



Virtual Frog Dissection: As a Computer Application

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Abstract — A virtual biology lab is an alternative of actual biology lab. Many experiments are performed in a biology lab. Dissection is one of the experiments performed in a biology lab. As we know that Dissection is the procedure by which internal organs of an organism are studied. In our work, 3D Virtual dissection software of frog has been developed for the biology students with the use of action script language. Action script has a java like syntax & is easier for creating visually engaging animations and interactive projects. Our main objectives are to make the software more realistic and more interactive. With the use of 3D frog dissection images, dissection has been made more realistic and with the help of virtual dissection tools it has been made more interactive. Different type of animation techniques have been embedded in the virtual learning environment. We have taken feedback of students and result has been evaluated. Evaluation data indicates an overall positive response by students and teachers towards “Virtual Frog Dissection” software.

Keywords — Virtual laboratory; computer simulation; biology teaching; virtual reality.

I. INTRODUCTION

A virtual biology lab is a computer simulation of actual physical lab. The Virtual Laboratories improve learning experiences by providing the student with a supplement to the physical lab.[1] Innovations in multimedia and computer related technology offer thrilling opportunities to improve the quality of teaching and learning science for students.[3] Colleges and universities across the world are in front of a generation of students, flocking to learn more about lifesciences. The faculty challenge is to encourage and motivate these students so that each performs to his/her fullest potential.

A. Virtual Laboratories applications in biology teaching:

There are lots of experiments which are performed under the biology lab. Dissection is one of the experiments performed in biology lab. Dissection is the process by which internal structure (anatomy) of an organism is studied. Dissection is an important part of biology lab because it offers hand on experience for students that take part in it. It promotes basics of the field of biology and the basic fact is that students are allowed to sight the inside of an organism.[6] Looking inside an organism is a big part of the learning of life because it gives a visual example of how things work inside the life form.[7] Dissection mainly consists of incision and exploring sections. Incision section includes inserting the pin into an organism, making cuts into the skin of an organism using scalpel, separating out skin of an organism using forceps. Exploring section includes exploring out the organs of an

organism and learning details of each organ of an organism. Virtual dissection is the part of the virtual biology lab.

B. Virtual dissection:

Virtual dissection is done on a computer, either online or through a computer program i.e. it is the computer simulation of actual dissection. [5] Through this dissection technique, we can prevent the extinction of animals, example-frog, Rat etc. we can carry out this dissection from anywhere and at any time. [2] The cost of experiment is insignificant and correctness can be checked after the test that how accurately the test has been performed. This test also gives pre idea about the real test and help us to understand the overall technique.

C. Reasons of Virtual Dissection:

Virtual Dissection is suitable, easy to access, can be repeated anytime and anywhere we want. It results in no untidiness and no broken parts. It is simpler, cost saving & mistakes are not costly. [4] It is safer, more interactive and less lengthy. People can use it from any place of the world. One can able to go back and learn any step of the dissection.

II. METHOD

A. Goal

- To develop more realistic dissection software. To make the dissection more interactive by the use of virtual cutting tools.
- To achieve both of the above objectives, animation techniques have been used for the incision section

using 3-d frog dissection images and virtual cutting tools.

B. Hardware and Software Requirements

- Adobe Flash Professional Cs4:
- Flash Professional CS4 is a 32-bit application which can be installed on computers with either 32-bit or 64-bit operating systems.
- Intel Pentium® 4 or AMD Athlon® 64 processor. Microsoft®.
- Windows® XP with Service Pack 2 (Service Pack 3 recommended) or Windows Vista® Home Premium, Business, Ultimate, or Enterprise with Service Pack 1; certified for 32-bit Windows XP and Windows Vista; or Windows 7.
- 1GB of RAM (2GB recommended).
- 3.5GB of available hard-disk space for installation; additional free space required during installation (cannot install on flash-based storage devices).

C. Operational Step

- Open a new project file.
- Set the dimensions & frame rate of project.
- Import 3-d images into library.
- Convert 3-d images into the appropriate symbols.
- Drag and drop the 3-d images onto the stage.
- Draw shapes and objects on the stage with the help of tool panel.
- Convert the shapes and objects into the appropriate symbols.
- Start doing animation using frames and key frames.
- Add interaction capabilities using action script language. E.g. drag and drop interaction etc.
- Export the project file.

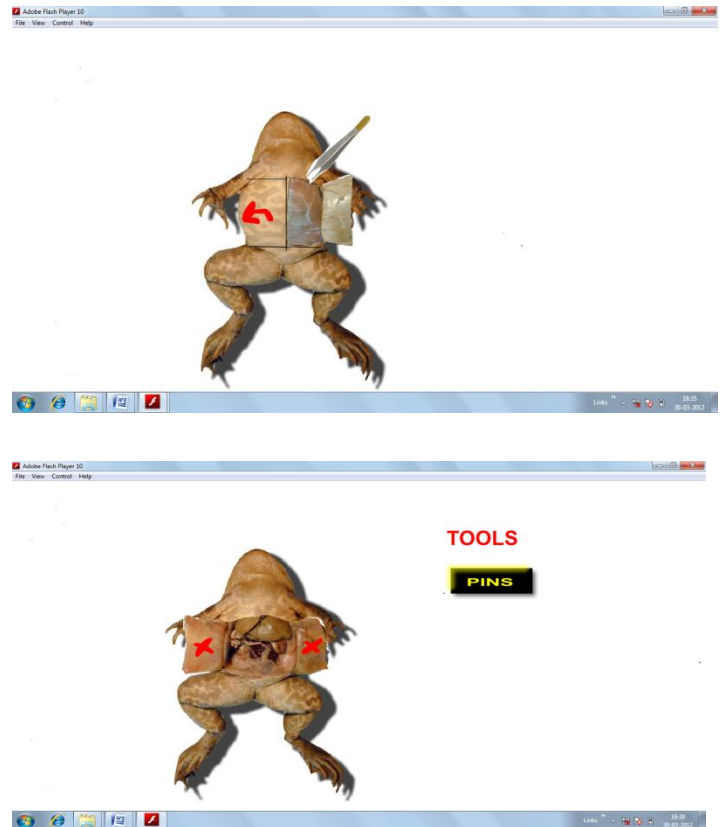
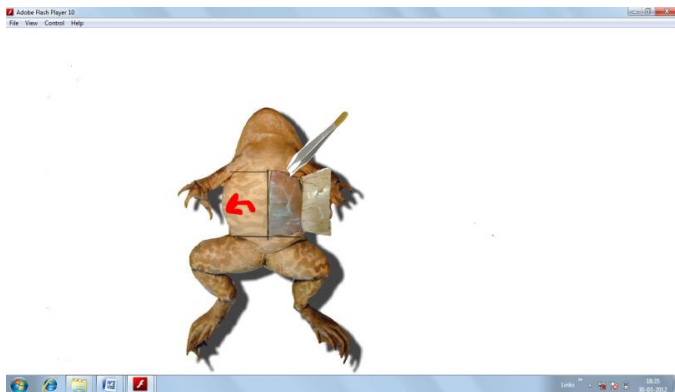


Fig.1,2,3 Few steps of virtual frog dissection

III RESULT & DISCUSSION

The study have been done on the students of different schools in Bilaspur ,C.G.,India & it has been found that 88% student were satisfied by the operation of the software and rest 11% feel that they want some more implementation on the software.

They all have been asked to carry out experiments on virtual lab and give their views about the software.

Few excerpts which are said by the school students are as follows:-

- “This software is really helpful and it would be great if it can be used in our school”.
- “This Software can be the new replacement of the real dissection”.
- “After banning dissection, this software can help us to know dissection”.
- “Virtual dissection is comfortable, easy to access, Can be repeated any time and any where we want”.
- “It results in no untidiness “.
- “It is simpler, cost saving and mistakes are not costly”.
- “It results in no broken parts”.

The analysis of the questions has been done among students. In this analysis more than 100 students of different schools had participated. This analysis is carried out on students of different classes – 9th, 10th, 11th & 12th.

| S.no | Questions Asked To The Students. | Strongly Agree | Agree | Can't Say | Not Agree |
|------|--|----------------|-------|-----------|-----------|
| 1 | Is the project implemented in future? | 70% | 15% | 10% | 5% |
| 2 | Is the real dissection should be opposed? | 40% | 44% | 8% | 8% |
| 3 | Is the virtual dissection best alternative of real dissection? | 60% | 30% | 4% | 6% |
| 4 | Steps in the software is easy to understand | 45% | 40% | 5% | 10% |
| 5 | The virtual dissection is trouble-free & clear. | 40% | 25% | 20% | 15% |
| 6 | The virtual dissection is quicker & better. | 70% | 20% | 2% | 8% |
| 7 | The procedure of dissection is in proper sequences. | 40% | 30% | 20% | 10% |
| 8 | Are the tools helpful to operate? | 45% | 33% | 17% | 5% |
| 9 | Does it help to achieve complete knowledge of dissection? | 59% | 20% | 11% | 10% |
| 10 | Does the software need change? | 43% | 17% | 10% | 30% |



Figure-4 Students using virtual biology lab

III. CONCLUSION

Virtual frog dissection can be used as a computer Application. Its useful to guide students i.e. they can understand about the actual dissection process. Dissection has been made more realistic using 3-D frog dissection images. Dissection has been made more interactive using virtual cutting tools. Virtual Dissection needs only preliminary setup in schools, and once installed, students can take help of this software without any hassles. This Lab allows us to perform the software from anyplace i.e. it provides independence to the students. They can do the experiment at home and repeat it a number of times. It gets easy to understand the process derive skills & to be perfect in the dissection via this software.

IV. FUTURE WORK

There are a huge number of areas that could be investigated for future work in the whole project. In the near future some more new features can be added to the software, these are as follows:

- To do animation for exploring out the organs of frog: the internal organs of the organism can be explored and the descriptions of each organ can be provided using text and audio.
- To embed multimedia (i.e. audio and text): text and audio can be provided for instructing, how to carry out the whole procedure of dissection.
- Haptic devices can be used for the touch sensation.
- It can be embedded in a mobile.

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