

MANAGING LONGITUDINAL RESEARCH: AN ACCOUNT OF THE FIRST SIX YEARS OF THE LONGITUDINAL LITERACY AND NUMERACY STUDY

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Acknowledgement

Since its inception in 1998, the LLANS project has drawn upon the expertise of a number of ACER researchers. The LLANS literacy and numeracy assessment tasks have been developed by members of the test development teams in the Assessment and Reporting Research Program. The Rasch analysis and scale construction was undertaken by Dr Ken Rowe, Director of the Learning Processes and Contexts Research Program, and Andrew Stephanou, Senior Research Fellow. Their work has made a significant contribution to the LLANS project.

Purposes

The ACER Longitudinal Literacy and Numeracy Study (LLANS) was designed to follow the growth in literacy and numeracy of a single cohort of students across the years of primary school. The key research question in this seven-year longitudinal study is: “What is the nature of literacy and numeracy development amongst Australian school children?” One way of responding to this question is to develop scales describing growth in literacy and numeracy. As a national longitudinal study, the LLANS has created an opportunity to develop achievement scales describing growth in literacy and numeracy from the very first year of schooling.

Theoretical framework

The LLANS is underpinned by the concept of developmental assessment. Developmental assessment makes it possible to obtain *an estimate of a student’s current location on a progress map as a guide to the kinds of learning experiences likely to be most useful at that stage in the student’s learning and as a basis for monitoring growth over time.* (Masters and Forster, 1997, p 1-2). Empirically derived scales, or progress maps, showing typical progression of development in an area of learning can provide a framework for reporting repeated measures of achievement for

the same students, thus showing growth over time. When students' achievements are located on the scales, the information can be used in a variety of ways. An individual student's growth over time can be described. The progress of groups of students can be compared over time. The relative achievement levels of particular cohorts of students can be identified at different stages or year levels of schooling. It is also possible to compare achievements in literacy and numeracy for the same cohort of students. The LLANS scales provide progress maps for literacy and numeracy.

Using Rasch measurement, the data from the series of LLANS assessments of the same national cohort of students has been used to construct scales showing growth in literacy and numeracy.

Methodology

A longitudinal design was chosen as the most appropriate means of identifying patterns of growth in literacy and numeracy achievement. In cross-sectional studies different students are assessed at a particular point in schooling, and this data is sometimes used to infer developmental patterns. A longitudinal design makes it possible to investigate growth by following the same cohort of students across the years of schooling, in order to identify the development in what students know and can do.

The sample

This longitudinal study involves children who commenced school in 1999. In 2004 the children are in their sixth year at school. One thousand children from a random Australia-wide sample of 100 schools, selected in proportion to the population size of each state and territory, formed the original cohort for the ACER Longitudinal Literacy and Numeracy Study (LLANS).

Ten students were randomly selected from class lists provided at the beginning of the 1999 school year by the 100 schools in the project, and the approval of the parents of these children was obtained. This created a total sample of 1000 students for the study. The starting age for schooling varies across the Australian states and territories, from 4.5 years to 5.11 years. As the cohort included students from all states and territories, the students would have been aged between 4.6 and 6 years old at the time of the first survey.

The data gathering schedule

Table 1 shows the data gathering schedule for each year of the study. In each survey, students complete assessments in literacy and numeracy. Two surveys were conducted in the first two years of school, to take account of the amount of learning that occurs in those years.

Table 1: LLANS data gathering schedule

1 st year* of school 1999	2 nd year of school 2000	3 rd year of school 2001	4 th year of school 2002	5 th year of school 2003	6 th year of school 2004	7 th year of school 2005
Survey 1 Term 1	Survey 3 Term 1					
Survey 2 Term 4	Survey 4 Term 4	Survey 5 Term 2	Survey 6 Term 2	Survey 7 Term 2	Survey 8 Term 2	Survey 9 Term 2

In Surveys 1 - 5, the assessments were conducted as interviews, with the teacher scoring the student's responses on a marking guide. From 2002, when the students were in their fourth year at school, the assessments took the form of pen and paper tasks. Teachers were given a six-week corridor of time in which to conduct the assessments.

The assessment tasks

The assessments tasks are of critical importance to this study. The LLANS tasks were developed through a rigorous process of collaborative work by ACER test developers, trialled in schools, and revised in the light of the outcomes of the trials. The tasks were designed to gather the expected wide range of responses from students in relation to particular skills and knowledge in literacy and numeracy.

Work on the LLANS tasks commenced in 1998, and a number of criteria shaped their development. The tasks were informed by contemporary research in literacy and numeracy, focusing on those aspects seen as essential to the development of effective literacy and numeracy skills.

The tasks for Surveys 1-5 were administered one-to-one in an interview situation by teachers, were designed to interest and engage students and were built around contexts familiar to students in the early years of school. The practicality of administration by teachers working with one student at a time was an important consideration, as was the duration of the assessments. The marking guides were a critical component of the assessment package, providing clear and explicit ways for teachers to judge and record students' responses during the course of the assessment interview. Clear instructions were provided to all teachers of the students involved in LLANS, in order to ensure standard conditions for the assessments. The clarity of the administration and scoring instructions was particularly significant in ensuring consistency and reliability of the data.

The series of literacy and numeracy tasks focused on critical aspects of literacy and numeracy, and included many hands-on activities and authentic texts, for example, high quality children's picture storybooks. The assessments for surveys 1-5 were conducted by the students' own teachers in one-to-one interviews, with the teacher

* We have used the terms '1st Year', '2nd Year' rather than Year 1 or Year 2, as the Australian states and territories currently use a range of nomenclature for the years of schooling. In July 2003 the Ministers for Education asked that a position paper be prepared to address the issue of the states and territories moving towards a more uniform starting age for schooling and common nomenclature by 2010.

recording students' responses on a marking guide specifically developed for each set of tasks.

Issues in conducting a longitudinal study

Developing assessment tasks

Developing assessment tasks, in literacy and numeracy, for seven linked surveys, has been a major initiative within the project.

Continuity across all surveys has been ensured by focusing on key aspects of literacy and numeracy. Each of the first five surveys for literacy included tasks on the following aspects of literacy:

Making Meaning from Text
Reading Fluency
Concepts about Print
Phonemic Awareness
Writing

Surveys 6-9 for literacy focused broadly on reading and writing. Tasks relating to the mathematical strands of number, measurement, space, chance and data have been included in all numeracy surveys. All numeracy surveys have included hands-on tasks, involving a range of materials: attribute shapes, counters, bundles of drinking straws, mirrors, dice and so on.

All materials required for the assessments have been provided to schools, to ensure that the tasks would be uniform. These have included readers and picture storybooks, calculators, rulers, charts, blocks, dice and a range of other items.

Nine LLANS numeracy assessments will have been developed by the end of the study. Five new literacy assessments were developed for surveys 1-5, and the ACER DART (Development Assessment Resource for Teachers) assessments for reading and writing were used in surveys 6-9.

The assessment tasks have been designed to model good assessment practice for schools.

Data collection

Keeping schools informed of the study and the annual assessment schedules has been an important management issue throughout the study. Different teachers have been involved each year as students have progressed through the school. Information about the study has therefore been sent to all schools each year. Where new principals have taken over, further information has often been requested.

The database of students has schools has been continually updated so that to distribution of assessments has been accurate and targeted.

Late returns of completed assessments have been specifically followed up in order to maximise the amount of data collected.

Maintaining the cohort

During the course of the study many students have transferred to other schools, and some are no longer participating in the study, for a variety of reasons. A small number of students have repeated a year of schooling, some of the original schools found it difficult to continue, and some students have changed schools. Over 200 schools are now involved in the study, many with a single student, who has transferred from another school.

Several difficulties have been encountered in maintaining the size of the cohort. For example, when a student transfers to a different school, if the original school knows the student's destination, we have been able to approach the student's new school seeking their support for her continuation in the study. Almost all principals have agreed to our request. When the original school does not know the student's destination, it is not possible for us to track this student. However, by the end of 2003, 720 students remained on the LLANS database. Assessment tasks will be sent to these students for Survey 8 in May 2004.

Data analysis

The full set of data from the surveys so far completed is extensive, and matters of data entry and analysis have required careful attention. In September 2004, a full review of all data, in literacy and numeracy, for the first seven surveys was undertaken. This work has laid the basis for further analysis, and the completion of the LLANS described scales.

The final joint analysis of surveys 1 – 7 for literacy and numeracy indicates the broad range of achievement, and the scope of the LLANS scales.

Findings

The major findings from this study will be derived from the analysis of the full set of longitudinal data. To date, the development of the LLANS scale is a significant outcome.

The value of the LLANS early years tasks has been recognised in two further national projects. A longitudinal literacy and numeracy study of Indigenous Australian students has been following a year behind the LLANS project, using the LLANS tasks and reporting progress against the LLANS scales (Frigo, 2004). The LLANS assessment tasks were chosen for this project *as being consistent with good assessment practice for Indigenous students: they are designed to take place in a meaningful context, administered on a one-to-one basis, include many- hands-on activities that use familiar classroom materials, they emphasise process as well as product and are in line with State/Territory curricula* (Frigo, 2004).

Effective practices for teaching literacy in the early years of school were investigated in a three year study funded by the Australian Government (Louden, 2004). In this study, the LLANS tasks were used with two national cohorts of Australian children in the first year of the study.

The first cohort of 1000 children in their first year at school completed the first set LLANS literacy tasks early in their first year at school, and the second set of LLANS assessment tasks at the end of their first year at school. Another cohort of 1000 children in their second year at school undertook the third and fourth LLANS literacy assessments at the beginning and end of the school year. A value-added analysis of the repeated measures for each group was undertaken, taking account of background variables and prior achievement in order to identify those teachers where the students' growth between the first and second assessment was better than might be expected. The classrooms of these teachers became the sites for close investigations of the literacy teaching practices of these teachers.

Conclusion

The LLANS study has provided insights into development in literacy and numeracy in the early years. The LLANS literacy and numeracy scales can be used to report growth over time. The tasks and scales have been used in two other significant studies. The study will continue until the students who became involved in the LLANS project in 1999 make the transition to secondary school.

References

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