

Interactive Chemistry Textbook Supplements: A Brief Comparative Report

Introduction

At one point in the history of computing, batch computing was considered to be the mode of the day. Computer input was controlled by punch cards and basic Qwerty-type keyboards. Interactivity or user control of a program was a far future consideration. The 1980's witnessed the introduction of the mouse to the public as an easy-to-use input device. Some may remember the Apple Macintosh as "The Computer For The Rest of Us." I believe that the introduction of the mouse to the masses has led to increased interactivity in the realm of computer programs. The world of education has also adopted the idea of interactivity and many digital products are being produced and outed as interactive programs for educational use.

Today, when we use the phrase interactive program, we are referring to a program in which the user has some control of the navigation. A key word is 'some' since the definition of interactivity is rather subjective. According to Robin Williams and Steve Cummings (1993) the characteristic "back-and-forth dialogue" found in many interactive digital products is the spirit of interactivity. Although a definition for interactivity can be committed to paper, personal and publisher definitions and view points of interactivity are rather subjective and open for discussion, debate and review. I believe that interactivity goes beyond mouse clicking for simple back and forth control of the navigation of a program, but interactivity allows for multiple means of navigation and decision making possibilities. Interactivity is not a page turner, but a means of taking one dimensional curriculum that is static and turning it into a dynamic multidimensional means of teaching. The purpose of this brief study, is to review and analyze the level of interactivity of several chemistry textbook supplements (demo versions) based on the authors views of interactivity.

Significance of the Topic

During the 2001-2002 school year, science teachers in the state of Texas have the daunting task of selecting textbooks which will be in use for as many as ten years. Beginning in early September science teachers across the state have been receiving weekly boxes packed with slick new science curriculum packages all claiming to be the best and the answer to all teaching concerns and problems.

In the 1989 FIPSE lectures (Moore, 1989), John W. Moore of the University of Wisconsin at Madison called for a change in the teaching of chemistry. He specifically called for a change towards active learning. J.J. Lagowski of the University of Texas at Austin also believes that our present educational system is passive rather than interactive. The interactivity will be the key for change and improvement in the field of chemical education. However, we as a teaching community need to establish guidelines and parameters for interactivity. Moore believes that for the effective learning of chemistry, a technological toolbox must be developed. This technological toolbox would ideally include interactive and multimedia computer programs.

As I face the overwhelming task of selecting of a chemistry textbook, a physics textbook and an Advanced Placement physics textbook, it is critical that I examine each package carefully especially the computer software.

Discussion of Findings

The demonstration computer programs from four textbooks were examined as part of this brief study. All CD-ROM programs were supplied by the publishers as part of their market and advertising packages mailed out for textbook selection. It is important to note that the CD-ROMS were demonstrations and not full versions of the media.

The ChemASAP package by Prentice Hall was provided with the Addison-Wesley Chemistry Textbook. This package contained for interactive elements. Animation in which the concepts and processes were explain with the use of animated instructional aids, video clips which included sound were excellent although not present for all chapters. Since this is only a demonstration version, it is my hope that the final product will be fuller. The presentation of the information was excellent and on target, although the only interactive control was the standard VRC controls: forward, reverse and stop. None the less, I would highly recommend these as part of a chemistry curriculum package which would include instructor discussions of the digital supplements. These are touted as supplements, not replacements for the typical instructional materials. The simulations feature of this package was by far the best of all those examined. The simulations allowed students to manipulate variables, observe results and make conclusions. Students has true control over these simulated experiments. For this feature alone, I will pick this textbook for use. The final two elements, problem solving and assessment, were interactive purely by mouse clicking navigation. The four elements are integrated into a wonderful package which also

included a calculator, interactive periodic table, a glossary, web-links and an interactive concept mapping tool.

The W.H. Freeman Company publishes the Chemistry in the Community textbook which is a cooperative project with the American Chemical Society. This CD-ROM reports to be the interactive element in their curriculum package, however as exploring the features, I have discovered that it is merely a tool for adding still figures and images as well as short video clips to a standard lecture. There is no interactivity for the student. The only control is the standard forward, reverse and stop. The images and video clips were excellent and I will use them, but according to the of definition of interactivity, the CD-ROM fails.

The W.H. Freeman Company also publishes Chemistry: Molecules, Matter and Change which supplies an Instructors Resource CD-ROM. As with the ChemCom CD-ROM, although it is supplied as the interactive feature of their curriculum package, it is geared towards the instructor and his development of lectures. Textbook illustrations and video clips are provided. As before, the level of interactivity is minimal with the standard VRC controls of play, reverse and stop. The illustrations and video clips, which included audio, were excellent and I predict that they would be enjoyed by students and of use for teachers who use multimedia in their teaching strategies. I also believe that these lecture elements would increase student learning and understanding, although they are not interactive for the students nor the teachers.

Glencoe's Chemistry: Matter and Change provides both an interactive student edition and an instructor's interactive edition. Both versions include a complete textbook as well as links to on-line activities and resources. The packaging for the CD-ROM features the work 'interactive' for both the student and teacher editions. However, upon review of both, I found them to be simple page turners. It appears that the textbook was merely placed onto the CD-ROM and page turner buttons added. The navigation didn't allow for decision making or multiple means of navigation. This CD-ROM program package was a true disappointment.

Summary

Textbook adoption years are exciting. There is a thrill in receiving boxes filled with new, colorful textbooks which will replace the 10 year old tattered ones currently in use. As I have reviewed the many publisher samples which have been sent so far, I have discovered that the textbook and other printed ancillaries are similar and will not

influence my textbook adoption decision. For me personally, the deciding factor will be the digital ancillaries. Many of the ideas and topics in chemistry are abstract and difficult for students to visualize. Many of the ideas presented include items which are too small to see and one-dimensional chalk-board presentations do not help many of the students gain mastery of the subject. Textbook publishers heavily advertise and promote their digital ancillaries claiming that these interactive CD-ROMS are the interactive answer to student difficulties with the subject of chemistry. I would claim that a buzz phrase for this round of science textbook adoptions is 'interactive CD-ROMs'. Unfortunately the definition of interactive is not clear and seems to vary from publisher to publisher. My suggestion and hope is that publishers not define interactive as simple page turning or the simple translation of printed curriculum materials to flat, one-dimensional digital versions of the same material.

John Moore in his FIPSE lectures (Moore, 1989) challenged the community of chemistry educators to change the way in which chemistry is taught. I do not believe that he meant electronic textbooks which are mere page turners. His challenge was to change the way in which chemistry is taught. I understand this challenge as one in which new materials and new media would be used to their fullest and most exciting extent. I believe that the publishers of science textbooks, review the literature on science education and improve their digital offerings. I believe that their digital offerings need to include laboratory simulations in which students make decisions, see that results of their decisions and can, in a simulated environment, experiment. Secondary science education is a critical point at which we either lose students due to disinterest or frustration with the topic of science, or we capture their interest and help to increase the number of scientists. I also suggest that as my fellow science teachers examine and adopt science textbooks, they carefully examine all pieces of literature and sample products that they receive. Do not just go for the pretty slick pictures, but carefully and thoughtfully examine the digital ancillaries and make decisions for the good of their students, not the convenience of the instructor.

References

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Related Web-Sites

<http://www.whfreeman.com/chemistry>

<http://www.whfreeman.com/chemcom>

<http://www.cyber-ed.com>

<http://www.phschool.com>

<http://www.tx.science.glencoe.com>

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