



1. Research models and methods



2. Developing a research proposal



3. Thesis Structure guidelines



3a. Sample Abstract from Engineering & Biology



3b. Sample Introduction from Engineering, Biology & Education



3c. Sample Methods section from Biology, Engineering & Education



3d. Sample Results section from Biology & Education



3e. Sample Discussion section from Biology



3f. Sample Conclusion from Engineering & Education



4. Thesis writing and persuasion

## Learning objectives

This module will help you to:

- learn about various research models.
- prepare a research proposal.
- structure your thesis and its chapters.
- write convincingly of your research outcomes and implications



# Research and Thesis writing

## 3. Thesis structure guidelines

3f. Sample Conclusion from Engineering & Education

### Example Conclusion from Engineering

The aims of this project were to develop a simple technique for microwave sintering of yttria zirconia, and to compare the resultant properties and microstructure with material sintered by conventional constant heating rate processes. As a result of this research, a simple technique which enables controlled microwave heating of yttria zirconia ceramics has been developed. Using this technique during constant rate heating it was found that there was an enhancement of densification during microwave sintering in comparison to conventional heating.

← aims of the research

← main results of the research

← secondary results of the research

A small but significant shift in the density - grain size relationship occurred during microwave sintering of 3 mol% yttria zirconia for densities below 96% T.D., indicating that microwave sintering accelerates lattice diffusion more than surface and grain boundary diffusion during the initial and intermediate stages of sintering. However, the difference in this relationship disappeared at higher densities once grain growth began to dominate. No shift was found in the density - grain size relationship during any stage of the sintering process when constant rate sintering of 8 mol% yttria zirconia in the microwave field was compared to conventional heating. Heating rate was not found to have a significant effect on the grain size / density relationship.

← detailed results in terms of microstructural properties

Whether there is a change in the grain size/ density relationship during microwave sintering when compared to conventional sintering is dependent on a number of other factors which affect the kinetics of diffusion and grain growth. A change in this relationship was identified for 3 mol% yttria zirconia, which has a relatively high activation energy and low driving force for grain growth, as compared to 8 mol% yttria zirconia, in which grain growth proceeds much more quickly due to low activation energy, high driving force and high grain boundary mobility.

← explanation and interpretation of results

Results of isothermal densification experiments at 1300°C also evidenced the enhancement of densification when microwave heating is used. Microwave heated samples had a significantly

higher density after brief dwell times at this temperature than did conventionally heated samples subjected to the same thermal schedule. Grain size/ density relationships were similar to those found during constant rate heating. However, the low temperature enabled the microwave samples to retain a smaller grain size once densification had ceased, due to the slower rate of grain growth.

Ageing experiments conducted at 1500<sup>0</sup>C showed that once densification was near completion, grain growth in 3 mol% yttria zirconia was accelerated in the microwave field, and exaggerated grain growth occurred. This resulted in a greater apparent transformability of the tetragonal phase. No significant differences in grain growth were observed between conventional and microwave heated 8 mol% yttria zirconia during ageing. The higher oxygen vacancy concentration of 8 mol% yttria zirconia does not appear to have increased the magnitude of the enhancement to densification by the microwave field.

It would appear that the effects of microwave sintering may not necessarily be the same for all ceramic materials. If the activation energy for grain growth is similar to or higher than the activation energy for densification, then it does appear to be possible for a change in the balance between densification and grain growth during sintering to occur which favours densification. Low grain boundary mobility is also advantageous in restricting grain growth during densification. However, dwell times need to be selected to avoid exaggerated grain growth.

The optimal way to take advantage of the benefits of microwave sintering for yttria zirconia ceramics would appear to be incorporation of dwell periods at temperatures in the 1200 - 1350<sup>0</sup>C range in the sintering program. This would allow high densities to be achieved, while restricting grain growth. Sintering at lower temperatures would also provide some energy savings.

further explanation and interpretation of results

main conclusions and implications drawn from the research

## Sample conclusion (from Education)

**8.0 THE MAIN ISSUES REVISITED: IMPLICATIONS AND CONCLUDING OBSERVATIONS**

The major thrust of this thesis has been to examine the contribution that teaching practices and particular linguistic practices in physical education lessons make to the production and reproduction of cultural discourses of masculinity and femininity and how these discourses intersect with other discourses associated with the practice of physical activity in Australian culture.

Although the study was originally conceived within the parameters of ethnography, the development of a focus on the linguistic practices in the lessons necessitated a more focused approach drawing on specific theories that addressed the meaning-making function of language within a social and cultural context. More particularly, it required a theory or theories that linked language, consciousness and sexuality. It is with poststructuralism and particularly with feminist poststructuralist writers that these connections are most usefully made in terms of the

As this title suggests, the conclusion is revisiting ideas put forward in previous chapters and tying them together into a clear position on physical education.

aims of research

main methods of analysing and explaining data.







participation in, physical activity is to change the issue must be addressed at all sites of practice, including the syllabus committees, tertiary institutions, physical education faculties in schools and teachers in their interactions with students. ... The long term purpose of this study is to provide a model of analytical practice which may be developed to enable teachers more readily to reflect on their linguistic and non-linguistic practices and to take more responsibility for the ways in which their practices contributes to the positioning of students in relation to gender (but also by extension, race, class, ethnicity, physical competency and so on). However, I would also want to argue for a more reflective and critical practice on the part of lecturers in tertiary institutions and syllabus designers which takes account of their contribution to the production and reproduction of discourses which constitute embodied subjectivities in and through the practices of physical education.

### 8.6 Conclusion

In addressing the issues relating to girls and physical education, physical educators must eschew an approach that regards the female students themselves as the problem and examine their own assumptions about the 'good' of physical education and sport. Physical education is an historical and cultural construction conceived primarily within a masculine discourses of sport and the human movement sciences. Such a conception fails to meet the needs of many girls and also many boys. Moreover it is likely to contribute to forms of masculinity and femininity that disadvantage girls and construct them as lacking and inadequate, uncomfortable with their bodies and turned off physical activity for life.

If we are serious about changing the experiences of girls in physical education, then the equity solution of equal access is not sufficient. Rather, what must be challenged is the model of physical education that has been developed by men, for the needs and interests of boys.

This final conclusion restates the position the thesis takes and puts forward a number of recommendations.