGURTS Virtual, CAMCOR Virtual and other software's can give good results. The knowledge gained by these methods is much more as they can be used again and again accessibility is easy no time boundation.

Phased manner dissections can be done for some species but that too uses ICT as major tools such as MIPS which can be used by the expert while performing dissections. The whole dissections are recorded in camcorders with theory and can be watched on multimedia projector by infinite people sitting in various parts of world, these tools can save the animals as only very few will be used for demonstration instead of their enormous killings.

Digital alternatives for Dissections- At a Glance

(i). Frogurts Virtual Dissection Software: Frogurts Inc is a Bio-eLearning company focused on creating the most engaging virtual dissection, general science, life science, and lab software are available. The software modules and labs for undergraduate and post graduate students with immersive experiences into the world of science around all of us.

Frogurts uses audio narration, captioned text, immersive environments, and interactivity to deliver key concepts within the theory and foundations of Science. Each topic is presented in an approach that integrates inquiry as well as National Science and Technology Standards. Students are assessed with randomized quizzes or tests, and are given a printable certificate when they complete each module.

(ii). Camcor Virtual interactive dissection software: Science Works virtual dissection programs are developed by a team of educators to help students learn the intricacies of anatomy. Designed by and for teachers, these outstanding interactive virtual dissection software programs are geared for Undergraduate programs. Available in six different interactive dissection packages, teachers can purchase specific dissection software on the frog, fetal pig, earthworm, crayfish, perch or cat. These virtual dissection programs provide students with state-of-the-art interactive dissection tools including a scalpel, magnifying glass and scissors. All interactive dissection software features QuickTime virtual movies, schematics, interactive tests, call-out labels and an in-depth glossary of terms. Dissection software gives students access to a virtual dissection lab, without the fuss or smell of the real thing. Developed by Science Works, Inc., these virtual tools provide detailed schematics of the major body systems, accurate interactive information on organ functions and structure and review questions.

(iii). The Digital Frog 2.5: It engages students with an interactive, virtual dissection, allowing the student to learn each of the cuts necessary by "cutting" with a digital scalpel before watching the full screen video. The program also makes learning anatomy an enjoyable experience, by allowing students to have fun and learn through exploration and discovery. Animations and interactions allow students to see how the frog's body works—from blood pumping through the heart, to joints that can be built up and moved by the user. The Digital Frog 2.5 is so much more effective than a wet lab because the interactive dissection is seamlessly linked to a comprehensive anatomy and physiology section, with human anatomy comparisons. A fascinating ecology section reminds students that biology is the study of living organisms. With context-sensitive definitions on every word and spoken pronunciations on significant words, students have all the information they need with just a mouse.

The Dissection unlike a real dissection, mistakes are easily corrected. The Anatomy module, with its animation, movies, photographs and in-depth text, seamlessly links from the dissection, providing a close-at-hand research as students work through the dissection. Comparisons to human anatomy are only a click away. The Ecology section rounds out the educational experience by giving students insight into species diversity, frog calls, behavior and the life cycle.

Expert Opinion on Dissection Ban

The Expert Committee was formed in January 2010 by the Ministry of Human Resource Development and the UGC, and it was tasked with determining whether dissection should be discontinued in zoology and life-science courses in Indian universities and colleges. The committee was chaired by Professor H A Ranganath, director of the National Assessment and Accreditation Council. Eminent academics Professor B K Sharma, Professor Reena Mathur and Professor K K Sharma played a pivotal role in turning the decision in favour of animal welfare.

“The committee’s recommendation is a compassionate first step”, says PETA India campaigner Dr Anuradha Srivastava. “However, a teaching system that relies on animal models is so destructive to animals, the environment, and students that we encourage the UGC to call for a complete and immediate ban on animal dissection and experimentation in our nation’s colleges at all levels.” As many as 19 million frogs, mice, cockroaches, guinea pigs, rats and rabbits, hitherto butchered in zoology and life science laboratories in India every year, will henceforth be saved from the slaughter. Thanks to the wisdom and concern shown at last by the University Grants Commission (UGC), the apex regulatory body for higher education in India, Buckled under pressure from environmental activists. The UGC has come out with guidelines that progressively prohibit dissection of these poor animals for experimentation. On the other hand, the UGC encourages introduction of digital technologies in all such educational institutions to teach animal anatomy and physiology, reiterating its commitment to preserve and protect wildlife and environment. For both UG and PG programs, there shall be reduction in the number of animals for dissection and experimentation as well as in the number of species with all ethical considerations. Preference shall be given to laboratory bred animal models, the guidelines say.

One of the recommendations limits and specifies the animal use in dissections. The experimental animal, to the best extent possible, should be procured from laboratory bred sources, especially breeders approved by Committee for Purpose of Care and Supervision of Experimental Animals (CPCSEA), Department of Environment and Forests. Their use will be under the purview of Institutional Animal Ethics Committee (IAEC), Removal of animals from their natural habitats should be best avoided. “UG students can adopt ‘only one species’ for ‘demonstration only’ by the faculty and ‘students should not do any dissection’. In lieu of this, Curriculum must be developed to encourage students to take up field work,” one of the recommendations says.

Factors influencing use of ICT in teaching and learning of zoology

There are lots of things which are to be kept in mind when we are moving from teaching a subject from traditional method to a latest trendy and sophisticated one. As only zoology or life science knowledge is not enough, we require skillful operation of computers and other equipments such as visulizers and multimedia projection systems with electronic and digital microscopes. It’s high time to learn these software’s and techniques for teachers and students to reap the benefit at its maximum. These are indeed easy ones as can be tried again and again without damage of materials or wastage. Earlier a slide was seen by a single student at one time but by ICT use the whole class can see it at a single click. Attitude towards computer education is must constructive efforts and motivation can do wonders in teaching learning of the subject. The college culture support from administration government pressure can lead to excellent implementation of ICT in Zoology.

Teacher and student attitude towards ICT

A positive attitude of both teacher and student is must for the successful integration of ICT. The belief in technology and the way to present the educational material is a must. If a teacher is positive it is sure he can built levels of trust in the heart and mind of students. The teacher must emphasize on the ICT methods in classrooms as it sparks the mind of students to rely on better technology, if it is available it should be used to the fullest. If a teacher has knowledge about the use of various equipments such as Camcorders and digital microscopes automatic sequencers computer linked software’s he can do wonders in the class by daily using innovative learning techniques. Models should be available in classrooms or lecture rooms with fully functional smart board and multimedia. The student’s innovative and creative mind such is used in making this successful by involving the children in activities relating to ICT and zoology.

Competence in use of ICT by Zoology Learners

To handle science and latest changing technology is one of the most difficult tasks nowadays as latest software’s are coming and to cope with them is a big challenge. Workshops are conducted all over India by HRD and DST Govt. of India in making teachers fully equipped with the changing techniques and methods. Science projects are made by teachers involving students which have played a good role in productive teaching. Moreover a teacher with good competence and proficiency in computers will be confident in using ICT in the subject basically competence depends on confidence of teacher. A good teacher is having an inherit capacity to learn but an accidental teacher can ruin the things who lacks knowledge and skills. A confident teacher can make his students confident in learning the subject in a new and latest way which is required in future to come in every student.

Gender Difference towards subject

The subject concerned i.e.; zoology has a marked difference in learning by boys and girls. When concerning students prior to dissection ban, boys were good learners and the art of dissection was good in males and female students remained on the back foot where dissections were concerned but in theoretical studies the girls outshined the boys, but practical aspect of girls was limited because of several factors. When it comes to teachers it is found that male

teachers use ICT much more better than Female teachers as males are more skillful and show interest in latest methods of learning the knowledge and thrust to cope with technology is found more in males because females sometimes fall short of access to latest and skilled software techniques because of various other jobs and less exposure to technology.

Experience

Experience always keep the flag of knowledge high but teachers who are in their fifties are using less ICT techniques or They adopt chalk and talk method which is not at all generating interest in subject of zoology the reason for applied sciences are flourishing is use of sophisticated instruments and interests in ICT related programs. The teachers now are acquiring High end techniques in zoology subject as it is time to use software's in the traditional subject and students like change in teaching methods or it becomes monotonous. The whole ideology of the subject changes when we introduce latest technique show latest technique and work with the latest with less time and more productive easy to capture in mind then we can be successful teachers in delivering the knowledge.

Education levels

Basic qualification for teaching a subject is different from class to class specialization in subjects and further elaborative qualification is also available. The most desired one is to teach by ICT and to make learning and teaching easy and understand the small concepts. This technology learning can make world a small place as one can access the subject knowledge any time any where any place which was not possible earlier. The software for dissections can be loaded by teachers in to student's desktops, laptops or mobiles or user passwords can be built at college website for practice. All this requires high knowledge of ICT and subject concerned.

Driving Forces in Implementation of ICT in the subject

Students access to technology at colleges and at home have increased astronomically over the last few years. A host of government initiatives in many countries has helped to dramatically increase the prominence of ICT. These initiatives have included extensive training schemes for all new and existing teachers in using ICT in subject teaching and learning. According to policy makers worldwide, such initiatives should lead to significant technological and pedagogic change within subject teaching, but surprisingly, then, appropriate and effective classroom use of ICT is found to be rare. In practice, established curriculum and teaching methods remain in place under a thin coating of technological glitter, and available technology is often underused and poorly integrated into classroom practice. In sum, there is a government drive towards provision of opportunities and expertise for using ICT in all colleges, yet significant weaknesses are reported in policy and practice. The present subject curricula, assessment frameworks, and policies concerning ICT use seem to simultaneously encourage and constrain teachers in using technology in the classroom. A further hindrance is that increasing investment in technology infrastructures has not been matched by investment of time and resources to develop new ways of learning and teaching. Teacher's openness to change and recognition of the transformative potential of using technology is required. Classroom change will not arise through simply providing more machines, software and functionality, and demonstrating that using ICT is effective

Accessibility

There is a need of quality education which can be done by enabling access to ICT. This gateway is must to explore the hidden in education and is a successful method to answer the curious mind of students. We can channelize their energies by giving an access to ICT at school and college levels. Once expertise is created it will be time saving and useful for Indian students.

Technical Support

Department of Information Technology (DIT) since its inception is focused on promotion of research & development efforts in Information & Communications Technology (ICT) and its related fields in the country. Accordingly DIT provides financial support as grant-in-aid to academic and R&D organizations for projects/schemes for undertaking research/development as also to organization/professional bodies for arranging Conference/Workshop/Seminar/Symposia in the areas of Information and Communications Technology (ICT) and its allied areas as well as their application in various socio-economic and business sectors. A large number of academic institutions, industries and research labs with geographical distribution spread all over the country are beneficiaries of Grants-in-aid support of DIT for organizing Workshops/Conferences/Seminars etc in the emerging areas of ICT.

Leadership support

Integrating Information and Communication Technologies (ICTs) in education is highly challenging, especially in the higher education sector. While there are several factors for successful integration of ICTs in teaching and learning, strong leadership support and institutional commitment play significant role. Leadership in education has been

regarded as a critical component in successful ICT integration in education. While distributed leadership and shared responsibility are necessary to sustain any innovation and implementation of technology plan in higher education, the vision of leadership with reference to ICTs become important in taking initiatives, and develop action plan for implementation. A successful ICT leader in education should be able to lead from the front to not only give vision, but also manage change and influence major stakeholders to buy-in.

Government policies ICT literacy

Government's vision on ICT Policy in School and college Education aims at preparing youth to participate creatively in the establishment, sustenance and growth of a knowledge society leading to all round socioeconomic development of the nation and global competitiveness. The Mission is to devise, catalyze, support and sustain ICT and ICT enabled activities and processes in order to improve access, quality and efficiency in the education system.

Objectives to achieve desired goal

Goals to achieve the above, through ICT Policy in Education will Endeavour to:

1. Create an environment to develop a community knowledgeable about ICT
2. An ICT literate community which can deploy, utilize, benefit from ICT and contribute to nation building
3. An environment of collaboration, cooperation and sharing, conducive to the creation of a demand for optimal utilization of and optimum returns on the potentials of ICT in education Promote
4. Universal, equitable, open and free access to a state of the art ICT and ICT enabled tools and resources to all students and teachers
5. Development of local and localized quality content and to enable students and teachers to partner in the development and critical use of shared digital resources
6. Development of professional networks of teachers, resource persons and schools to catalyze and support resource sharing, up gradation, and continuing education of teachers; guidance, counseling and academic support to students; and resource sharing, management and networking of school managers and administrators, resulting in improved efficiencies in the schooling process
7. Research, evaluation and experimentation in ICT tools and ICT enabled practices in order to inform, guide and utilize the potentials of ICT in school education
8. A critical understanding of ICT, its benefits, dangers and limitations Motivate and enable
9. Wider participation of all sections of society in strengthening the school education process through appropriate utilization of ICT.

Conclusions and Discussion

ICT in biology teaching is really useful interesting in the future development of the subject some reasons which have restricted the use are: a) fear of using ICT; b) teachers do not know to use ICT; c) schools and college are poorly equipped with ICT; d) only informatics lessons are taught during the ICT classes e) animals were available for dissections and no ban on their dissection or use as experimental animal. ICT are accessible at schools and the teachers use them only by adoption of a classical learning method. Therefore, the students' interest in natural sciences is decreasing. The lack of skills using ICT is one of the reasons why the teachers do not use ICT in teaching biology. They do not use the educational discs of biology while learning this subject, because they do not know how to install a certain program and how to use it. Another reason of poor using ICT is old-fashioned relationships among the teachers in Colleges. ICT are something new for teachers over 50 and older. Modern technique is hardly understandable for the older teachers.

Recommendations

For improving the usage of ICT, information about how to apply personal computers, digital projectors, camcorders, digital cameras etc. is necessary for teachers. To fulfill the purpose, different courses need to be organized. Moreover, all schools should be equipped with software and hardware including educational discs of biology, establishing ICT rooms for biology teaching etc...

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