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Automating the Measurement of Critical Thinking in Discussion Forums

A thesis presented in partial fulfilment of the requirements for the degree of Doctor of Philosophy (PhD) in Information Systems at Massey University, Palmerston North, New Zealand

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Critical thinking is seen as an essential skill for survival in the 21st century and those involved in education agree that encouraging students to think critically is an essential requirement of the educational system. There is considerable debate among educationalists concerning the most effective way to encourage the development of critical thinking skills and little agreement on the best way to measure evidence of critical thinking.

This study examines what is meant by the term critical thinking and investigates some of the tools that have been used to measure evidence of critical thinking. The study concentrates on the measurement of critical thinking among discussion forum participants and describes the development and testing of a tool designed to automate the process of measuring critical thinking.

Since the study involved the design, development and testing of a computerised tool, an action research approach was adopted. Action research gained popularity among information systems developers around the mid 1990s. It is seen as a methodology that encourages the generation of scientific knowledge by allowing the researcher to modify intentionally a real setting and carefully evaluate the results.

The study describes the development of an automated text classification system that uses content analysis to classify discussion forum transcripts using critical thinking models developed by Garrison, Anderson, & Archer (2000), Henri (1992) and Perkins & Murphy (2006). The findings from the study suggest that automated tools have the potential to assist in the measurement of critical thinking abilities and are worthy of further investigation.
Arriving at a point where I can present this thesis has taken me on a journey of discovery that would have been impossible without the encouragement and support of a number of talented and caring people. Working full-time and studying part-time takes its toll and I would not have persevered had I undertaken the journey alone.

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Ethics Committee Approval Statement

Ethical approval for this project was obtained from the Massey University Human Ethics Committee and the Eastern Institute of Technology, Hawke’s Bay Research and Ethics Committee.

A copy of the Massey University Human Ethics Committee approval document is provided in Appendix A.

A copy of the Eastern Institute of Technology, Hawke’s Bay Research and Ethics Committee approval document is provided in Appendix B.
List of Publications

Book Chapters


Refereed Journals


Refereed Conference Proceedings (Paper presentations)


# Table of Contents

Abstract .......................................................................................................................... i

Acknowledgements ...................................................................................................... iii

   Ethics Committee Approval Statement ................................................................. iv

List of Publications ....................................................................................................... v

   Book Chapters ....................................................................................................... v

   Refereed Journals ............................................................................................... v

   Refereed Conference Proceedings (Paper presentations) ..................................... v

Table of Contents ...................................................................................................... vii

List of Figures ............................................................................................................ xiii

List of Tables .............................................................................................................. xv

CHAPTER 1: INTRODUCTION ................................................................................. 1

   1.1 Background .................................................................................................... 1

   1.2 Thesis Rationale .......................................................................................... 3

   1.3 Purpose Statement ...................................................................................... 4

   1.4 Research Questions ..................................................................................... 5

   1.5 Benefits of the Study ................................................................................... 6

   1.6 Thesis Structure ........................................................................................... 7

   1.7 Conclusion ...................................................................................................... 8

CHAPTER 2: LITERATURE REVIEW ..................................................................... 9

   2.1 Critical Thinking ........................................................................................... 9

       2.1.1 History of Critical Thinking ................................................................. 10

       2.1.2 Defining Critical Thinking ................................................................. 14

       2.1.3 Teaching Critical Thinking ............................................................... 21
3.4.5 Phase 4: Model validation ......................................................... 105

3.5 Issues of reliability and validity .................................................. 105

3.5.1 Reliability in quantitative research ............................................. 107

3.5.2 Validity in quantitative research ................................................. 107

3.5.3 Validity and reliability in qualitative research ......................... 108

3.6 Conclusion .................................................................................. 109

CHAPTER 4: INITIAL DEVELOPMENT AND TESTING OF THE AUTOMATED TOOL .......................................................................................................................... 111

4.1 Background ................................................................................ 112

4.2 The ACAT System ....................................................................... 113

4.3 Application of the Initial ACAT System .................................... 121

4.3.1 Methodology ........................................................................... 121

4.3.2 Findings and discussion .......................................................... 123

4.4 Peer review ................................................................................ 129

4.5 Conclusion .................................................................................. 131

CHAPTER 5: USING THE ACAT SYSTEM TO MEASURE GROUP PARTICIPATION .............................................................................................................. 133

5.1 Background ................................................................................ 133

5.2 Automatic Content Analysis ....................................................... 135

5.2.1 The ACAT System: Coding Categorisation Process ............... 137

5.3 Text Categorisation Algorithms .................................................. 138

5.3.1 The ACAT System: Text Categorisation Algorithm ............... 139

5.4 The ACAT Automatic Coding Process Module ....................... 140

5.5 Application of the Automated ACAT System ......................... 147

5.5.1 Methodology .......................................................................... 147
CHAPTER 8: SUMMARY, CONCLUSIONS, LIMITATIONS AND FUTURE DIRECTIONS ..................................................................................................................197

  8.1 Background ..................................................................................................198
  8.2 Summary of the Research Activities ............................................................199
  8.3 Conclusions ..................................................................................................203
  8.4 Limitations of the Study ................................................................................206
  8.5 Contributions ................................................................................................209
  8.6 Implications and Potential for Further Research and Development ..........210
  8.7 Concluding Remarks ...................................................................................212

REFERENCES ........................................................................................................215

APPENDICES ........................................................................................................237

  Appendix A: Ethics Documentation: Massey University ..................................239
  Appendix B: Ethics Documentation: EIT Hawke's Bay .........................................241
  Appendix C: Information Sheet: Discussion Forum Participants .........................243
  Appendix D: Consent Form: Discussion Forum Participants ..............................247
# List of Figures

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Figure 2.1</td>
<td>Community of Inquiry Model</td>
<td>55</td>
</tr>
<tr>
<td>Figure 2.2</td>
<td>Practical Inquiry Model</td>
<td>56</td>
</tr>
<tr>
<td>Figure 3.1</td>
<td>Research cycling and knowledge creation</td>
<td>90</td>
</tr>
<tr>
<td>Figure 3.2</td>
<td>Lewin's Research Spiral</td>
<td>92</td>
</tr>
<tr>
<td>Figure 3.3</td>
<td>Four phase action research framework for the study</td>
<td>100</td>
</tr>
<tr>
<td>Figure 4.1</td>
<td>ACAT System Components</td>
<td>115</td>
</tr>
<tr>
<td>Figure 4.2</td>
<td>ACAT Taxonomy Model Editing Screen</td>
<td>116</td>
</tr>
<tr>
<td>Figure 4.3</td>
<td>ACAT Transcript Coding Screen</td>
<td>116</td>
</tr>
<tr>
<td>Figure 4.4</td>
<td>ACAT Results Screen</td>
<td>117</td>
</tr>
<tr>
<td>Figure 4.5</td>
<td>ACAT Coefficient Screen</td>
<td>117</td>
</tr>
<tr>
<td>Figure 5.1</td>
<td>Documentation Classification Process</td>
<td>140</td>
</tr>
<tr>
<td>Figure 5.2</td>
<td>ACAT System Stop Word &amp; Stemming Processes</td>
<td>142</td>
</tr>
<tr>
<td>Figure 5.3</td>
<td>ACAT System Training Text Entry Screen</td>
<td>144</td>
</tr>
<tr>
<td>Figure 5.4</td>
<td>ACAT System Training Text Allocation Screen</td>
<td>145</td>
</tr>
<tr>
<td>Figure 5.5</td>
<td>ACAT Automated System Conceptual Model</td>
<td>146</td>
</tr>
<tr>
<td>Figure 7.1</td>
<td>Scattergram of Cambridge Thinking Skills Assessment</td>
<td>192</td>
</tr>
</tbody>
</table>

score and the ACAT system weighted score
# List of Tables

<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table 2.1</td>
<td>Critical thinking cognitive skills and sub-skills</td>
<td>18</td>
</tr>
<tr>
<td>Table 2.2</td>
<td>The affective dispositions of critical thinking</td>
<td>20</td>
</tr>
<tr>
<td>Table 2.3</td>
<td>Tests covering more than one aspect of critical thinking</td>
<td>25</td>
</tr>
<tr>
<td>Table 2.4</td>
<td>Survey of computer mediated communication content analysis studies</td>
<td>35</td>
</tr>
<tr>
<td>Table 2.5</td>
<td>Bloom's levels of critical thinking</td>
<td>45</td>
</tr>
<tr>
<td>Table 2.6</td>
<td>Positive and negative indicators of critical thinking</td>
<td>50</td>
</tr>
<tr>
<td>Table 2.7</td>
<td>Models used to measure critical thinking in discussion forums</td>
<td>59</td>
</tr>
<tr>
<td>Table 2.8</td>
<td>Summary of Critical Thinking Models</td>
<td>73</td>
</tr>
<tr>
<td>Table 2.9</td>
<td>Model for identifying engagement in critical thinking</td>
<td>74</td>
</tr>
<tr>
<td>Table 3.1</td>
<td>Emphases of quantitative, mixed, and qualitative research</td>
<td>85</td>
</tr>
<tr>
<td>Table 4.1</td>
<td>Coding categories and indicators for Hara et al. (2000)</td>
<td>119</td>
</tr>
<tr>
<td>Table 4.2</td>
<td>Coding categories and indicators for the COI Model</td>
<td>120</td>
</tr>
<tr>
<td>Table 4.3</td>
<td>Number of postings using the Hara et al. Model</td>
<td>124</td>
</tr>
<tr>
<td>Table 4.4</td>
<td>Number of postings using COI Model</td>
<td>125</td>
</tr>
<tr>
<td>Table 4.5</td>
<td>ACAT calculations for reliability coefficients</td>
<td>126</td>
</tr>
<tr>
<td>Table 5.1</td>
<td>Table structure of the ACAT training dictionary table</td>
<td>143</td>
</tr>
<tr>
<td>Table 5.2</td>
<td>Posting categorisation for different training dictionary populations</td>
<td>149</td>
</tr>
<tr>
<td>Table 5.3</td>
<td>ACAT (raw text, stopword, stemmed) and manual posting categorisations</td>
<td>150</td>
</tr>
<tr>
<td>Table 5.4</td>
<td>Correlation between the ACAT system and the human coders</td>
<td>151</td>
</tr>
</tbody>
</table>
Table 6.1: Number of postings using the COI model 163
Table 6.2: Correlation between the ACAT system and the human coders 165
Table 6.3: Posting categorisation for automatic and manual coding 166
Table 6.4: Correlation between the ACAT system and the human coders 167
Table 6.5: Individual participant classification (number of sentences) 169
Table 6.6: Individual participant classification (as percentage) 170
Table 7.1: Individual participant classification using the Perkins and Murphy (2006) model (number of sentences) 186
Table 7.2: Individual participant classification using the Perkins and Murphy (2006) model (percentages) 188
Table 7.3: Cambridge Thinking Skills Assessment demonstration test results and cumulative ACAT score results 190