CHAPTER 5

RECOMMENDATIONS, CONCLUSION AND IMPLICATIONS FOR FURTHER RESEARCH

5.1 Recommendations

This chapter discusses the major findings of the study. It also includes the pedagogical implications, conclusion and implications for further research.

The findings of this study have shown that this prototype multimedia courseware possesses many positive features. Nevertheless, there are certain areas of weaknesses in the instructional and technical design, and the operation. It is the researcher's contention that a model quality courseware could be developed if modifications and improvements are made based on these weaknesses.

With reference to the design of the introduction and closure of each activity, the learners agreed that there was a proper introduction and closure. Nevertheless, the researcher admits that the activities do not cater for accidental termination. When this occurs, the learners were not able to continue the disrupted activity from where they had terminated. As an example, if the learners' click the icon to exit accidentally, they will be
led to screen 36. Here they are given the option to either exit or continue. If they select to continue, they will not be led to the screen where their lesson was disrupted. Instead, they will be led to the opening screen and from thereon will have to continue the lesson. The learners found this very frustrating and suggested that cancellation of the command be made readily available. This finding is in contrast with Tham (1995) whose finding indicates that the lessons catered for accidental termination and this enabled his students to continue the disrupted lesson.

The researcher shares Hazen’s (1985) suggestion that learners should be able to exit via a command as opposed to turning the machine off. It is therefore, necessary both to allow the learner to exit at any point and to provide information on how to exit. Ideally, learners should be allowed to reenter where they left off. Hence, an effective and systematic courseware should provide for accidental termination.

With reference to structure of the lesson (Figure 6), it should be admitted that the design caters for a systematic execution of the activities. Nevertheless, a particular weakness as observed by the researcher is that, learners having completed the task on screen 9 and closed the document window, will be immediately led to screen 5. This caused some frustrations, delay and undue problems to the learners because they will now have to get to the activity menu and then progress further. The researcher feels that having completed screen 9, they should be led to
screen 6 where they would select option *Guided* and continue with the activities. This would save a lot of time and cause less confusion and frustration among the learners. The learners noted that they could not get access to specific screens directly but instead, had to click to the beginning of the lesson. This is not only inconvenient but also demotivating and time consuming. With regards to direct access to specific paths of lesson, for instance, to MsWord (Microsoft Word), the learners found that they did not know how to execute the path to MsWord because the instructions lack clarity. Hence, they could not proceed to the next screen. This problem is evident at screen 8. As long as the path is not executed the learners would not be able to complete similar tasks as found on screens 31 to 35. However, with apt computer users this might not pose a problem. If the learners could execute the Microsoft Word path at screen 8, then the subsequent paths for screens 31 to 35 would automatically be identified by the programme. Therefore, to cater for the less able computer users it is crucial to display clear and concise instructions on the screens. Nonetheless, the researcher guided them in executing the path. The researcher admits that the path could also be specified before the learners began the lesson. Hence, to allow learners get access to MsWord with ease, the researcher suggests that provision should be made for accessing. This would not only help save
time but also motivate the learners to proceed faster with greater confidence.

Based on the comments presented by the learners, the researcher agrees that this prototype courseware should have a User's Manual. The explanation in the manual should be clear, complete and concise. In addition, the user’s manual should be well-organised and adopt a step by step approach (Cohen, 1983). Furthermore, pictures and diagrams should be included to enable the learners to visualise the explanations better. The researcher further recommends that the user’s manual should be computer friendly because this would alleviate fears and resistance.

The researcher firmly believes that learners should be led from the simpler to the more difficult tasks as indicated in Bloom's Taxonomy (cited in Seels, 1990). The learners especially average and below average agreed that they had difficulty in attempting the activities on screen 6 compared to those on screens 13 and 19 (Figure 6). Hence, the sequencing of activities from simpler to more difficult tasks should be as follows: Screen 13, 19, 21, 6 and finally 30. This would not only build confidence in the learners, they would be motivated to continue working on the activities.

This suggestion is also supported by Kumar (1995) who claims that tasks should be arranged in sequence appropriate to the comprehension ability of the learners. This opinion is further reinforced in a study.
conducted by Reigeluth (1983) and Scandura (1987) as cited in Kumar (1983). They propose that a learning task should be arranged in a continuum of general to detail, simple to complex and abstract to concrete.

Another recommendation would be to incorporate additional activities and examples in the lesson. This would provide sufficient opportunities for learners to either attempt these activities or merely read the examples. The researcher suggests that these activities should be varied in order to sustain learners' attention. Among the aspects in the learning activities that could contribute to effective learning are the teaching methods, audio-visuals, styles of work, levels of interaction, infusion of humour and others.

The findings of this study indicated that the degree of personalisation is insufficient. Although, there was a certain amount of personalisation in the lesson presentation, the researcher admits that the lesson should address the learners, at least occasionally, by their first name. In addition, there is a need to use more direct speech and active vocabulary throughout the lesson. This suggestion is also shared by Cohen (1983) who asserts that there is a need to attribute a personality to the machine and programme. The use of learners' names or personal pronouns like 'I', 'We' or 'You' would help communicate with the user in a more friendly and warm manner.

The researcher further recommends the following:-
i) all the tables and figures should have the same colour.

ii) the number of colours used per screen should be limited to four and

iii) all the background depicting nature should take a lighter shade of green.

Cohen (1983) suggests that performance is sharpened with critical information about responses. As a result, correct behaviour will be repeated and refined, while errors can be eliminated. In this context, the researcher recommends that the learners should be informed about their performance by providing a score at the end of the lesson or after completing an activity.

Another recommendation is that designers preparing computer courseware for learning purposes should be reasonably trained in the different disciplines. The researcher believes that the designers should be knowledgeable in the field of human psychology which includes cognition, development, perception, attitude and motivation. Equally important are designers' familiarity with educational theories and practices, instructional design, colour and screen design and skills in programming.

Finally, the researcher firmly agrees that developing a prototype courseware is a tedious and time consuming process. For an effective and efficient courseware that can be successfully used by learners, it
should be undertaken by a group of members. This is because it is quite impossible for any one person to be an expert in so many diverse areas in courseware design. Hence, courseware should be best developed using a team approach. This would not only shorten the time but also help distribute the work load. In this context, the researcher agrees with Smith (1989); Chen and Shen (1989) that a multidisciplinary team with division of labour will help develop a good quality courseware that could be effectively used by learners of different abilities.

5.2 Conclusion

This study clearly signifies that an efficient and effective courseware can be developed if a systematic and well designed approach is undertaken. This will ensure that the courseware is both instructionally and technically sound.

It is further evident from this study that learners' responses to the multimedia courseware indicated overwhelming positive ratings. These findings are consistent with the results obtained by previous investigations (Alderman et al., 1978; Kulik et al., 1990, Mansner et al., 1983; Swartz, 1983; and Self, 1982, cited in Skinner, 1988). Hence, findings from this study combined with the results of previous research
efforts serve to discount the view of CAL as a dehumanizing and boring instructional technique.

Moreover, if a courseware for computer-based instruction is prepared in a systematic and logical manner, it could be effectively and successfully used as a supplementary material or as a pedagogical device in the teaching learning situation. It is the researcher's contention that an effective courseware for wider consumption and appreciation should best be developed by a group of dedicated and knowledgeable members. Hence, a team approach is needed in the development of such a courseware.

As with any consistent research findings, it is important to speculate on why learners demonstrated positive attitudes towards the multimedia courseware. It is the researcher's contention that learners preferred the interactive nature of the courseware because it allowed for their active participation. Several studies have emphasized that active student participation is one factor which accounts for its superiority and efficiency (Avner 1978, Ayner, Moore and Smith 1980, Bradley Brink and Galsser 1984 and Magindson 1978, cited in Skinner 1988).

Since studies have consistently indicated the positive benefits of computer-assisted construction in individualised learning (Menis, Snyder, & Benkohav, 1980, cited by Dalton, Hannafin & Hooper, 1989), instruction, therefore has to accommodate individual learner differences.
The task of instructional designers is to ensure that individual learning needs are identified before providing appropriate instruction. Hence, it can be concluded that an effective courseware should take into consideration the learner factor.

CAL creates a safe and comfortable learning climate for learners and the latter are allowed to progress at their own pace. As evident from this study, learners reported feeling “safe” when making mistakes and learning from mistakes. Hence, this stands in contrast to the embarrassment often experienced by learners attempting and failing to respond correctly in large group classroom situation. A point to note is that a well designed computer-assisted lesson has been credited with improved performance and attitudes (Clement, 1981; Dalton, Hanaffin & Hooper, 1985). It is hoped that the weaknesses identified in this courseware would serve to ensure that such mistakes are avoided in developing similar coursewares.

5.3 Implications for Further Research

Although formative evaluation of instruction is time consuming and expensive, it is a necessary step in design process and more importantly, the results are certainly overwhelming. It is hoped that the findings from
this study would be used to further improve prototype courseware for computer-based instruction.

There is a need to investigate the different approaches to train teachers on the multifactors involved in designing a courseware. Identification of an approach should take into consideration the knowledge of the language, subject matter, use of authoring tools, instructional design, colour and screen design and the skills in programming. More importantly, it should be learner centred and able to taking into consideration their specific learning problems and solutions.

Since, the findings of this study reveal that the courseware was instructionally and technically sound, it would be useful to investigate on the feasibility of using it, with modifications, for weaker learners. Furthermore, it would also be useful to conduct further research on its effectiveness in other pedagogical situations. Investigations could also be done on the feasibility of designing and developing a courseware as a supplement to conventional teaching methods.

Finally, this study could be extended to a wider learner population in a natural setting and subsequently, subjected to summative evaluations before it is developed into a complete instructional package.