Population measures and the ALL Survey

It's not just about numbers - numeracy and Australian training

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For further information about the Adult Literacy and Lifeskills survey please feel free to contact Dave Tout at CAE on davet@cae.edu.au or phone 03 9657 8118

Background to ALLS - The Adult Literacy and Lifeskills Survey (ALLS)

- Its predecessor, the International Adult Literacy Survey (IALS) was run in Australia 10 years ago
- Data collection for the survey was undertaken by ABS in late 2006 into early 2007
- Representative sample of almost 9000 adults surveyed – aged 15-74 years.
- Excluded remote indigenous adults
- Survey is an international survey developed by Statistics Canada and the United States’ Educational Testing Service coordinated with the OECD.
Background to ALLS

ALLS in Australia measured:

- **Prose Literacy** - the knowledge and skills needed to understand and use information from text including editorials, news stories, poems and fiction
- **Document Literacy** - the knowledge and skills required to locate and use information contained in various formats including job applications, payroll forms, transportation schedules, maps, tables and graphics
- **Numeracy** - the knowledge and skills required to effectively manage and respond to the mathematical demands of diverse situations
- **Problem Solving** - the knowledge and skills required to identify a problem, search for relevant information and integrate it into a coherent problem representation, evaluating the problem situation with respect to given goals and criteria, devising a plan and monitoring its execution.
- **Health Literacy** - The knowledge and skills required to understand and use information relating to health issues such as drugs and alcohol, disease prevention and treatment, safety and accident prevention, first aid, emergencies, and staying healthy.

Background to ALLS

The items/questions

- The tasks were, as much as is possible in a large scale testing situation, based on adult contexts and ‘real-life’ scenarios and texts, and were open ended.
- The items are based upon simulated texts such as advertisements, newspaper articles, instructions, maps, diagrams and plans, photos, etc.
- Items can be adapted to meet national requirements re language, terminology, units, etc.
- A ruler and calculator are provided to respondents for use in the numeracy items
Background to ALLS
The booklets

- The Core Task Booklet consists of six prose, document and numeracy tasks to determine the respondent's ability to undertake further skills assessment.
- Each respondent who correctly answers three questions from the Core Task Booklet were asked to complete a Main Task Booklet.

Background to ALLS
The booklets

- The Main Task Booklets for the ALLS survey are compiled using any two of eight assessment blocks of items (~ 20 questions ea).
- Respondents get different booklets – it is the items that are in effect assessed - not the respondent.
Background to ALLS

Why was numeracy included?

- Numeracy seen as another potential key indicator of skills to be assessed alongside literacy

- Numeracy vs quantitative literacy
- Definition and description
- Construct – framework
- Complexity scheme
- Feasibility AND pilot studies
- Statistical validity and reliability
- Selection of final set of items
- 4 years work
Background to ALLS
Why was numeracy included?

The description of numeracy

Numeracy behavior involves:
managing a situation or solving a problem in a real context
everyday life
work
social
further learning
by responding
identifying or finding
setting up
• determine
• construct
• relate
• formulate
• reason
• model
interpreting
comunicating about
information about mathematical ideas
quantity & number
dimension & shape
data & chance
change
that is represented in a range of ways
objects & pictures
numbers & symbols
formula
diagrams & maps
graphs
tables

and requires activation of a range of
enabling knowledge, behaviors, and processes
mathematical knowledge and understanding
mathematical problem-solving skills
literacy skills
beliefs and attitudes.
Background to ALLS: Background Questionnaire

BQ includes almost 300 questions about:

- Demographics
- Education
- Language
- Parental Information
- Labour Force
- Literacy and Numeracy Practices at work
- Literacy and Numeracy Practices generally
- Participation in Education and Learning
- Social Capital and Well Being
- Use of Technologies
- Income
Background to ALLS: Background Questionnaire

Literacy and Numeracy Practices at work:
- How often reads letters, memos or emails
- How often reads or uses reports, articles, magazines or journals
- How often reads or uses manuals or reference books including catalogues
- How often reads or uses diagrams or plans
- How often reads directions or instructions
- How often reads or uses bills, invoices, spreadsheets or budget tables
- How often writes or fills in letters, memos or emails
- How often writes or fills in reports, articles, magazines or journals
- How often writes or fills in manuals or reference books including catalogues
- How often writes or fills in directions or instructions

- How often writes or fills in bills, invoices, spreadsheets or budget tables
- How often measures or estimates the size or weight of objects
- How often calculates prices, costs or budgets
- How often counts or reads numbers to keep track of things
- How often manages time or prepares timetables
- How often gives or follows directions or uses maps or street directories
- How often uses statistical data to reach conclusions
- Has reading skills in English to do main job well
- Has writing skills in English to do main job well
- Has maths skills to do main job well
Background to ALLS: The levels

- As in IALS, the literacy, numeracy and problem solving ability will be expressed as a score on a scale ranging from 0-500 points. The score is the point at which a person has an 80% chance of successfully performing tasks at that level.
- The scale is grouped into five levels. Level 3 is considered the level adults require to cope with the demands of everyday life and work.
- The 5 levels do not directly correlate to the 5 levels of the Australian National Reporting System (NRS) or its revision, the Australian Core Skills Framework (ACSF). The NRS into account support and context, for example.

Background to ALLS: The items

Sample Level 1 Literacy item
Background to ALLS: The items

Sample Level 5 Numeracy item

Handy financial hint
For a quick way to estimate how much your investment is worth, use this formula:

\[ A = P(1 + r)^t \]

- \( A \) = new amount after the time period.
- \( P \) = principal (the amount you invest)
- \( r \) = interest rate
- \( t \) = time period in years

Sample Level 1 Numeracy item (from Core booklet)

Background to ALLS: The items

Nationwide Manufacturing Company Union Council

ELECTION RESULTS

Meeting date: June 23, 2000

The election of a new member of the union council for election group 3, at the Corner plant took place on June 30, 2000.

The results of the election were as follows:

<table>
<thead>
<tr>
<th>Candidates</th>
<th>Number of votes</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Smith</td>
<td>120 votes</td>
</tr>
<tr>
<td>M.A. Holland</td>
<td>80 votes</td>
</tr>
<tr>
<td>D.P. Barnes</td>
<td>29 votes</td>
</tr>
</tbody>
</table>

Consequently Mr. A. Green was formally elected as member of the Union Council for Nationwide Manufacturing Company.

In accordance with article 14, paragraph 2 of the union council bylaws, any interested party may lodge a complaint with the council within one week after publication of these results.

For the election committee:
C. Moore,
Information Bulletin No. 40

Samuel date: July 4, 2000
Background to ALLS: The items

Sample Level 5 Literacy item

Background to ALLS: Limitations

- ALLS does only provide a statistical 'snapshot' of the performance and abilities of the adult population in relation to a reading test of literacy, numeracy and problem solving.
- Survey assessment items can only imitate real life literacy and numeracy tasks. Authenticity and validity are limited by the requirement for written responses with no allowance for oral interaction.
- There is no assessment of writing skills per se and no writing scale has been developed.
- The emphasis is on information processing via reading.
- As such, ALLS is a survey about 'aspects' of literacy and numeracy, not the whole spectrum of literacies or numeracies that are part of today’s society.
- As well, the survey only deals with English and an international/global view of English at that.
Background to ALLS: What it can do

- Provides a statistical ‘snapshot’ of the performance and abilities of the adult population.
- Reinforces the complexity of literacy/literacies/numeracies
- Comparability - can compare performances (internationally/statewise/against population categories/characteristics) and look for factors and influences etc.
- Tells us something we would otherwise not know – dispel the myth of 100% literacy.
- Ammunition for the adult LLN field.
- Source of data for further research.
- Use the research and theories behind the scales – complexity of text and task, complexity of numeracy tasks, ask questions!

The results from ALLS so far

Number and proportion of persons in each group with skill levels 1 or 2

<table>
<thead>
<tr>
<th></th>
<th>Prose literacy scale</th>
<th>Document literacy scale</th>
<th>Numeracy scale</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1,000s</td>
<td>%</td>
<td>1,000s</td>
</tr>
<tr>
<td><strong>Australia:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>7,002.9</td>
<td>46.4</td>
<td>7,066.9</td>
</tr>
<tr>
<td><strong>Victoria:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1,843.0</td>
<td>48.7</td>
<td>1,859.0</td>
</tr>
</tbody>
</table>
The results from ALLS so far

Number and proportion of persons in each group with skill levels 1 or 2

Health literacy scale

<table>
<thead>
<tr>
<th></th>
<th>1,000s</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia:</td>
<td>8,980.3</td>
<td>59.5</td>
</tr>
<tr>
<td>Victoria:</td>
<td>2,310.7</td>
<td>61.1</td>
</tr>
</tbody>
</table>

Per cent of adult population at document literacy levels 1-5:
Compared to 1996, of the people who migrated to Australia in the five years prior to the survey whose first language was not English, there was a statistically significant increase in the proportion of people attaining literacy scores of Level 3 or above on both the prose and document scales. On the prose scale, the proportion of this group with scores at Level 3 or above increased from 22% to 38% while on the document scale the proportion increased from 32% to 50%.
The results from ALLS so far

Document literacy and schooling

Education vs ALLS performance

- Levels 4/5
- Level 3
- Level 2
- Level 1

Years of formal schooling

Percentage at ALLS levels

10 or less | 11 to 15 | 16 to 20 | 21 or more

The results from ALLS so far

Numeracy and schooling

Education vs ALLS performance

- Levels 4/5
- Level 3
- Level 2
- Level 1

Years of formal schooling

Percentage at ALLS levels

10 or less | 11 to 15 | 16 to 20 | 21 or more
The results from ALLS so far

Males significantly outperformed females on numeracy:

- **47.5%** of males are at levels 1 or 2
- **57.6%** of females are at levels 1 or 2
- A difference of over 10%!

The results from ALLS so far

**Age**

- Age and skills are inversely related. Younger cohorts tended to score higher on average and also had larger proportions at higher skill levels.
The results from ALLS so far

Educational attainment
• Persons whose highest qualification was a Bachelor Degree or above consistently outperformed those whose highest qualification was an advanced diploma/diploma or below, particularly on the problem solving domain.
• Persons without a qualification who had completed school to Year 12, achieved higher skill levels than those who had completed school to Year 11 only, and similarly those who had completed to Year 11 achieved higher skill levels than those who had completed school to Year 10 or below.

Employment
• Employed persons had higher literacy levels on average than those who were unemployed or not in the labour force.
• Regardless of full-time or part-time status, a greater proportion of employed persons had a skill level of 3 or higher across all scales, than either unemployed people or those who were not in the labour force.

Participation in education and learning
• Those with lower literacy levels were less likely to have participated in course-based learning over the last 12 months.
The results from ALLS so far

Income
• There is a strong association between prose skill level and median personal gross weekly income. For example, those with a skill level of 1 had a median income of $205 less per week than those with a skill level of 2. This gap in income potential remained fairly steady as people moved up the skill levels. For example, the difference between those with a skill level of 2 and 3 was $192.

Information Communication Technology
• There is a relationship between high literacy levels and greater computer and internet use, as well as the range of computer/internet skills that people have
• However, regardless of skill level, a very high proportion of 15-24 year olds used the internet particular for browsing, on a daily basis or a few times a week. Also regardless of skill level, few people aged 55 years and over used the internet on a daily/weekly basis

The results from ALLS so far

Questions, questions?

• What are the literacy and numeracy skill requirements of training, on-the-job requirements, the content of VET courses and Training Packages and training materials? Do we know? How do these compare with what ALLS is saying potential learners and participants have?
• What are the implications for the training system? Which groups of adults are we targeting in our industry? What skills do they have? How do we support them? Do we support them?
• Are teachers and trainers able to cope with learners with low levels of LLN? Do we support them?
• What are the social capital implications? What are the connections between the literacy and numeracy performance of adults as measured by ALLS relate to or impact on social capital outcomes? Do they?
And what about numeracy?

From IALS we know:

- The proportion of individuals with Level 1 skills exerts a strong negative drag on growth in GDP per capita so one could realise quite large economic gains by investing in the bottom.
- The skill levels of women seem to matter more to the growth in GDP than those of men.

Ref: Coulombe, Tramblay & Marchand (2004)

The initial ALLS data supports other research data from the UK that indicates the strong role that numeracy plays in both human and social capital terms.

- People without numeracy skills suffered worse disadvantage in employment than those with poor literacy skills alone. … Women with numeracy difficulties appeared especially vulnerable to exclusion from the clerical and sales jobs to which they aspired (Bynner & Parsons, 1997, p. 27).
- For women, while the impact of low literacy and low numeracy is substantial, low numeracy has the greatest negative effect, even when it is combined with competent literacy. … Poor numeracy skills make it difficult to function effectively in all areas of modern life, particularly for women. (Bynner & Parsons, 2005, p. 7)

What does this mean about increasing the numeracy competence of women? What do we do now in numeracy (and maths) teaching and practices that disadvantages women/girls?
And what about numeracy?

Have we learnt anything?
For example: “it is clear from the results that when people have poor literacy skills, they have even worse numeracy skills. The need to upgrade numeracy skills in the context of literacy must be taken into account of in all decisions to raise the level of adult literacy in Australia” (Wickert, 1990)

What policy or program actions have we taken in relation to numeracy? Literacy versus numeracy – is it an equal partnership? Is numeracy buried and not even bolted on? At the policy, program and funding level? At the provider level? At the classroom level?

And what about numeracy?
- How do we address the gender issues and priorities?
- What is the overlap between literacy and numeracy?
- What are the population characteristics associated with adults with low numeracy? Are these the same as for literacy? Is low numeracy concentrated among some population groups?
- What are the labour market outcomes for those with low numeracy? Are they concentrated in certain occupations? Industrial sectors?
- What are the implications for VET training and curriculum?
- What are the implications for school maths curriculum and teaching?
And what about numeracy?

For numeracy educators and researchers can we find out more information about teaching and learning…

- What’s harder for (some) people and easier for others?
- What factors make items more difficult?
- What factors impact on success in numeracy?
- What about the influence of the facets? (context, type of response, other features)

And what about numeracy?

Other research is now happening

Recent NCVER Research (eg FitzSimons et al. 2005, Marr & Hagston, 2007) have found that endeavours to research the mathematics related skills valued and used in workplaces are complicated by the phenomenon of ‘invisibility’ of numeracy. By this they mean that workers are not conscious of using mathematical skills at work, even when they use them frequently. This is partly owing to the negative self-image held by many workers with respect to mathematics and numeracy skills. This negative self-image causes them to assume that any operations they are capable of undertaking must be common sense rather than mathematics.

Another factor in the invisibility of numeracy is the highly contextual nature of mathematically related workplace tasks that are frequently intertwined with other skills or procedures and the skills don’t relate to ‘school mathematics’, and so are not appreciated or recognised as mathematics or numeracy.
And what about numeracy?

It’s not just about numbers!

- Numeracy isn’t just about numbers – it’s about a wide range of maths skills – measurement, stats & data, dimension & space, algebra and numbers? And it includes the messiness of problem solving, reading, writing and talking!
- It’s not just about the staggering stats of ALLS – and whether we beat NZ or the USA!!?? It’s what’s behind the numbers – we need to ask questions: Who? Why? How? What? Where? When?

Some References

- Bynner, John & Parsons, Samantha (2005) Does numeracy matter more?, National Research and Development Centre for Adult Literacy and Numeracy (NRDC), London
- Hagston, Jan, (2002) Exploring the International Adult Literacy Survey data: Implications for Australian research and policy, Language Australia, Melbourne