STUDENT INVOLVEMENT IN SCIENCE IN THE JUNIOR PRIMARY SCHOOL: A VIDEO-ANALYSIS OF A MULTI-GRADE CLASSROOM SETTING IN IRELAND

By

Helena Walker B.Ed. (Hons.)

A thesis submitted to Dublin City University for the degree of

MASTER OF SCIENCE

This work was carried out under the joint supervision of:
Thomas Mc Cloughlin, Education Department, St. Patrick’s College
&
Dr. Odilla Finlayson, School of Chemical Sciences, Dublin City University

July 2008
Table of contents:
Title page
Declaration
Table of contents
Abstract
Acknowledgements
Ethical Considerations

1. The significance of research in science education
   1.1 Background information 1
   1.2 The current situation 2
   1.3 The aim of this work 7

2. Factors influencing participation levels in the science classroom
   2.1 Science and the gender debate 10
   2.2 The role of the teacher 15
   2.3 Teaching styles 16
   2.4 Gender and grouping in the science classroom 18
   2.5 Criteria for grouping in the classroom 24

3. Academic ability and achievement in science
   3.1 Research on academic ability as an influence in science learning 29
   3.2 Academic ability and grouping as an influence in science learning 31
<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.</td>
<td><strong>Classroom observation</strong></td>
<td></td>
</tr>
<tr>
<td>4.1</td>
<td>The use of video-recording in the classroom as a data collecting medium</td>
<td>34</td>
</tr>
<tr>
<td>4.2</td>
<td>Limitations of the use of video-recordings</td>
<td>38</td>
</tr>
<tr>
<td>4.3</td>
<td>Classroom research as an aid to enhancing science learning</td>
<td>38</td>
</tr>
<tr>
<td>5.</td>
<td><strong>Methodology</strong></td>
<td>44</td>
</tr>
<tr>
<td>5.1</td>
<td>Design of the investigation and description of the measurement techniques</td>
<td>44</td>
</tr>
<tr>
<td>5.2</td>
<td>Data collection</td>
<td>51</td>
</tr>
<tr>
<td>5.3</td>
<td>Groupings</td>
<td>53</td>
</tr>
<tr>
<td>5.4</td>
<td>The use of Transana 2.1 – Coding and Video Analysis</td>
<td>57</td>
</tr>
<tr>
<td>6.</td>
<td><strong>Results</strong></td>
<td>63</td>
</tr>
<tr>
<td>6.1</td>
<td>Keyword frequencies</td>
<td>63</td>
</tr>
<tr>
<td>6.2</td>
<td>Timing and male/female usage of keywords over all sixteen lessons</td>
<td>96</td>
</tr>
<tr>
<td>6.3</td>
<td>Results in relation to changes in groupings in the lessons</td>
<td>104</td>
</tr>
<tr>
<td>6.4</td>
<td>Results from field notes</td>
<td>116</td>
</tr>
<tr>
<td></td>
<td>6.4.1 Question Time</td>
<td>116</td>
</tr>
<tr>
<td></td>
<td>6.4.2 Field notes</td>
<td>118</td>
</tr>
<tr>
<td></td>
<td>6.4.3 Student worksheets and written work</td>
<td>118</td>
</tr>
<tr>
<td>6.5</td>
<td>Combining results of video analysis with the results of the worksheet analysis in the keyword groups of <em>active participation</em> and <em>non-participation</em></td>
<td>125</td>
</tr>
</tbody>
</table>
6.6 Comparison of children’s participation levels compared with ability 129

7. Discussion 139
7.1 Keywords and keyword maps 139
7.2 The timing of keyword usage in the lessons 143
7.3 Results for gender 145
7.4 Frequency of keywords for individual children 147
7.5 Results of keywords in relation to changes in groupings for the lessons 150
7.6 Analysis of video and worksheet data in the keyword groups of active participation and non-participation 158
7.7 Analysis of children’s participation levels compared with ability levels 159
7.8 Limitations 161

8. Conclusions and implications of the research 163

9. Bibliography 168

10. Appendices (Table of contents)

Appendix A — Field notes
Appendix B — Lesson plans
Appendix C — Lesson transcripts
Appendix D — Children’s worksheets
Appendix E — Classroom plans
This classroom based research project focuses on participation rates of children in the junior primary school during science classes and from the information gathered attempts to identify how a teacher can encourage optimal participation from all children. Factors which influence participation rates and factors which have no influence on participation rates are discussed in relation to the results. These factors include gender, the role of the teacher, teaching styles, gender and groupings and academic ability as an influence in science learning. The position of the Irish Revised Primary School Curriculum for science in effecting participation levels is also discussed. The classroom in which the research takes place is a multi-grade class with an age range of four years old to eight years old. Multi-grade classes place added demands on the teacher’s time and as the researcher is also the class teacher video recordings of the lessons were utilised to facilitate the gathering and analysis of data.

The findings of the research indicate that the content of the Revised Primary School Curriculum for science provides highly appropriate and enjoyable content for this age group. It also indicates that the majority of children maximise their participation within their own class and age groupings. Altering these groups is generally counter-productive. One notable exception for altering the groups is when academically low achieving children fail to try to participate due to a lack of self-esteem. These children respond positively to less competitive groupings.
ACKNOWLEDGEMENTS

It would not have been possible to write this thesis without the help and support of many people around me. I would like to extend my sincere gratitude to all who contributed, in particular:

The Donegal Education Centre and St. Patrick’s College, Drumcondra who together provided an opportunity for distance learning and also to Dublin City University for the opportunity to research for a Master’s degree.

My supervisor, Mr. Thomas McCloughlin, who provided the initial support and guidance necessary for my research and who also, contributed invaluable advice and expertise throughout the writing of the thesis.

My second supervisor, Dr. Odilla Finlayson, whose knowledge and skill proved indispensable and who gave direction to the completion of my thesis.

The Principal of St.Columb’s N.S., Ms. Sharon Goulden and also the Chairman of the Board of Management, The Reverend H. Gilmore, for their support and back-up.

My family and friends for all their help and friendship.

Finally I thank Gareth and Philip for being there with unequivocal support and encouragement.
ETHICAL CONSIDERATIONS

During the course of the research it was important to the researcher to maintain a high standard of ethics and to make certain that all research was conducted in an appropriate manner. In order to ensure that this was the case permission to conduct the research project in school within normal teaching duties was received from the Principal and also the Chairman of the Board of Management. The identities of all the children involved in the research are protected by the use of pseudonyms throughout the thesis.