CHAPTER 5
SUMMARY AND CONCLUSION

5.1 INTRODUCTION

Chapter 5 offers a summary and an integrated discussion of the study's findings. This is followed by a critical evaluation of the study and a discussion of the clinical implications. Finally, recommendations for further research are made.

5.2 SUMMARY AND INTEGRATION OF RESULTS

Successful implementation of technology can be regarded as compliant with the laws for applying technology (Quist and Lloyd, 1997, pp.121-123). These laws assert that technology should not be too elaborate (law of parsimony); not inflict disproportionate demands on learning or energy (laws of minimal learning and minimal energy); not interfere with everyday activities (law of minimal interference); be suitable for the user's needs and personality (law of best fit); and should be practical to use and implement (law of practicality and use). When the Minspeak™ approach is imported for use on South African AAC users' VOCAs, it should be critically reviewed to ensure that it complies with the laws for implementation and that it is relevant for the local context.

The laws of particular interest for the purpose of this study, are the laws of minimal energy, learning and interference. The Minspeak™ approach is engineered to use icons with multiple meanings based on associations with the icons. These associations can be influenced by a number of factors, including amongst others the user's culture, language, gender, age and area of expertise. When the meanings assigned to icons by the developers are unfamiliar to AAC users, the previously mentioned laws can be compromised. The user might have to invest more time and cognitive energy in memorising meanings and icon sequences, and in recalling codes to retrieve vocabulary. The user's rate of communication might be jeopardised and therefore the use of icons that are familiar to the user is preferred.

The aim of the current study was to investigate which meanings tertiary education students attached to selected Minspeak™ icons used in different Unity™ versions. The meanings were derived in the form of associations with the icons. Words to describe these associations were used as a basis for comparison with the vocabulary in the current Unity™ 128 version. This comparison enabled description of the agreement between the meanings conveyed in this study and in the current Unity™ 128 version.

The percentage of commonality per icon was calculated and the associations were subcategorised, where groups of words from the same semantic field were compiled to form common associations. However, only some associations were investigated, as an arbitrary minimum of 15 % commonality was required to qualify as a common association. The average percentage of commonality was calculated for every question for every icon and the results for the different icons were compared. The list of vocabulary items describing the meanings based on the elicited associations was compared with a compiled list of current Unity™ vocabulary.

Meanings were derived through eliciting associations from tertiary education students using a self-administered cueing questionnaire. The results indicated that the participants made different associations with varying degrees of commonality to the icons. The APPLE, MEDICAL and SENTENCE icons achieved the highest average commonality and the INTERJECTION, WANTED and RETURN icons achieved the lowest average commonality. However, an investigation of the commonality of associations revealed that in some cases there was only one dominant association, and in other cases two or three associations with a lesser degree of commonality were elicited (see Table 4-2 for more detail). The implication of this phenomenon for learnability of the icons and their meanings was discussed. A single dominant association suggests that the icon's meaning might be familiar to most users in the context. Two or three less common associations provide a wider range of meanings, but these meanings might not be as familiar to users as in the former instance. Further research is needed to establish a minimum required degree of commonality for meanings to be regarded as enhancing learnability.

The suggestion was made that meanings derived from South Africans would differ from the meanings implemented in the current Unity™ 128 version. This notion was investigated by comparing the two lists on two levels: comparison of the *vocabulary* (i.e. the words used to

describe the associations underpinning the meanings); and a comparison of the *concepts* which form the basis for the vocabulary lists per icon. The first level of comparison (comparing words) revealed that for the majority of icons more than 60 % of the *vocabulary* items varied. However, one cannot assume that this is a true reflection of the participants' familiarity with the vocabulary as there were conceptual agreements not reflected in the comparison. For some icons there was agreement on both word and conceptual levels (e.g. the APPLE, STOP, MEDICAL icons), while for others there were few similarities on a word level, but some conceptual agreement (e.g. INTERJECTION, THUMBS UP, SENTENCE, WANTED icons). For other icons there were minor word or concept agreement found (e.g. RETURN, FROG icons).

The majority of icons' conceptual agreement indicated that the vocabulary used in the Unity™ software package might be useful as a basis for customising a user's vocabulary (notably the APPLE, STOP, MEDICAL, SENTENCE, MUSIC, THUMBS UP and THUMBS DOWN icons). The vocabulary for some of the icons, like the KNOT icon, could rather be coded under another icon (e.g. the WRONG icon) to optimally use every space on the overlay. The use of the RETURN icon is also questioned in terms of effectiveness on an overlay with limited space.

Icons need to be either transparent or translucent as the efficient use of codes depends on the user's ability to make functional associations with the icons and their meanings (Bruno and Goehl, 1991, p.70). The translucency of icons was argued to be an important variable in determining the ease of learning of AAC systems. The more familiar the relationship between an icon, its referent and the associations used during teaching, the easier it should be to learn (Luftig and Bersani, 1985; Paivio, 1986; Schlosser, 1994). A higher percentage of commonality, and possibly a higher degree of familiarity, might be more conducive to learning. When an associated meaning has a lower percentage of commonality, the learning and energy requirements might be increased.

In most cases the vocabulary included in the current Unity™ software packages should be reviewed for appropriateness in the local context and culturally congruent words should be included in this list. Providing culturally appropriate intervention is a basic principle underlying accountable service delivery to AAC users (Soto, Huer and Taylor, 1997). If the selected icons are not congruent with the user's cultural context the vocabulary and codes

selected in such an AAC system could hamper communicative effectiveness due to the slower communication rate and a higher memory load. The results of this study confirm the findings of Huer (2000, pp.180–185), that indicated that individuals from diverse cultural and linguistic backgrounds perceive graphic symbols differently. The results of this research project raise the same issue: When an AAC user and his clinician attach different meanings to a graphic representational system, how does it impact on the acquisition process and later generalisation and maintenance of the learnt symbols?

This study's results emphasised that encoding strategies like the Minspeak™ approach cannot simply be imported to South Africa without carefully reviewing their compliance with the laws for implementing technology. These results should, however, be viewed against the limitations of this study.

5.3 CRITICAL EVALUATION

As this study only used 480 participants, 40 participants per icon, the results should be seen as preliminary findings to encourage further research and to caution clinicians to carefully consider the use of each icon and its associations. The participants in this study represented a range of cultures and languages, in order to obtain general information about the associations provided by South African communicators. However, ideally a more representative sample for each of the 11 official languages should be obtained. For this purpose the current study should be expanded to the greater South Africa, as this sample was confined to a specific context in the Gauteng Province only (the University of Pretoria). Furthermore, all the participants were tertiary education students, and this sample cannot be regarded as representative of South African adults. This aspect obviously limits the potential for generalisation.

This study included 12 Minspeak™ icons used as core icons in the UniChat™ programme. Although these icons were selected to have articulation possibilities with more sophisticated Minspeak™-based VOCAs, there are obviously more icons that need to be investigated.

The elicited associations were responses to open-ended questions, which made direct comparison impossible, as almost every participant approached the questionnaire differently. A pruning system was developed to extract the dominant meanings for use in subsequent

analytical procedures. This pruning system proved to be valuable, and was used reliably by both the intra-rater and interrater.

Although the current study compared associated meanings made by South African tertiary education students to meanings used in the current Unity™ software, it is important to point out that the applicability of the Minspeak™ approach to the UK and US populations has not been formally researched.

5.4 IMPLICATIONS FOR CLINICAL PRACTICE

- Albeit preliminary, the list of elicited associations might be used by AAC users and their clinicians, to compile an individualised vocabulary list for South African users. This list is based on associations with visual features of icons. Teaching these associations should be related to such visual features in order to enhance learnability. The list could provide a useful basis from where to investigate associations of other populations for use in intervention.
- The comparison between the elicited list and the current Unity™ vocabulary list revealed substantial differences. This finding strengthens the notion that iconic encoding systems cannot merely be imported and used in other countries without adaptation to the context and culture of the user.
- The questionnaire that was developed might be used in South Africa and other developing countries to determine which associations potential users would probably make with Minspeak™ icons. The results could be used as a basic list of words to include in an individualised vocabulary and for obtaining rationales for selecting and using specific icon sequences. This procedure could enhance the ease of teaching and learning. The questionnaire's utility is not necessarily limited to Minspeak™ icons, but could also be used for any other iconic encoding system that is based on associations.
- The elicited association list revealed that some of the icons' traditional use (i.e. how they are used in Unity™) might be inefficient in terms of space management on the overlay. For instance, the KNOT and WRONG icons code ideas that share the same semantic field. The icons' codes and vocabulary might be merged, using either of the icons' to code the vocabulary.

5.5 RECOMMENDATIONS FOR FURTHER RESEARCH

- Subsequent research should include more participants from diverse backgrounds to obtain a more representative sample of the South African adult population.
- This study included only 12 icons, but the list of elicited associations should be expanded to include all the icons used in the Unity™ software package.
- Formal research is needed to determine whether the Unity™ icons and vocabulary, adopted in the UK and US versions are indeed appropriate for those populations.
- The usefulness of the developed questionnaire for eliciting associations using another iconic encoding system (e.g. *LINKS-icon*™, Zygo Industries) could be investigated.
- The impact of the percentage of commonality of a common association on the learnability of set vocabulary packages like Unity™ needs to investigated.
- The use of language activity monitoring (LAM) could provide useful additional information to determine which icons are more frequently used for encoding and retrieving prestored messages. This might enhance our understanding of which icons are possibly less useful or more difficult to learn. It might be worthwhile to establish when AAC users switch to spell-mode and the reason why they switch to spell-mode.
- When elicited association lists have been compiled for all the icons, the development of a vocabulary sort could be done. This could be a useful tool for teaching and using Minspeak™-based VOCAs in South Africa.

5.6 SUMMARY

This chapter summarised the study's results, followed by a critical evaluation. Furthermore, it viewed the study in the light of its clinical implications. Finally, recommendations for further research were made.