

# Population measures and the ALL Survey

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

*Dave Tout, CAE & Multifangled*

davet@cae.edu.au



For further information about the Adult Literacy and Lifeskills survey please feel free to contact Dave Tout at CAE on [davet@cae.edu.au](mailto: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



## Background to ALLS

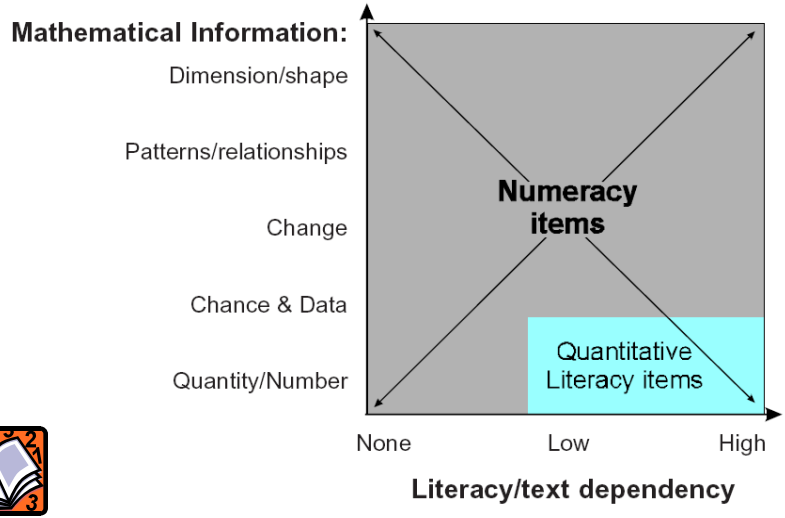
### Why was numeracy included?

- 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?



# Background to ALLS

## Why was numeracy included?

### The description of numeracy

Numerate behavior involves:

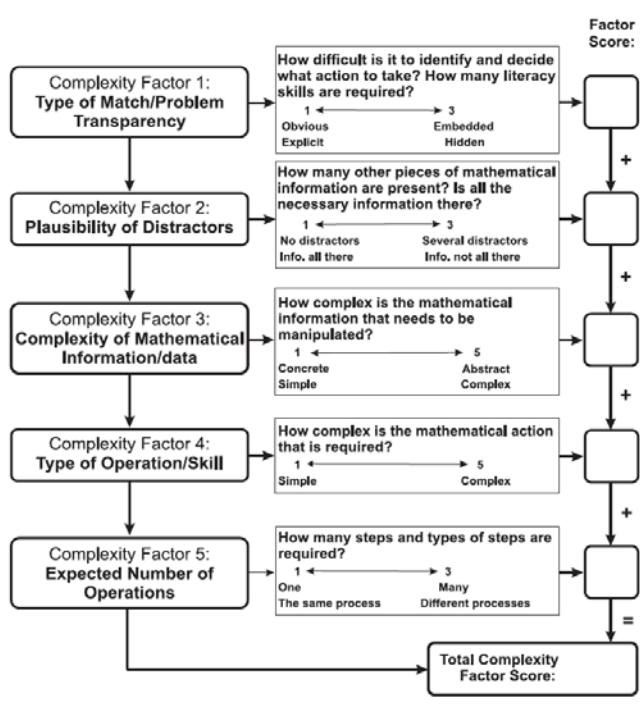
- managing a situation or solving a problem in a real context
  - everyday life
  - work
  - societal
  - further learning
- by responding
  - identifying or locating
  - acting upon:
    - order/sort
    - count
    - estimate
    - compute
    - measure
    - model
  - interpreting
  - communicating about
- to information about mathematical ideas
  - quantity & number
  - dimension & shape
  - pattern and relationships
  - data & chance
  - change
- that is represented in a range of ways
  - objects & pictures
  - numbers & symbols
  - formulae
  - diagrams & maps
  - graphs
  - tables
  - texts
- 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

### Why was numeracy included?

### The Complexity scheme



## 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



## Background to ALLS: Background Questionnaire

### Literacy and Numeracy Practices at work:

- 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

**MEDCO ASPIRIN** 500

INDICATIONS: Headaches, muscle pains, rheumatic pains, tooth-aches, earaches. RELIEVES COMMON COLD SYMPTOMS.

DOSAGE: ORAL. 1 or 2 tablets every 6 hours, preferably accompanied by food, for not longer than 7 days. Store in a cool, dry place.

CAUTION: Do not use for gastritis or peptic ulcer. Do not use if taking anticoagulant drugs. Do not use for serious liver illness or bronchial asthma. If taken in large doses and for an extended period, may cause harm to kidneys. Before using this medication for chicken pox or influenza in children, consult with a doctor about Reyes Syndrome, a rare but serious illness. During lactation and pregnancy, consult with a doctor before using this product, especially in the last trimester of pregnancy. If symptoms persist, or in case of an accidental overdose, consult a doctor. Keep out of reach of children.

INGREDIENTS: Each tablet contains  
500 mg acetylsalicylic acid.  
Excipient c.b.p. 1 tablet.  
Reg. No. 88246



0 67736 11079 1


Made in Canada by STERLING PRODUCTS, INC.  
1600 Industrial Blvd., Montreal, Quebec H9J 3P1



Sample Level 1 Literacy item



## Background to ALLS: The items



**INVESTMENT**

**DOUBLE YOUR MONEY  
IN 7 YEARS**

10% fixed interest each year, over a period of 7 years  
Minimum deposit \$1000.00

### 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 5 Numeracy item

## Background to ALLS: The items

Nationwide Manufacturing Company Union Council

### ELECTION RESULTS

Posting Date: June 22, 2000

The election of a new member of the Union Council for election group 3, at the Carver plant took place on June 21, 2005.

The results of the election were as follows:

<u>Candidates</u>	<u>Number of votes</u>
A. Greer	120 votes
H.A. Holliday	80 votes
G.F. Reynolds	29 votes

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

In accordance with article 16, paragraph 1 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:  
K. Moore,  
Information Bulletin No. 40

Removal date: July 6, 2000

Sample Level 1 Numeracy item  
(from Core booklet)



# Background to ALLS: The items

Sample Level 5 Literacy item



### RATINGS

#### Clock radios

Listed by type, with types, listed in order of overall score. Differences in score of 4 points or less were not deemed significant.

1 Brand and model. If you can't find a model, call the company. Phone numbers are listed on page 735.

2 Price. The manufacturer's suggested or approximate retail price, followed by the large advertised price.

3 Dimensions. Tone measurement.

4 Overall score. A composite, encompassing all our tests and judgments. A five-point radio would have earned 100 points.

5 Convenience. This composite judgment reflects such things as the legibility of the display, the ease of tuning the radio and setting the alarm, and the presence or absence of useful features.

6 Performance. An overall judgment reflecting performance in our tests of sensitivity and selectivity, tuning ease, station ratio, the ability to bring in the stronger of two stations on the same frequency, charge rejection, the ability to ignore signals from just above the band, resistance to interference, signals bounding off-aircraft and such.

7 Sensitivity. How well each radio received a station with little interference.

8 Selectivity. How well each radio received clearly a weak station next to a strong one on the dial.

9 Tone quality. Based mainly on computer analysis of the speaker's output and listening tests, using music from CKX. How clear produced high-fidelity sound.

10 Reversible time-setting. This useful feature makes setting clock and alarm times easy. If you overshoot the desired setting, you simply back up.

11 Dual alarm. Lets you set two separate wake-up times.

Brand and model	Price	Dimensions (H x W x D)	Overall Score	Convenience	Performance	Sensitivity	Selectivity	Tone Quality	Reversible Time-Setting	Dual Alarm	Comments	
<b>Full-featured clock radios</b>												
RCA RP-3690	100-040	8x2x18 85	85	3	4	5	5	5	5	5	✓ 12 A B D H J L O T U	A
Sony ICF-C303	90-045	5x2x18 84	84	3	4	5	5	5	5	5	✓ 12 C E F J L T	C
Panasonic RC-X220	80-045	10x2x13 82	82	3	4	5	5	5	5	5	✓ 12 A G K M O S T U	B & D
Realistic 272	60-000	5x2x15 79	79	3	4	5	5	5	5	5	✓ 3 A G H K O T	D
Magnavox A13900	85-000	15x3x13 78	78	3	4	5	5	5	5	5	✓ 3 O G K M O R T	B & D
Emerson AQ2745	30-020	8x2x18 70	70	3	4	5	5	5	5	5	✓ 3 O G	B & K
Soundesign 3753	20-020	8x2x13 62	62	3	4	5	5	5	5	5	✓ 3 J Q	B & Z
<b>Basic clock radios</b>												
Realistic 263	28-18	10x2x10 74	74	3	4	5	5	5	5	5	--- 3 A D H O P U	h
Soundesign 3622	12-110	5x2x13 68	68	3	4	5	5	5	5	5	--- 3 U	g
Panasonic RC-4904	13-115	5x2x13 67	67	3	4	5	5	5	5	5	--- 12	B & e
General Electric 7-4612	13-130	5x2x13 66	66	3	4	5	5	5	5	5	--- 12 A D	A g
Lloyds CR001	20-115	5x1x13 64	64	3	4	5	5	5	5	5	--- 3 U	---
Sony ICF-C240	15-113	5x1x15 63	63	3	4	5	5	5	5	5	--- 12	g
Emerson AQ2720	19-110	5x2x13 61	61	3	4	5	5	5	5	5	--- 3 O T	a
Gran Prix D507	15-110	5x1x10 54	54	3	4	5	5	5	5	5	--- 3	d
<b>Clock radios with cassette player</b>												
General Electric 7-4965	80-000	10x3x15 85	85	3	4	5	5	5	5	5	✓ 12 A D G H K O S T	--- B E
Panasonic RC-X250	110-000	10x3x13 78	78	3	4	5	5	5	5	5	✓ 12 A G K O R U	B & A H
Sony ICF-ZS650	72-000	15x2x15 74	74	3	4	5	5	5	5	5	✓ 12 G R T U	g H A F H
Soundesign 3844MoY	40-300	13x3x13 62	62	3	4	5	5	5	5	5	--- 3 O K J S U	F G I M

[1] Discontinued. Replaced by RC-X260, \$79 list and \$60 average advertised sale price.

**Features in Common**  
A: "Power" alarm tone of about 3 secs. • "Alarm"  
B: "Time" setting, timing, and power buttons.  
C: "Display" area shows time and date.  
D: "Display" has high-low frequency radio.  
E: "Display" has larger digits than most.  
F: "Night" light—glows for 30 sec after  
G: "Auto" reset time control.  
H: "Sleep" time-out to 10 min, repeating.  
I: "Power" time-out to 10 min, repeating.  
J: "Memory" recall of 12 stations.  
K: "Memory" recall of 12 stations.  
L: "Memory" recall of 12 stations.  
M: "Memory" recall of 12 stations.  
N: "Memory" recall of 12 stations.  
O: "Memory" recall of 12 stations.  
P: "Memory" recall of 12 stations.  
Q: "Memory" recall of 12 stations.  
R: "Memory" recall of 12 stations.  
S: "Memory" recall of 12 stations.  
T: "Memory" recall of 12 stations.  
U: "Memory" recall of 12 stations.  
V: "Memory" recall of 12 stations.  
W: "Memory" recall of 12 stations.  
X: "Memory" recall of 12 stations.  
Y: "Memory" recall of 12 stations.  
Z: "Memory" recall of 12 stations.

## 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

Prose literacy scale		Document literacy scale		Numeracy scale	
1,000s	%	1,000s	%	1,000s	%
<b>Australia:</b>					
7,002.9	46.4	7,066.9	46.8	7,935.6	52.5
<b>Victoria:</b>					
1,843.0	48.7	1,859.0	49.2	2,055.1	54.3



## The results from ALLS so far

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

Health literacy scale  
1,000s      %

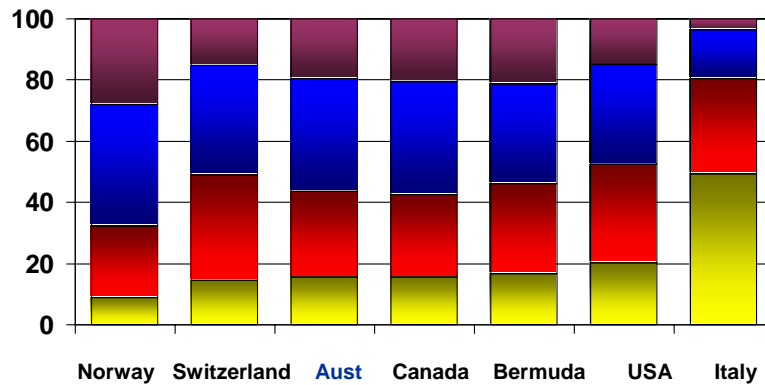
Australia:  
8,980.3    59.5

Victoria:  
2,310.7    61.1



## The results from ALLS so far

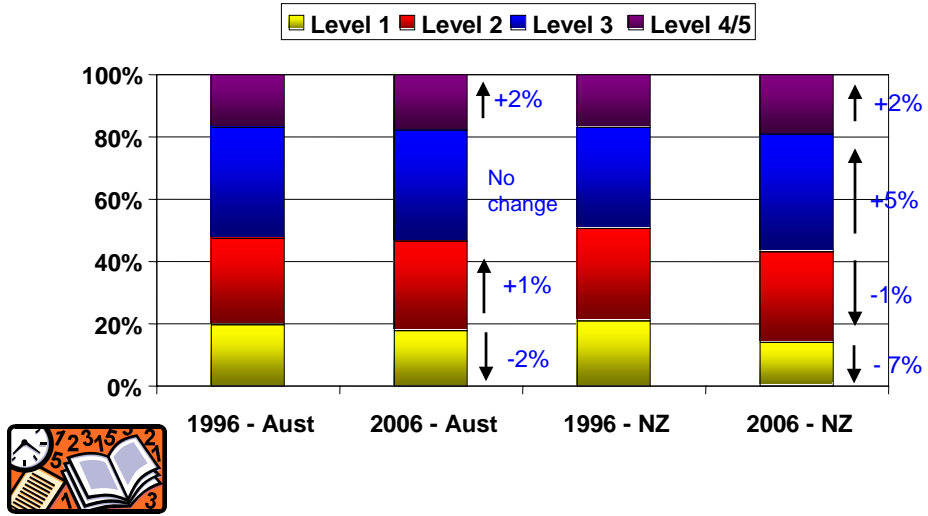
Per cent of adult population at document literacy levels 1-5:  
%



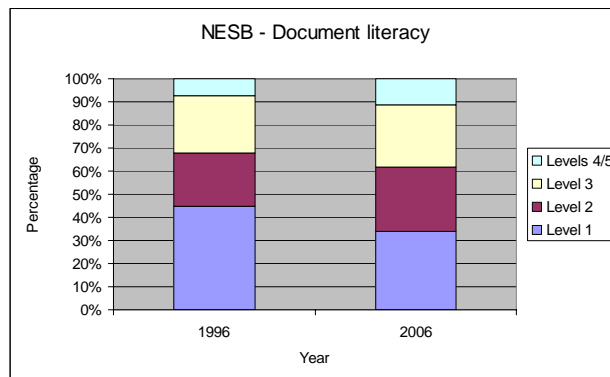
■ Level 1     
 ■ Level 2     
 ■ Level 3     
 ■ Level 4/5

# The results from ALLS so far

Our nearest neighbours: Document literacy in Oz vs NZ



# The results from ALLS so far

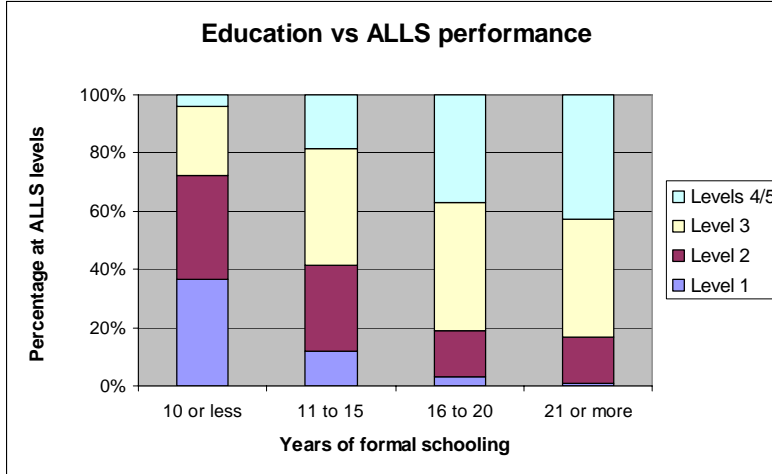


Compared to 1996, of the people who migrated to Australia in the five years prior to the survey whose first language was not English, there was a statistically significant increase in the proportion of people attaining literacy scores of Level 3 or above on both the prose and document scales. On the 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%



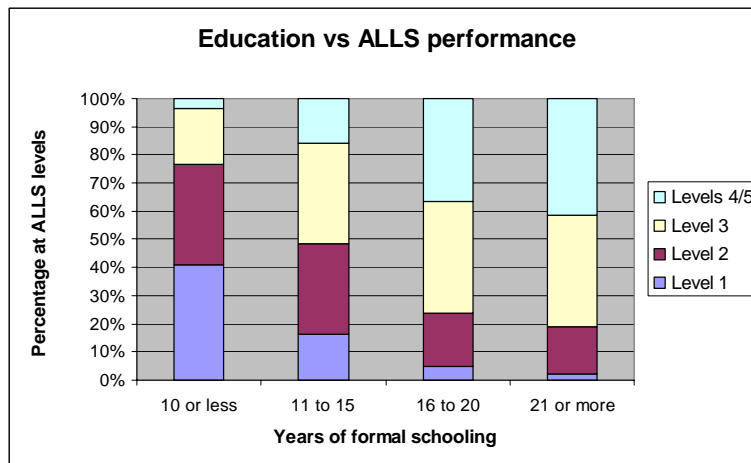
# The results from ALLS so far

## Document literacy and schooling

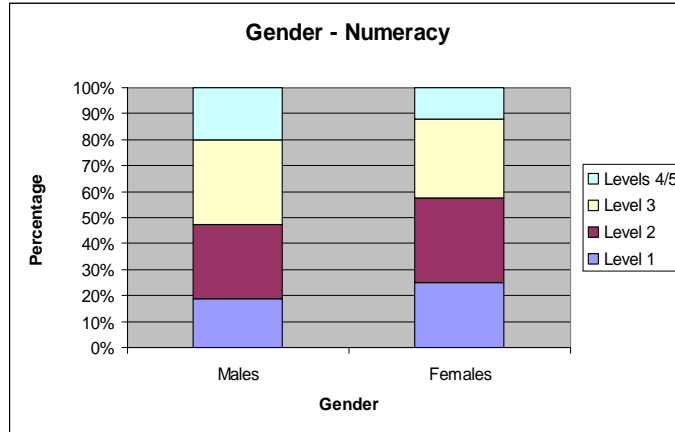


# The results from ALLS so far

## Numeracy and schooling



## 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**

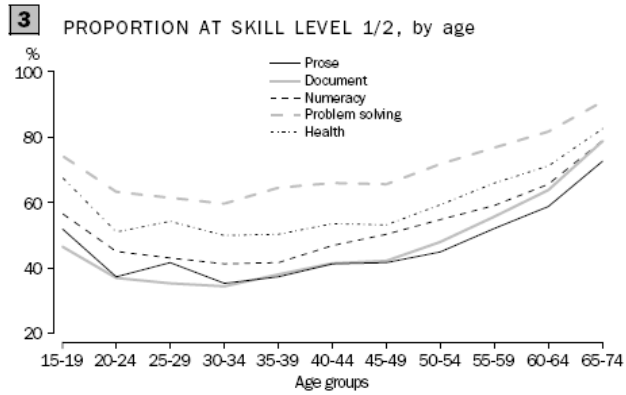
**A difference of over 10%!**



## 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.



## The results from ALLS so far

### 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, Trambly & Marchand (2004)*



## And what about numeracy?

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

- Australian Bureau of Statistics, (2007) *Adult Literacy and Life Skills Survey: Summary results, Australia* (cat. no. 4228.0), Australian Bureau of Statistics, Canberra
- Bynner, John & Parsons, Samantha (2005) *Does numeracy matter more?*, National Research and Development Centre for Adult Literacy and Numeracy (NRDC), London
- Bynner, John and Parsons, Samantha (1997) *Does numeracy matter? Evidence from the National Child Development Study on the impact of poor numeracy on adult life*, Basic Skills Agency, London
- Coulombe, Serge; Trambly, Jean-Francois & Marchand, Sylvie. (2004) *Literacy scores, human capital and growth across fourteen OECD countries*, Statistics Canada, Ottawa
- Desjardins, Richard; Murray, Scott; Clermont, Yvan & Werquin, Patrick (2005) *Learning a living: First results of the Adult Literacy and Lifeskills Survey*, Statistics Canada, Ottawa (downloadable through the Statistics Canada Website at: <http://www.statcan.ca/bsolc/english/bsolc?catno=89-603-XWE>)
- FitzSimons, G., Mlcek, S., Hull, O. & Wright, C. 2005, *Learning numeracy on the job: A case study of chemical handling and spraying*, NCVET, Adelaide.
- Gleeson, Lynne, 2005, *Economic returns to education and training for adults with low numeracy skills*, NCVET, Adelaide.
- Hagston, Jan, (2002) *Exploring the International Adult Literacy Survey data: Implications for Australian research and policy*, Language Australia, Melbourne
- Hartley, Robyn & Horne, Jackie, (2006) *Social and economic benefits of improved adult literacy: Towards a better understanding* National Centre for Vocational Education Research (NCVER), Adelaide
- Marr, Beth & Hagston, Jan, (2007) *Thinking beyond numbers: Learning numeracy for the future workplace*, NCVET, Adelaide.
- T. Scott Murray, Yvan Clermont and Marilyn Binkley, *International Adult Literacy Survey. Measuring Adult Literacy and Life Skills: New Frameworks for Assessment*, Statistics Canada, Ottawa