Title: The effect sizes associated with an innovation in computer-assisted learning
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The Effect Sizes Associated with an Innovation in Computer-Assisted Learning

Barry J. Fraser
&
George P. L. Teh

Paper presented at the 7th International Congress for School Effectiveness and Improvement, held in Melbourne, Australia on 3-6 Jan 1994
The Effect Sizes Associated With an Innovation in Computer-Assisted Learning

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Paper presented at the 7th International Congress for School effectiveness and improvement, held in Melbourne, Australia from 03 to 06 Jan 1994.
Abstract

This study of the efficacy of computer-assisted learning is distinctive in that (1) the innovation in CAL made use of micro-PROLOG, (2) traditional achievement and attitude outcomes were complemented by measures of classroom psychosocial environment, and (3) the sample was drawn from the unique educational milieu provided by Singaporean schools. In contrast to past research, the use of micro-PROLOG-based CAL in this study led to massive impact in terms of achievement (effect size of 3.5 standard deviations), attitudes (1.4 standard deviations) and classroom environment (ranging from 0.1 to 1.9 standard deviations). Students in the CAL group had higher achievement and attitude scores, and they perceived their classroom environments more favourably in terms of greater gender equity, investigation, innovation and resource adequacy.
The Effect Sizes Associated With an Innovation in Computer-Assisted Learning

According to a comprehensive synthesis of 134 meta-analyses encompassing 7,827 individual studies, the average effect size in education typically is modest and averages only 0.4 in terms of the difference between the achievement of an experimental and a control group expressed in standard deviation units (Fraser, Walberg, Welch, & Hattie, 1987). For computer-assisted learning (CAL) specifically, meta-analyses have revealed comparable average effect sizes (Kulik & Kulik, 1991; Roblyer, Castine, & King, 1988). That is, despite high hopes for CAL, research as yet has not established CAL as being markedly more effective than other educational provisions in terms of promoting student achievement.

Past research on CAL, however, often has been focused on courseware (e.g., for drill-and-practice) which hasn't necessarily embodied the most powerful CAL possible. Consequently, there is an urgent need to develop carefully and evaluate rigorously appropriately-designed CAL courseware which capitalises on recent advances in the fields of computing and computer education. Such development and evaluation efforts could indicate the potential that future generations of CAL courseware could have for making a more sizeable impact than in past research.

The main purposes of this article are to describe the development of some innovative CAL based on micro-PROLOG and to report an evaluation of its efficacy in terms of effect sizes. An important unique contribution made by the study is that, in addition to investigating effectiveness in terms of traditional student achievement and attitude outcomes, the CAL courseware was evaluated in terms of its impact on the nature of the classroom.
psychosocial environment. This research was conducted in the distinct milieu of the Singapore school system.

Background

**Effect Sizes in Past Research on CAL**

Although there has been considerable optimism about the potential of computer-assisted learning (CAL) to revolutionise education in terms of its potential to promote student achievement and attitudes, a myriad of evaluation studies of CAL have failed to support this optimism. Table 1 summarises the results of a set of 11 different past meta-analyses reviewed by Fraser, Walberg, Welch and Hattie (1987). These meta-analyses taken together encompassed 557 individual studies and tested 566 relationships involving the efficacy of CAL in terms of promoting student achievement. This table shows that the effect sizes for these meta-analyses, expressed as correlation coefficients, ranged from 0.03 to 0.26 for different meta-analyses and had a grand mean of 0.15.

The average effect size for these 11 meta-analyses, expressed in terms of the number of standard deviations of difference between a CAL and a control group, was found to be approximately 0.3. This value of 0.3 specifically for CAL studies is reasonably consistent with the synthesis (Fraser, Walberg, Welch, & Hattie, 1987) of 134 past meta-analyses of a wide range of educational variables which indicated an average effect size in education of approximately 0.4 standard deviations.
More recently, Roblyer, Castine and King's meta-analysis of CAL (Roblyer, Castiné, & King, 1988) revealed an average effect size of only 0.4 standard deviations, whereas Kulik and Kulik's (1991) meta-analysis revealed a comparable value of 0.3 standard deviations. Although past research has revealed only consistently modest effect size, it should be noted that many of the individual studies were conducted some years ago and the innovation in CAL often involved drill-and-practice. Consequently, there is a need to investigate the efficacy of more recent innovations in CAL.

Although past evaluative research on CAL has been plentiful, the investigation of effect sizes reported in this article is distinctive in three important ways. First, the innovation considered in this study involved micro-PROLOG-based CAL, which has been the focus of very few past evaluations. Second, in addition to investigating the impact of CAL on traditional achievement and attitude outcomes, the present study appears to be the first which also evaluated CAL in terms of its impact on classroom psychosocial environment. Third, the study was conducted in the unique milieu of Singapore secondary schools.

**The Singapore Context**

In many ways, the Singapore education system is different from that of many other countries. For example, the Singapore system is highly centralised (with almost every school using the same prescribed textbooks), the mode of instruction is essentially expository and achievement-oriented, and schools are graded for excellence based on students' academic performance. Educational applications of computers were introduced fairly extensively into the schools only in 1980. The focus initially was on teaching computer science as a subject at the pre-university level and low-level
computer literacy courses at the secondary school level; there was no
extensive computer education program at the primary level. Computer-
assisted learning (CAL) was introduced to the schools only in 1986, and
currently schools use CAL in science, mathematics and English for
remediation and enrichment. Singaporean schools do not develop their own
CAL courseware (Teh & Fraser, 1993).

In Singapore, there is a dearth of research on the effects of CAL. To
date, only three research studies have been reported (Low, 1988; Ong & Lee-
Leck, 1986; Woo-Tan, 1989). On the whole, positive effects of CAL have
been found. However, because the samples in these studies were small and
non-random, and because of the short duration of the experimental treatment
and the narrow scope of the content selected, their findings should be
interpreted with caution. Furthermore, the sample selected in one of the
studies was from one of the best schools in the country, thus limiting the
generalisability of the results obtained. Thus, research data on the use of
CAL in Singapore is sparse, of questionable validity and of low
generalisability. Because of the lack of dependable research information, and
in view of the potential that research conducted in the unique educational
context of Singapore has for our understanding of computer-assisted learning
environments, the present study was conceptualised and conducted.

*Classroom Environment*

The field of classroom psychosocial environment now is established as
a thriving area of research (Fraser, 1986, in press; Fraser & Walberg, 1991).
Nevertheless, although there has been a revolution in recent years in terms of
both the scope and variety of the roles which computer-assisted learning has
played within education, the field of classroom learning environment (Fraser,
1986, in press; Fraser & Walberg, 1991) has lagged behind in two major ways. First, hitherto there has existed no learning environment instrument which has been tailor-made specifically for use in classrooms using computer-assisted learning. Second, innovations in computer-assisted learning rarely have been evaluated in terms of their impact on the nature of the classroom learning environment as perceived by students (Ellett, 1986; MacGregor, 1986). The present paper fills some of the gaps by reporting the evaluation of an innovation in computer-assisted learning in terms of its impact on classroom environment, in addition to reporting its impact on student achievement and attitudes.

Micro-PROLOG-Based CAL Environments

The innovation in computer-assisted learning which formed the focus of this study was distinctive in that it made use of micro-PROLOG, the microcomputer version of PROLOG, a high-level fifth-generation declarative language, which was developed for artificial intelligence research and which has been found to be robust, compact and accessible to students in classroom applications (Chalk, 1987).

Micro-PROLOG has been used in the classroom since 1981. In 1980, Kowalski suggested that logic could be used as a computer language for children (Kowalski, 1984). Since then, CAL projects have used micro-PROLOG in education in the United Kingdom, Israel, Australia, Denmark, Canada and France. Several attempts to teach micro-PROLOG to non-programmers and novice users have been reported (Briggs, 1984; Clark & McCabe, 1984; Conlon, 1985; Ennals, 1984).

The University of Exeter's School of Education has been involved actively in the use of micro-PROLOG in teaching history and other
humanities subjects, and teaching pupils with specific learning difficulties (dyslexics). The approach adopted by the project team has been to use micro­
PROLOG to implement application shells or authoring software that provide a
programming environment in which teachers and students design and write
"programs" (Briggs, 1988; Nichol, Briggs, & Dean 1987a; Nichol, Briggs,
Nichol, O'Connell, & Raffan, 1987).

Each application shell or authoring software developed by the Exeter
team concentrates on a particular type of application area. These application
shells have been developed to allow teachers and students to write adventure
games, simulations and detective databases and to handle structured
information (Briggs, 1988; Nichol, Briggs, & Dean, 1987b). Application
shells are similar to expert system shells. Instead of a framework for
handling expertise, the shell provides a structure into which the student or
teacher can enter knowledge. The application shell then will provide access to
that knowledge, either answering questions or manipulating the knowledge to
provide simulations (Briggs, 1988).

Micro-PROLOG was chosen as a suitable language for implementing
"application shells" because of the ease with which it is possible to write
programs that manipulate other programs. Like other expert systems based
on micro-PROLOG (Law, Ogborn, & Whitelock, 1988), it is straightforward
to develop a language with which to describe knowledge for a particular
application and then to write an interpreter to manipulate that knowledge in a
particular way. Another advantage of using micro-PROLOG is that it is of a
sufficiently high level to allow a prototype to be designed and implemented
very quickly.
One of the Exeter programs, LINX, was used to create the CAL modules used in this study. LINX is a specific-purpose application shell which enables users to create textual programs with a branching tree structure. LINX is logical, powerful, well-structured and flexible (Dean, 1988). It provides a structure for writing CAL simulations or other programs (like CAL tutorials) which involve the user in decision-making. Teachers can write CAL programs using LINX by inserting their own structure and data. LINX also allows students to explore decision-making by providing a framework into which they can enter a network of possible decisions and consequences. The basic structure of LINX is shown in Figure 1. This figure shows that a LINX program takes the form of a decision tree with a branching structure of links and choices.

Insert Figure 1 about here

The resulting simulation or tutorial can be made more sophisticated by allowing consequences to be delayed or combined. The application shell, LINX, consists of procedures that allow students or teachers to enter, examine and even alter such information, and an interpreter allowing them to "run" the simulation or tutorial.

The CAL courseware which formed the focus of the present study covered the topic of decision-making in geography, and was designed specifically for a six-week segment in the Singapore school geography syllabus. In order to enhance the validity of conclusions from the evaluative study, a control group, which studied the same topic via the direct expository teaching methods common in Singapore, also was included in the study.
The CAL approach consisted of a sequence of instructions consisting of learning activities for the concept of decision-making, followed by a prescribed set of exercises. During the CAL lessons, students were presented with the necessary information. Students also were guided with instructions on the computer screens, were provided with practice exercises, and had their learning assessed. Feedback was provided contingent upon correct and incorrect responding.

To run the CAL programs, students type g for go from the menu. This puts the program in play mode. The play screen is divided into (1) a text window that describes the current event or instructions, (2) a choices window that offers the user the choices available at each stage in the program—or displays next if no choices are available, and (3) a function key window which lists the uses of each of the function keys.

The student can work through the program by selecting the relevant choices at each stage or using next when events are linked together with no choice of path. In addition, the student can select a function key to:

- look up information
- start again
- go back one step (i.e., looping)
- go back further (i.e., looping)
- review the students' notes
- trace where the student currently is in the lesson
- immediately stop the running of the lesson. If the lesson is restarted, the lesson will continue from where the student had left off.

In other words, the program is user-friendly and easy to run, and the looping and branching options allow students to check, retrace or skip parts
of the program. The student also can print a copy of the current screen or the whole lesson. But, whatever the students do, one of the function keys allows the students to look at the progress or various stages of their lessons, or the number of loops or branchings that they have performed. This can be displayed on the screen, or recorded on the diskette or printed out.

Effect Sizes for Achievement and Attitudes

The study involved 12 teachers, each in a different randomly selected school. In order to reduce the "teacher effect", each teacher taught one experimental and one control class. All schools were coeducational. The total number of students in these 24 classes was 671 (348 in the experimental group and 323 in the control group). Approximately equal numbers of males and females made up the sample. Students were slow learners in their second year of high school in Singapore (referred to as "Secondary Two Normal" students).

The instruments used to measure achievement in and attitude towards geography were developed and validated for the present study. The Geography Achievement Test (GAT) is a 30-item multiple-choice test which assesses the concept of decision-making in geography. The Semantic Differential Inventory (SDI) is a 20-item semantic differential instrument which measures students' attitudes towards learning geography. The alpha reliability coefficient for the whole sample was found to be 0.95 for the GAT and 0.94 for the SDI.

To investigate differences in students' achievement and attitudes between the CAL and control group, ANCOVA procedures were computed separately for the achievement and attitude measures. The three covariates used were students' primary school leaving examination scores, their
semester achievement scores and their pretest scores on the achievement or attitude measure.

For achievement, a significant $F$ value of 5 824.59 ($p<0.01$) confirmed the presence of a reliable treatment effect. With the covariates partialled out of the total variance, the $\eta^2$ statistics (i.e., the amount of variance accounted for) had the high value of 0.90. That is, about nine-tenths of the variance in posttest achievement scores could be attributed uniquely to the treatment beyond that accounted for by the three covariates. The effect size (in terms of the number of standard deviations of difference between the means of the CAL and control group) had the very large value of 3.5, with the difference favouring the CAL group.

For the attitude measure, the $F$ value was 630.13 ($p<0.01$) and the $\eta^2$ statistic was 0.52 after covariates were partialled out. The effect size was 1.4 standard deviations and differences favoured the CAL group.

Effect Sizes for Classroom Environment

Over the past 20 years or so, considerable progress has been achieved in the field of classroom environment research (Fraser & Walberg, 1991). Studies in numerous countries have shown that students' perceptions of their classroom environment account for appreciable amounts of outcome variance, often beyond that attributable to student aptitude (Haertel, Walberg, & Haertel, 1981). Curriculum evaluators have found that student perceptions of classroom environment have differentiated revealingly between alternative curricula even when outcome measures have shown negligible differences (Fraser, 1979, 1981; Walberg, 1975).

While research on students' perceptions of psychosocial characteristics of their classrooms is not new, studying the impact of microcomputers on
classroom learning environments is new. Most research on computers in school and classroom settings has been concerned with gender equity in computer learning (Levin & Gordon, 1989; Schubert, 1986; Sutton, 1991), the effectiveness of computer-assisted learning in terms of cognitive and affective outcomes (Kulik & Kulik, 1991), and student preference for software (Swigger, Campbell, & Swigger, 1983). Little research has involved the impact of computers on learning environments in education.

However, a study by Maor and Fraser (1992) examined the perceptions of 120 students and seven teachers of the learning environment in seven inquiry-based computer classrooms. Generally, students’ perceptions significantly increased on two of five classroom environment scales after using a computerised database. In line with Ellett’s plea for systematic research into the effects of newer educational technologies on learning environment characteristics (Ellett, 1986), and with Fraser’s general claim that any educational innovations should be evaluated in terms of their impact on classroom environment (Fraser, 1986), the present study incorporated an investigation of the effect sizes associated with CAL for classroom environment measures.

Because hitherto no classroom environment instrument tailor made for CAL settings existed, a new instrument was developed for the purposes of the present research (Teh & Fraser, 1993). The final version of this new instrument has four Likert-type scales with response alternatives for each item of Almost Never, Seldom, Sometimes, Often and Very Often. The scales are named Gender Equity, Investigation, Innovation and Resource Adequacy. Eight items are contained in each scale. Typical items are "The teacher pays more attention to boys' questions than to girls' questions" (Gender Equity),
"Students carry out investigations to answer questions coming from class discussions" (Investigation), "New and different ways of teaching are used in this class" (Innovation), and "There are enough computer programs available for our lessons" (Resource Adequacy). The scoring direction is reversed for almost half of the 32 items.

The initial development of the new questionnaire took cognisance of Moos's three general dimensions as they apply to all human environments (Moos, 1974). These three general dimensions are Relationship Dimensions (the nature and intensity of personal relationships within the environment), Personal Development Dimensions (the basic directions along which personal growth and self-enhancement tend to occur) and System Maintenance and System Change Dimensions (the extent to which the environment is orderly, clear in expectations, maintains control and is responsive to change). Table 2 shows that the four scales in the final version of the instrument provide reasonable coverage of the three different basic types of dimensions proposed by Moos. The development of the instrument also benefitted from a review of the literature for the purpose of identifying scales that are considered important in the unique environment of computer-assisted learning (Heywood & Norman, 1988; Levin & Gordon, 1989; Siann, Macleod, Glissov, & Durndell, 1990; Swan & Mitrani, 1990; Tolman & Allred, 1991; Wallace, 1989), and from comments and feedback obtained from geography teachers and students at the "Secondary Two" level in Singapore on draft versions of sets of items.

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Insert Table 2 about here

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Gender Equity was included in the instrument because a decade of research on gender equity in the CAL environment has shown that the use of computers maintained and exaggerated inequities (Sutton, 1991; Kirk, 1992), that equity issues are complex (Schubert, 1986; Sutton, 1991), that there are gender differences in achievement and attitudes towards computer usage (Hattie & Fitzgerald, 1987; Levin & Gordon, 1989; Siann, Macleod, Glissov, & Durndell, 1990; Sutton, 1991).

To investigate differences in students' perceptions of classroom environment between the experimental (computer) and control (non-computer) group, ANCOVA procedures were used again for the same sample with the same three covariates. A separate ANCOVA was computed for each of the four scales. A summary of the results for significance of differences between the perceptions of the computer and non-computer groups are reported in Table 3. The effect size (i.e., the number of standard deviations of difference between the experimental CAL group and the control group) for each of the four GCEI scales also is reported in Table 3.

Significant differences ($p<0.01$) emerged in the students' perceptions between the computer and non-computer group for all of the four scales, namely, Gender Equity, Investigation, Innovation and Resource Adequacy. Table 3 also reveals that the use of PROLOG-based computer-assisted learning was associated with an effect size of 1.0 standard deviations for Gender Equity, 1.9 standard deviations for Investigation, 1.7 standard deviations for Innovation and 1.5 standard deviations for Resource.
Adequacy. These differences favoured the CAL group in every case. Relative to control classes, the CAL classes were perceived to have greater gender equity, investigation, innovation and resource adequacy. The present study's findings in the context of computer-assisted learning are consistent with past studies on non-CAL classroom environments (Fraser, 1979, 1981, 1986; Walberg, 1975) in which learning environment measures have proved useful in curriculum evaluation.

Discussion

This study of the use of computer-assisted learning in school geography education in Singapore is distinctive because, first, the courseware made use of micro-PROLOG, second, research on CAL in geography education in Singapore hitherto has been non-existent and, third, past evaluations of CAL have not included an investigation of the effects of using CAL on the classroom psychosocial environment. It was found that appropriately-designed PROLOG-based CAL can be an effective instructional method in the classroom milieu, and that the educational application of micro-PROLOG as a learning tool in social science classrooms can be efficacious. While a myriad of studies have examined the effects of CAL, the number of studies examining the effect of PROLOG-based CAL is meagre at best. Hopefully, this study will serve as a catalyst for further research into the use of PROLOG in the classroom.

No systematic attempts previously have been made to examine the effects of CAL on learning environment characteristics. Little has been studied or is known about the impact of microcomputers on learning climates in education (Ellett, 1986). This study responds to the plea by Ellett (1986) and Lancy (1987) to fill the lacunae represented by the study of computers
and their impact on students. This study is significant because, in contrast to previous research, it uses PROLOG-based courseware developed by the investigators in assessing computer learning environments in schools. One of the study's original contributions was that a new classroom environment instrument was developed specifically for the unique setting of computer-assisted learning. It is likely that other researchers will find this new instrument useful in future studies of CAL classroom environments.

The major finding was that, in contrast to past research, the use of CAL in this study led to massive impact in terms of achievement (effect size of 3.5 standard deviations), attitudes (1.4 standard deviations) and classroom environment (ranging from 1.0 to 1.9 standard deviations). These figures can be compared with the effect sizes of 0.3-0.4 found in past meta-analyses of the effect of CAL on student achievement (Fraser, Walberg, Welch, & Hattie, 1987; Kulik & Kulik, 1991; Roblyer, Castine, & King, 1988). The large effect sizes arising from this study could be attributed to the way in which the PROLOG-based CAL courseware took cognisance of the curriculum objectives of the schools, the prerequisites of following the exact curriculum topics, and the integration of the courseware with the syllabus requirements of the schools. It seems that appropriate computer-based teaching is effective with low aptitude students (i.e., the Normal students), which is consistent with the meta-analysis of CAL effectiveness of Bangert-Drowns, Kulik and Kulik (1985). Replication and further related research is recommended, however, because of the uniqueness of the Singapore milieu.
References


Maor, D., & Fraser, B. J. (1992, March). *The learning environment as a focus for the evaluation of inquiry-based computer classrooms*. Paper
Effect Sizes for an Innovation in CAL

Presented at the annual meeting of the National Association for Research in Science Teaching, Boston, MA.


Table 1

*A Summary of 11 Meta-analyses of the Effects of Using CAL on Achievement*

<table>
<thead>
<tr>
<th>Area covered</th>
<th>No. of studies</th>
<th>No. of relationships</th>
<th>Overall $r$</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>College level</td>
<td>59</td>
<td>54</td>
<td>0.12</td>
<td>Kulik, Kulik, and Cohen (1980)</td>
</tr>
<tr>
<td>High school</td>
<td>51</td>
<td>48</td>
<td>0.16</td>
<td>Kulik, Bangert, and Williams (1983)</td>
</tr>
<tr>
<td>Mathematics</td>
<td>153</td>
<td>89</td>
<td>0.20</td>
<td>Hartley (1980)</td>
</tr>
<tr>
<td>Mathematics</td>
<td>15</td>
<td>126</td>
<td>0.03</td>
<td>Leong (1980)</td>
</tr>
<tr>
<td>Science</td>
<td>11</td>
<td>14</td>
<td>0.10</td>
<td>Aiello and Wolfe (1980)</td>
</tr>
<tr>
<td>Science</td>
<td>14</td>
<td>14</td>
<td>0.06</td>
<td>Willett, Yamishita, and Anderson (1983)</td>
</tr>
<tr>
<td>Mathematics &amp; science</td>
<td>101</td>
<td>68</td>
<td>0.26</td>
<td>Curbelo (1984)</td>
</tr>
<tr>
<td>Elementary schools</td>
<td>48</td>
<td>48</td>
<td>0.15</td>
<td>Niemiec (1985)</td>
</tr>
<tr>
<td>Elementary schools</td>
<td>25</td>
<td>25</td>
<td>0.23</td>
<td>Kulik, Kulik, and Bangert-Drowns (1984)</td>
</tr>
<tr>
<td>Drill &amp; practice</td>
<td>40</td>
<td>40</td>
<td>0.17</td>
<td>Burns and Bozeman (1981)</td>
</tr>
<tr>
<td>Tutorial work</td>
<td>40</td>
<td>40</td>
<td>0.22</td>
<td>Burns and Bozeman (1981)</td>
</tr>
<tr>
<td>Overall</td>
<td>557</td>
<td>566</td>
<td>0.15</td>
<td></td>
</tr>
</tbody>
</table>

Based on Fraser, Walberg, Welch, and Hattie (1987)
Table 2

Descriptive Information for GCEI Scales

<table>
<thead>
<tr>
<th>Scale name</th>
<th>Description</th>
<th>Moos's classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender Equity</td>
<td>Extent to which boys and girls are treated equally by the teacher</td>
<td>Relationship</td>
</tr>
<tr>
<td>Investigation</td>
<td>Extent to which the skills and processes of inquiry are used in problem-solving and investigation</td>
<td>Personal Development</td>
</tr>
<tr>
<td>Innovation</td>
<td>Extent to which the teacher plans new and varying activities and techniques, and encourages students to think creatively</td>
<td>System Maintenance</td>
</tr>
<tr>
<td>Resource Adequacy</td>
<td>Extent to which the computer hardware and software are adequate</td>
<td>System Maintenance</td>
</tr>
</tbody>
</table>
Table 3

A Comparison of Experimental and Control Groups on Classroom Environment Scales

<table>
<thead>
<tr>
<th>Scale</th>
<th>No. of items</th>
<th>$F$</th>
<th>Effect size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender Equity</td>
<td>8</td>
<td>219.66**</td>
<td>1.0</td>
</tr>
<tr>
<td>Investigation</td>
<td>8</td>
<td>809.14**</td>
<td>1.9</td>
</tr>
<tr>
<td>Innovation</td>
<td>8</td>
<td>703.63**</td>
<td>1.7</td>
</tr>
<tr>
<td>Resource Adequacy</td>
<td>8</td>
<td>504.28**</td>
<td>1.5</td>
</tr>
</tbody>
</table>

** $p<0.01$
Figure Caption

*Figure 1.* The structure of a LINX file
consequences can be carried forward

screens can be joined by choices

screens can be joined by link

Starting Event

Event 1

Event 2

Event 3

Event 4

Event 5

Category 1

Category 2

Text

Text

Starting text

Links by keywords

Text

Text