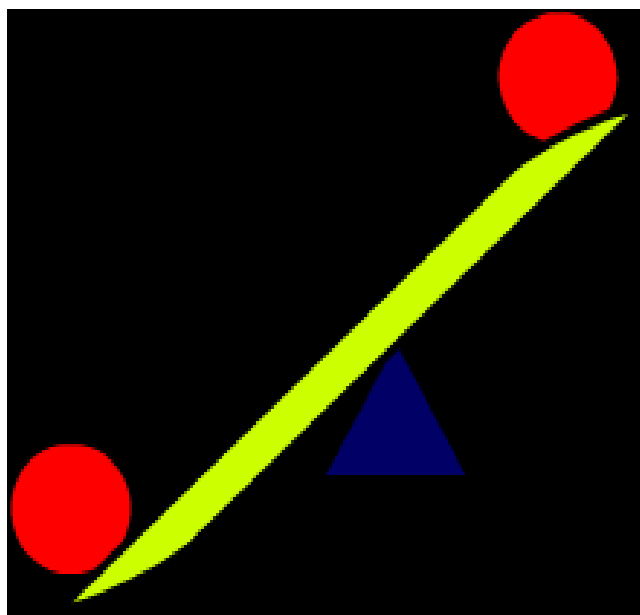


studied before finalising its use. For some a very slow frame rate like 6 was considered appropriate whilst for others a rapid frame rate like 24 was good for creating the desired effect .So timing is the essence of animation . Animation has the following advantages :

- a) Demonstrate continuity in transitions
- b) Show dimensionality in transitions
- c) Show change over time
- d) Enrich graphical presentations
- e) Visualization of three dimensional structures
- f) Attract attention of the user

Here the author(designer and developer) created animations to demonstrate concepts as well as for problem solving .

Fig.8. Example of an animation



2.12 Timing

Allowing the user to control when changes to the screen display take place, and at what speed, makes a programme more flexible for use with a wide range of learners of different abilities.

2.13 Audio

Audio definitely succeeds in attracting the attention of the audience. Audio can be used to gain attention, give feedback, give directions, personalize computers, make annotations, provide multilingual support, teach how to pronounce words, provide meaning for images or image collections, and accommodate weak readers. In case the meaning is unclear to a learner using visual information only, the audio may clarify it. A sense of realism may also be experienced due to audio. It can be used to direct attention to important points .So a learner may be prompted to look at a certain portion of the screen .However sound effects should be used judiciously as they may distract the learner from the main message. Also continuous presence of sound may cause the learner to ignore the audio . Producing good quality audio can be difficult, moreover like other media most commercial audio, particularly music, is copyright. The learners should have access to appropriate hardware and software . Careful use of audio can greatly increase the ease of use, effectiveness and appeal of many applications. Thompson, Simonson, and Hargrave in Educational Technology, A Review of the Research (AECT) reviewed studies conducted on the effectiveness of audio media on learning when accompanied by other forms of media. Gordon (1998) researched the relevance of learner characteristics and learning styles when planning law school courses. He identified four major learning modalities, kinesthetic, tactual, auditory, and visual. Kinesthetic learners and auditory learners seemed to benefit the most by the integration of audio media into teaching strategies.[23]

2.14 Programming Phase

After the screenlayout is ready the next phase is to get the CAI package running on the .This may be done by the instructional designer or a team of programmers may be assigned the work . This was the phase in which all the pieces of text, graphics, animations, sound and video were integrated to prepare the multimedia .These are the tools that are designed to minimize the actual amount of programming expertise required by a teacher in the

creating of educational software. Two main groups of such authoring tools exist:

- i) authoring languages (AL)
- ii) authoring systems (AS)

Authoring languages can be regarded as a family of specialized higher order application languages, facilitating the production of software. Authoring systems are software packages that guided the researcher through the process eliminating the need to know to programme .

Conclusions

At the undergraduate level Mathematics is usually taught in the traditional way. Today the use of computers in education is widespread and is a fact that we cannot escape from, however it is pertinent to mention here that while technology can be a huge factor in motivating the students and facilitating learning; if not utilized properly they may lead students to an error .

It is expected that engineering education will evolve to make greater use of information and communications technologies, as tools that can help improve teaching and learning.[18]

The author(designer and developer) has experienced that the development of Multimedia package is a sequential programme which needs deep concentration and consistency to give a proper shape to the product. Understanding the needs of the target audience and implementing this need the CAI is a challenging task .The design and development of this particular package has been described here.

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