



SIX YEARS OLD
&
COMPETENT

THE SECOND STAGE OF
THE COMPETENT CHILDREN PROJECT
— A SUMMARY OF THE MAIN FINDINGS

CATHY WYLIE
WITH
ANNE ELSE

SIX YEARS OLD
&
COMPETENT

THE SECOND STAGE OF
THE COMPETENT CHILDREN PROJECT
– A SUMMARY OF THE MAIN FINDINGS

CATHY WYLIE
WITH
ANNE ELSE



NEW ZEALAND COUNCIL FOR EDUCATIONAL RESEARCH
Wellington 1998

New Zealand Council for Educational Research
PO Box 3237, Wellington, New Zealand

© NZCER 1998

ISBN 1-877140-39-2

Distributed by NZCER Distribution Services
PO Box 3237, Wellington, New Zealand

CONTENTS

WHAT IS THE COMPETENT CHILDREN PROJECT?.....	5
The children at age 6.....	6
WHAT HAPPENS TO CHILDREN'S COMPETENCIES BETWEEN AGE 5 AND AGE 6?.....	7
What do children's competency scores tell us?.....	8
How much do children's levels of performance change between 5 and 6?.....	9
The difference school makes.....	10
EARLY CHILDHOOD EDUCATION AND CHILDREN'S COMPETENCIES AT AGE 6.....	12
Starting age at ECE.....	13
Length of ECE experience.....	14
Different combinations and types of ECE.....	15
Staff interaction with children.....	15
The benefits of good quality early childhood education.....	16
PARENTS AND CHILDREN.....	18
Family income.....	18
Parents' employment.....	19
Child care.....	20
Contact with extended family.....	20
Change in the children's lives.....	21
Children's health.....	22
Family activities involving the children.....	23
Reading at home.....	24
Writing at home.....	26
Maths at home.....	28
THE FIRST YEAR AT SCHOOL.....	31

SIX YEARS OLD
&
COMPETENT

Contribution of Early Childhood Education to the transition to school	31
Attendance.....	31
Progress.....	31
How parents felt about the first year at school	32
Parents' satisfaction and parental choice.....	35
SCHOOL FACTORS AND CHILDREN'S COMPETENCIES.....	36
School community	36
Class size.....	37
FAMILY RESOURCES AND CHILDREN'S COMPETENCIES	38
Family income.....	38
Other factors	38
Parents' occupations, mother's qualification and mother's employment.....	39
Owning a computer.....	40
Getting a daily newspaper.....	41
Parents' aspirations for their children's education.....	41
HOME ACTIVITIES AND CHILDREN'S COMPETENCIES	42
GENDER	46
ETHNICITY AND ENGLISH AS A SECOND LANGUAGE	47
HEARING PROBLEMS.....	48
CONCLUSIONS	49
Effects over time.....	49
Early childhood education	50
Measuring children's performance	50
Teachers.....	51
Schools	51
Families	52
Home activities	53

WHAT IS THE COMPETENT CHILDREN PROJECT?

This research project, funded by the Ministry of Education, follows a group of about 300 New Zealand children from around the age of 5, when they are still in early childhood education, through until they leave school.

The main aim is to explore whether home and education have different roles in the development of New Zealand children's competencies, and whether those roles change over time and as children have other experiences.

We also aim to chart what differences in home and educational resources and experiences exist for children, and to understand which of these affect children.

For this project, we chose 10 different areas which are important for children's own wellbeing, for school achievement and continued learning, and for taking part in society and paid work.

We grouped these into 6 "being" competencies: communication, curiosity, perseverance, social skills with other children and with adults, individual responsibility; and 4 "doing" competencies: literacy, mathematics, logical problem-solving, motor skills.

We were able to measure what children could do in these 10 areas by observing them at work or giving them specific tasks to do, then scoring how well they performed. We used two measures for literacy: word recognition and invented spelling.

THE CHILDREN AT AGE 6

The first part of the research looked at the children at age 5.¹

In the second part of the research, we measured the children's performance at age 6, after they had been at school for a year. We compared the children's scores at age 6 with their scores at age 5, when they were still in early childhood education.

We then looked at what might be making a difference to children's scores at age 6. Our research included some of the things children experienced between the ages of 5 and 6, such as class size, the type of school they went to, or their family's income. It also included some experiences from the time before they started school, such as their early childhood education, or their family's income back at age 5.

1 Please see page 54 for details of the Competent Children project's publications.

WHAT HAPPENS TO CHILDREN'S COMPETENCIES BETWEEN AGE 5 AND AGE 6?

In their first year at school, children made the most gains in mathematics and literacy.

Rapid progress in mathematics showed up very strongly in the scores on the 9 different number tasks we used. For example, at age 5 only 19% could count to at least 30, but 82% could do this at age 6. Only around 10 percent of the children could read at age 5, but only around 10 percent could not read at age 6. They also became better at using their hands for cutting out and tracing.

In social skills, communication, perseverance, and curiosity, children generally did about as well or slightly less well at age 6, compared with age 5. This may be because starting school is hard work for children. Or it may be because the teachers who measured children's performance in these areas did not know them as well as their early childhood teachers had done, or assessed them differently. Our research at age 8 should help to show what the reasons are.

The picture of what the children in this project could do at age 6 is likely to overstate the national levels of children's performance at age 6. Our sample included a higher proportion of children from high income families than is found in the whole population. As we show later, family income is a key factor in how well children perform.

WHAT DO CHILDREN'S COMPETENCY SCORES TELL US?

Does a child's score in one area of competency tell you what they are likely to score in another area at the same age? With one or two exceptions, the answer is no.

A child may do well in mathematics, but not so well in recognising words. A child's scores in the "being" competencies may be quite different from their scores in the "doing" competencies. So each area of competency is making its own contribution to the differences between individual children.

Does a child's score in one area at age 5 tell you what they are likely to score in the same area at age 6? Again, the answer is no — even when a very similar measure is used at both ages.

Individual children's scores at age 5 did give some indication of their scores at age 6. But the age 5 score does not actually *predict* the age 6 score.

The one exception is mathematics. A child's mathematics score at age 5 gives a fair indication of their mathematics score at age 6. But this prediction is not totally accurate.

This means that it would not be wise to try to see how much "value" a school is adding for individual children, by comparing any kind of test scores at age 5 with scores at age 6.

HOW MUCH DO CHILDREN'S LEVELS OF PERFORMANCE CHANGE BETWEEN 5 AND 6?

We divided the scores in the different competencies into four bands, and looked at how many children moved from one band to another between the ages of 5 and 6.

While many children did move up or down, they usually moved only from one band to the next band. So children who had scored in the lowest band at age 5 were the least likely to score in the highest band at age 6. The children who had scored in the highest band at age 5 were the least likely to score in the lowest band at age 6.

For example, 37% of children stayed in the same band at both ages for word recognition, one of our two literacy measures. Very few children who were in the bottom band at age 5 moved to the top two bands at age 6.

Mathematics

This pattern showed up most clearly in mathematics. Children do make a great deal of progress in mathematics during their first year at school. But their *relative* levels of achievement do not change much.

Overall, 49 percent of the study children were in the same band of scores for mathematics at age 6 as they had been at age 5. Those in the bottom and top bands at age 5 were the most likely to stay in the same band at age 6.

Children who had been in the top and second to top bands at age 5 were unlikely to be in the bottom band at age 6. None of the children who had been in the bottom band at age 5 improved enough in the first year at school to be in the top band at age 6.

What could teachers do to help the children in the bottom band do better? Other research² suggests that teachers should assess individual children's understanding about mathematics when they start school. The teachers could then tailor number activities according to each child's strengths or weaknesses.

The School Entry Assessment kit, introduced in 1997, can help teachers to do this kind of assessment. This could lead to teachers tailoring maths activities more closely to children's levels at age 5. If this does not happen, it seems that those children who are performing less well than other children on maths at age 5 will still be doing so at age 6.

THE DIFFERENCE SCHOOL MAKES

The first year at school narrowed some of the gaps between different groups of children which we found at age 5. In general the gaps between Pakeha/European and Maori children narrowed to around half of what they were at age 5. Gaps between Pakeha/European and Pacific Island children halved for literacy, stayed much the same for communication, but doubled for mathematics.

2 Young-Loveridge, J (1991) *The Development of Children's Number Concept from ages five to nine* Early Mathematics Learning Project Phase II report. Hamilton: Education Department, University of Waikato

When we looked more closely at these results, we found that the gaps between different ethnic groups were almost all due to the level of family income, not to ethnicity. So the first year at school does make up for low family income to some extent.

This change showed up again when we compared the age 5 and age 6 scores of children who went to early childhood education centres in low income communities with the scores of children who went to centres in middle income communities. Table 1 shows what happened to the gaps for five competencies after the first year at school.

Table 1: *Percentage point gaps in scores for children from low and middle income Early Childhood Education centres*

	<i>At age 5</i>	<i>At age 6</i>
Perseverance	10	7
Communication	9	6
Mathematics	20	12
Logical Problem-Solving	15	12
Literacy:		
word recognition	22	3
invented spelling	22	19

But the pattern we found also suggests that there are limits to what schools can do to narrow the gaps in relative levels of mathematics and literacy performance. The next sections show the impact of what happens in children's lives *before* they start school.

EARLY CHILDHOOD EDUCATION AND CHILDREN'S COMPETENCIES AT AGE 6

Back at age 5, children's ECE experience appeared to make a positive difference in mathematics, motor skills, perseverance, communication, and social skills.

What made this positive difference? The most important aspects were the age at which children started ECE, how long they went to ECE, the income levels of the ECE centre's community, and the quality of the centre's programmes, of staff interaction with children, and of resources and safety.

At age 6, some of the ways in which early childhood education had made a difference at age 5 were no longer showing up. But some effects were still there a year later, and some had strengthened. Other links between early childhood education and children's competencies showed up for the first time at age 6.

These aspects of ECE were all strongly linked with children's competency levels at age 6:

- age at which children started ECE
- total length of time they spent in ECE
- quality of staff interaction with children
- extent to which children were allowed to complete activities.

Generally, the better their ECE experience "rated" on these factors, the better it is for children at age 6, though each competency is differently affected.

At both age 5 and age 6, the community income levels of the child's final ECE centre also made a difference in several areas. At age 6, the highest scores for perseverance, communication, social skills with adults, mathematics, literacy, and logical problem-solving all came from children who had attended ECE centres in middle income communities. Children whose final ECE centre served mainly low income families scored significantly lower on these six competencies.

STARTING AGE AT ECE

At age 6, the age at which a child started ECE continued to make a difference for some competencies, even after allowing for family income, or the level of resources in the children's school or class. The links were stronger than they had been at age 5. Starting ECE before the age of 3 was linked with higher scores in communication, mathematics, and logical problem-solving.

So we can say that starting early childhood education before the age of 3 in New Zealand helps children's performance in some areas at age 6.

But it is not true to say that the earlier ECE starts, the better it is for the child. There were no clear overall advantages for children who started before they were 1 year old. There were no disadvantages either, in any competency area.

Going to a school which served a low income community removed the advantage for mathematics of starting ECE earlier.

LENGTH OF ECE EXPERIENCE

At age 6, length of ECE had a broader impact on children's performance than it had at age 5. It was clearly making a contribution of its own in six competencies.

Children who had gone to ECE for 48 months or longer scored higher on logical problem-solving and individual responsibility. Those with 36 months or more ECE experience scored higher on communication, mathematics, and word recognition. Those with 24 months or longer ECE experience scored higher on fine motor skills.

When we allowed for other factors, such as family income, there were some changes to how strong these links were. Family income at age 5 made more difference than family income at age 6. But length of early childhood education clearly made a contribution of its own at age 6. This was broader than it had been at age 5.

For mathematics, going to a school in a low income community removed the benefits of having longer ECE experience. But children with less than 36 months in ECE who were in classes of 21 or fewer scored as well on mathematics as those who had had longer ECE experience. In other words, for mathematics, being in a smaller class can "make up" for a shorter time in ECE.

DIFFERENT COMBINATIONS AND TYPES OF ECE

For mathematics at age 6, different combinations of ECE had different effects, depending on family income. Children from families in the lowest income bracket did best if they had gone to two or more ECE services at once. Children from middle income families did best if they had gone to one service after another. Children from high income families did best if they had gone to just one service.

Going to more than one kind of ECE at the same time seems to be an advantage for logical problem-solving, but a disadvantage for perseverance.

Children who had attended playcentre scored more highly for perseverance than those who had attended kindergarten or private preschools. This was the only difference related to ECE type. Playcentres are generally better at allowing children to finish activities they have started.

STAFF INTERACTION WITH CHILDREN

At age 5, good quality staff interaction with children at the child's final ECE centre had made a difference for social skills with other children, and also for literacy. At age 6, it continued to make a difference for literacy, and also for perseverance and individual responsibility.

Again, class size had an effect on these links. Children who had been at ECE centres with a low rating for staff interaction scored better for perseverance and social skills with adults if they were in a school class with fewer than 21 children.

THE BENEFITS OF GOOD QUALITY EARLY CHILDHOOD EDUCATION

If our study had been done at only one point in the children's lives, we would have a different picture from the one we obtained by following the children for a further year.

Putting the age 5 and age 6 pictures together, we found positive links between different aspects of ECE experience and 9 of our 10 competencies. The only exception is curiosity. Some of these links showed up at age 5 only, some at age 6 only, and others at both ages.

We now know that the links between children's ECE experience and their competency levels can show up after they have moved on from ECE.

What appears to benefit children's development is:

- starting ECE before the age of 3
- ECE experience which provides access to the mix of activities, equipment, and interactions which most New Zealand ECE services offer, and
- attending ECE services with well trained, reasonably paid staff. Our phase 1 study showed that these services are the ones where staff:child interaction is good, and children can complete activities.

Early childhood education experience clearly benefits all children, including those from low income homes. As the next section shows, low family income has a strong negative effect on children's competency levels.

SIX YEARS OLD
&
COMPETENT

If early childhood education services are expected to provide the high levels of support which would make a greater difference for children from low income families, they will need more resources than they have now.

Table 2: Enduring and Fresh Positive Associations of Prior Early Childhood Educational Experience with Children’s Competencies at 6

<i>ECE Factor</i>	<i>Associations</i>	
	<i>Enduring</i>	<i>Fresh</i>
ECE starting age	—	Communication, Logical Problem-Solving, Mathematics
ECE length	Mathematics, Fine Motor Skills	Word Recognition, Communication, Individual Responsibility, Logical Problem-Solving
Patterns of ECE	—	Perseverance, Logical Problem-Solving
ECE final type	—	Perseverance
Quality staff-child interaction	Literacy ¹	Perseverance, Individual Responsibility
Children allowed to complete activities	—	Perseverance
ECE socio-economic mix	Perseverance, Communication, Mathematics, Literacy, Logical Problem-Solving	Social Skills with Adults

¹“Literacy” here refers to both the Word Recognition and Invented Spelling measures

PARENTS AND CHILDREN

FAMILY INCOME

The families of the project children at age 6 had before-tax incomes ranging from less than \$15,000 a year (7 percent) to over \$80,000 a year (16 percent). The 1996 Census data shows that our sample under-represents one-family households earning less than \$15,000 a year, and over-represents those earning over \$50,000 a year. The income brackets we used, and the percentages of project families in each bracket, were:

lowest income (up to \$20,000)	13%
low income (\$20,001-\$30,000)	11%
middle income (\$30,001-\$60,000)	40%
high income (More than \$60,000)	32%

Three-quarters of the children's families experienced no great change in income over the year. Two thirds of sole-parent families (67 percent) had less than \$20,000 to live on; 12 percent had between \$20,000 and \$30,000, and 14 percent had incomes between \$30,000 and \$60,000. By contrast, 38 percent of the two-parent families in the study had incomes of over \$60,000, and 45 percent had between \$30,000 and \$60,000.

More Pacific Island families (24 percent) were in the lowest income group than families from other ethnic groups.

We also asked parents to tell us approximately how much of their family income after tax was spent on housing. This gave us some

idea of how much income might be left for all other expenses, including children's activities.

Close to half (46 percent) of the lowest income group said housing took half or more of their income, compared with 36 percent of the low income group, 29 percent of the mid income group, and only 18 percent of the highest income group. Sole-parent families and families whose main source of income was a state benefit were twice as likely as others to be paying half or more of their after-tax income for housing. Only 28 percent of Pakeha/European families were paying half or more of their income after tax on housing, compared with 43 percent of Maori and of Pacific Island families.

PARENTS' EMPLOYMENT

Among the fathers, only 9 out of 254 were unemployed, and only 15 were employed part-time. By the time the children were 6, a quarter of the mothers were in full-time employment, 6 percent more than before the project children started school, 38 percent were employed part-time, and 35 percent were not in paid employment. None of the mothers in the lowest income group were employed full-time, but their part-time employment rate was as high as those in other income groups. Mothers employed part-time were almost three times as likely (35 percent) as those employed full-time (13 percent) to have an unskilled job.

About 1 in 6 (14 percent) of the mothers held more than one job, and 43 percent said that their job involved irregular hours, weekend work, shift work, long hours, or travel. Irregular hours

were just as likely for mothers employed full-time as for those employed part-time.

Two-thirds (67 percent) of the men worked irregular hours, worked at weekends, had long hours, did shift work, or travelled in their paid employment. What were once “irregular” hours and conditions are now becoming much more the norm, for women as well as men.

CHILD CARE

Almost all the care of the study children before and after school, during school holidays, or when the child was sick was done by parents themselves (96 percent). Just over a fifth (22 percent) could also call on grandparents or other relatives; 7 percent could call on the child’s former early childhood education centre or caregiver; and 5 percent used a school-related programme (such as after-school care).

So full-time employed parents relied heavily for help with child care on their own relations and friends who are not in paid employment — especially when the family income was low. The higher a parent’s school qualification, and the higher their income, the more likely they were to use a school-related programme.

CONTACT WITH EXTENDED FAMILY

At age 6, most of the children had some contact with their extended families, and 30 percent of those whose extended family played a small but regular part at age 5 now saw them playing a larger part at age 6 — as did 22 percent who had earlier

had irregular contact. Only 11 percent of those who had no contact at age 5 still had no contact at age 6.

Three-quarters of the children in sole-parent families continued to see their other parent, and most of these (73 percent) got on well with them. Children who no longer saw one of their parents were just as likely to remain in touch with that parent's extended family as those who continued to see the absent parent.

The extended family of the main caregiver in the lowest income families was most likely to be playing only a small part in the child's life, with irregular contact (26 percent compared with 10 percent for other income groups). The middle income group was the one whose main caregiver's extended family was most likely to have regular contact and to play a large part in the child's life (70 percent compared with 43 percent for others).

CHANGE IN THE CHILDREN'S LIVES

At age 5, the children had already experienced many changes in their lives. The first year of school—a major change in itself—also brought other changes for almost two-thirds (64 percent) of the study children.

The two main kinds of change for children in their sixth year were the same as they had been in the preschool years: a change in the people they lived with (most often the birth of a brother or sister), and moving house (19 percent). A fifth of the sole-parent families (8 of 40) became two-parent families, and 3 percent of the two-parent families (7 of 230) became sole-parent families. Sole-parent families were twice as likely as two-parent families

to shift house in the child's sixth year (30 percent compared with 16 percent).

A job change took place for 16 percent of the parents in the child's sixth year — almost as high as the 20 percent experiencing job change over the whole of the preschool years. This may reflect more women moving into paid work as their child enters school.

Parents in the lowest income bracket were least likely to report a change of job over the year, or the long-term or frequent absence of one parent. But they were most likely to report a separation of main caregiver and partner (15 percent of this group, compared with 6 percent in the next highest bracket, and 2 percent in the two highest brackets).

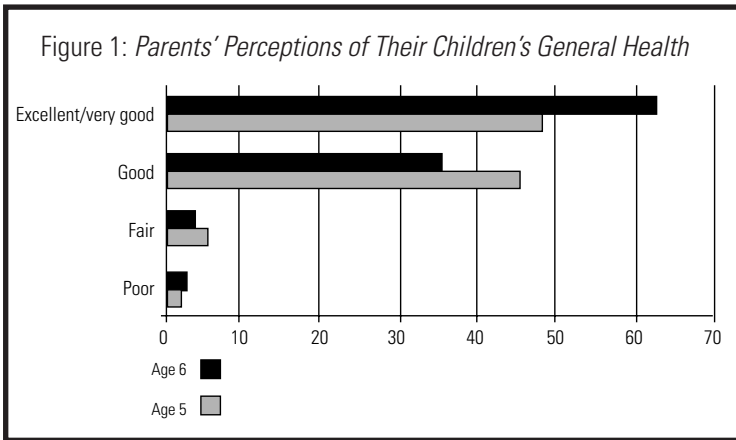
Children who experienced change of some sort in the past year were around twice as likely as others to be unsettled. Yet fewer children were unsettled at age 6 than at age 5 and more were coping well. Three times as many girls as boys were reported to be coping well with the things that unsettled them.

CHILDREN'S HEALTH

The project children's health showed some overall improvement from age 5 to age 6.

The main health problems mentioned by those who described their child's health at age 6 as poor, fair, or good were chronic illness (a third), ear infections (23 percent), or frequent colds (21 percent). This is all much the same as at age 5.

Health status was poorer in the lowest income families: less than half (48 percent) of parents in this group described their child's health as excellent or very good, compared with two thirds (67 percent) of others.



FAMILY ACTIVITIES INVOLVING THE CHILDREN

There were some changes between ages 5 and 6 in the overall pattern of family activities involving the study children. There was more eating out and less socialising with others at age 6 than at age 5. There were fewer literacy related activities, perhaps because school is seen as the place for that. There were fewer sociodramatic activities, and less routine housework, which may reflect children's absence from the home for longer periods now that they were going to school.

The children from the highest income homes had more varied experiences than others: 43 percent often did more than 5

different family activities, compared with 21 percent of the two middle income groups, and 15 percent of the lowest income group. Pacific Island parents reported many more activities conducted as a family than did others.

READING AT HOME

Now that 90 percent of the children could read, we asked about nine home reading activities and also about any “other” home reading activities which children were doing (see Table 3).

Table 3: *Home Reading Activities*

Reading activity	(N=297) %
Reads words	98
Reads sentences	93
Sounds out words	91
Looks at books on own	90
Reads own books	90
Asks for favourite books to be read	84
Reads books from library	79
Memorises favourite stories	76
Pretends to read	72

Most of the children were doing most of the nine activities we asked about. Girls were more likely to do two of them: play at reading (84 percent compared with 62 percent of boys), and memorise favourite stories (87 percent compared with 71 percent of boys).

At age 5, levels of reading activities at home had risen as levels of income rose. But at age 6, only two activities showed different patterns related to family income. Children in the low income group were less likely than others to ask for favourite books to be read to them, or to read books from the library. Even so, 70 percent and 61 percent respectively were doing each of these things.

The majority (61 percent) of the children were also doing some home reading activities other than the ones we asked about. These included reading signs or brand names, reading the newspaper, making books and reading them, reading to siblings, spelling, reading instructions, their own stories or poems, and playing word games. A few 6 year olds also listened to tapes while they read the matching book, enjoyed word puzzles, used alphabet cards, played school, referred to a dictionary or encyclopaedia (some on CD-Rom), read recipes, enjoyed non-fiction books, or read music.

Girls were a little more likely to do other home reading activities than boys (67 percent compared with 56 percent), particularly making and reading books (20 percent compared with 8 percent of boys), and showing a younger sister or brother how to read (13 percent compared with 4 percent of boys).

More children in the highest income families did these other home reading activities, compared with 61 percent in middle income families, and lower proportions again in low (49 percent) and lowest (46 percent) income families.

Children in low income families did not make books and read them; but they and children from the highest income group were more likely than the middle and lowest income groups

to do spelling. Children from the lowest income group were less likely than others to read signs or brand names, or to read a newspaper or correspondence. Children whose mothers had no school qualification were the least likely to read books from the library or to read signs or brand names.

WRITING AT HOME

We asked about nine home writing activities, and about any other home writing activities.

Most children were writing their names and lists at age 6. It was also quite common for children to be writing stories and poems.

Table 4: *Home Writing Activities*

<i>Writing Activity</i>	<i>n=297 %</i>
Writes own name	99
Asks about specific letters	96
Writes lists	90
Copies printed material	80
Writes stories or poems	66
Copies family members' writing	59
Copies school work (e.g. stories)	59
Writes on the computer	40
Takes part in TV/video/computer programme involving writing	12

The highest income group were the most likely to own a computer, so of course they were also the most likely to be

writing on one (56 percent, compared with 37 percent of the second income group, 18 percent of the third, and 25 percent of the lowest).

Copying school work increased from 50 percent in the highest income group to 74 percent in the lowest income group. Pacific Island children were most likely to be copying school work, and family members' writing (81 percent and 91 percent), and least likely to be using a computer to write.

More girls than boys did three activities: copying printed material (87 percent compared with 75 percent), copying school work (68 percent compared with 51 percent), and writing stories or poems (78 percent compared with 56 percent).

Half the girls and 24 percent of the boys were also doing writing activities other than the ones we asked about. The higher the family's income, the more children did these: from 47 percent in the highest income group to 21 percent in the lowest income group.

Making books was the main other writing activity (16 percent). Between 3 and 5 percent of the children kept a diary; the same proportions made maps or symbols, or taught a younger sibling to write. Six percent used magnetic letters to make words. A few children were using a typewriter, using puzzle books or doing crosswords, or writing letters or recipes. Some were writing on any available surface — including their own bedroom wall!

At age 6, children who had been able to write their own name at 5 were more likely than those who had not to be making up and writing lists, and almost twice as likely to be writing stories or poems, and writing on the computer. Children who had been

doing other home writing activities at 5 were almost twice as likely to be doing these at 6.

By contrast, children's levels of reading and mathematical activities at age 6 showed no strong relationship with their levels at age 5.

MATHS AT HOME

We asked about 14 home mathematics activities at age 6, and also about any other mathematics activities.

Table 5: *Home Mathematics Activities*

<i>Mathematics activity</i>	<i>(N=297) %</i>
Tells own age	99
Counts out loud	97
Counts things	95
Adds things	92
Plays board games	89
Tells or tries to tell the time	87
Uses numbers when cooking, building, etc	85
Measures things	75
Subtracts things	67
Talks about halves, quarters and so on	65
Uses counting rhymes in word or song	64
Plays computer games/uses computer for number activities	52
Adds money correctly	29
Says times-tables	21

Children whose mothers had School Certificate or no school qualification were less likely than others to do more than 11 of the 14 activities. But there was a bigger difference related to family type, with 27 percent of children in sole-parent families doing 11 or more of the 14 activities, compared with 72 percent of children in two-parent families.

This difference may be income-related. Income made more difference for mathematics than for reading and writing: 21 percent of the highest income children did 13–14 of the activities, compared with 12 percent of the middle income group, none of the low income group, and 7 percent of the lowest income group. But since the list included computer games or activities, only those who had a computer at home could do all 14. This ruled out many low income children.

The proportion of children doing each of five items increased as family income rose. Children from the lowest income group were least likely to play board games (72 percent). Maori children were less likely than Pakeha/European children to subtract things, or to use numbers when involved with cooking or constructing, but they were more likely to play cards or dominoes. Boys were a little more likely than girls to play computer games.

The proportions of children doing several items rose in line with the mother's level of qualification. But the group most likely to add money correctly was children whose mothers' highest school qualification was Higher School Certificate. In terms of mother's qualification, this group was also the most likely to play computer games and do times-tables daily.

SIX YEARS OLD
&
COMPETENT

Close to half (46 percent) of the children also did other mathematics activities at home. They used the telephone (20 percent), played cards and games such as dominoes (11 percent), read letterbox numbers (6 percent), knew money denominations (9 percent), and used calculators (9 percent). A few children did sums at home, used numbers in programming videos and microwaves, were using a calendar, did mental arithmetic (usually with their parents), or could count in another language.

Again, income made a difference: 56 percent of children in the highest income group did other maths activities, compared with 33 percent in the lowest income group. Children from families in the highest income group were also most likely to be using a calculator.

THE FIRST YEAR AT SCHOOL

CONTRIBUTION OF EARLY CHILDHOOD EDUCATION TO THE TRANSITION TO SCHOOL

Most parents thought that their child's early childhood education experience helped their child make the adjustment to school. Children were used to mixing with other children, to routines and activities, to working with adults, and sometimes knew other children who had been to the same early childhood education centre.

ATTENDANCE

Almost all (91 percent) of the project children had a good attendance record in their first school year. Only 5 children had a poor record. The main reasons for attendance being less than good were illness and poor health. The only competency score related to attendance was word recognition, where children with good attendance did better.

PROGRESS

We asked the children's teachers to rate their overall progress in their first school year. Thirty-three percent of the children were rated as excellent or very good; 21 percent average, but very good in some curriculum areas; 28 percent average or medium; 18 percent slow; 1 percent minimal (including a special needs child).

Differences in ethnicity or family type showed no links with teacher assessments of children's overall progress. Family income at age 5 was the only family factor showing a link.

More children from the highest income families were described by their teachers as making very good or excellent progress (44 percent compared with 25 percent of others). As family income fell, the proportion of children described as making only slow progress rose (from 9 percent of those from the highest income families to 25 percent of those from the lowest income families).

HOW PARENTS FELT ABOUT THE FIRST YEAR AT SCHOOL

Parents saw their children become more confident and independent over their first year at school (too confident, said 13 percent!), more socially adept, more enthusiastic about books, reading, and writing, and gaining more general knowledge.

Only one parent had not met their child's teacher. Most parents said they felt comfortable talking about their child with the teacher. Over half (57 percent) said they had worked with the teacher on problems the child had experienced. These problems were slightly more likely to be connected with the child's happiness or wellbeing than with their learning progress.

We asked parents if they were satisfied with their child's progress over their first school year, and 68 percent said they were. But 25 percent had some reservations, and 7 percent (21 parents) were dissatisfied.

Only 62 percent of the parents of boys were satisfied, compared with 75 percent of the parents of girls. Parents thought 17 percent of the boys were not making good progress, compared with 5 percent of the girls.

Higher income parents were more dissatisfied than lower income parents. A high proportion (25 percent) of parents of the 20 children attending private schools were dissatisfied, compared with 6 percent of other parents. Almost all the private school children had high income parents. Parents of children at decile 9–10 schools (the highest socio-economic rating) were also considerably less likely to say they were satisfied (57 percent) than those with children at schools with lower decile ratings (76 percent).

Parents' main reasons for being dissatisfied were that their child was not making sufficient progress at school (16 parents), and/or that the child was unconfident or unhappy. But there was no such clear pattern among the parents who had some reservations. Many of these parents thought their child was making good progress in their first year at school.

How did parents' levels of satisfaction compare with measures of how well their children were doing at school? Our findings show that the answers are not straightforward.

Teacher ratings

Almost half the parents who were dissatisfied had children whose teachers described their initial school progress as slow, compared with 31 percent of the parents with reservations, and 10 percent of the satisfied parents.

However, 15 percent of the dissatisfied parents had children described by their teachers as making excellent or very good progress. Parents who said their children were unhappy, unconfident, or not being extended enough were just as likely as satisfied parents to have children in this top bracket of teacher assessment.

Reading book levels

Both parents and teachers seem to use reading as a key to their assessment of children's progress in their first school year — although it is a child's mathematics performance at age 5 which seems to be the better indicator of overall performance at age 6.

We found that 75 percent of the 21 children with dissatisfied parents were on the lowest four reading book levels, and only 5 percent were on the high levels. But children whose parents said they were unhappy or unconfident at school appeared at all the reading book levels. Children whose parents were concerned about some aspect of the school itself — such as large classes — were more likely to be on the top two reading book levels than on the next three levels.

Competency scores

Children's scores on our competency measures matched teachers' assessments better than they matched parents' perceptions. But we did find that children whose parents thought they were not being challenged enough by school work had lower competency scores in general than other children. Whatever the reason for

this, these parents had some real grounds for concern, and teachers need to address their concern.

On average scores overall, there was very little difference between children with satisfied parents, and children whose parents had reservations. But among those children whose parents said they were not making enough progress, scores did become consistently lower on all but three of the competencies, although sometimes the differences were slight.

Children from high decile schools tended to score more highly than others on some of our competency measures. Children attending private schools scored as well as others on all competencies, and better on one, word recognition. (There was a large overlap between this link with private schooling and the link with having a high income family.) Yet both these groups of children had parents with much higher levels of dissatisfaction than other groups.

PARENTS' SATISFACTION AND PARENTAL CHOICE

What these findings tell us is that some parents may have higher expectations than their children can meet. Parents' levels of satisfaction may reflect their own expectations as much as children's actual achievements in their first year of school.

If this is so, it raises questions about increasing policy emphasis on parental choice as a way to improve schools. Parental choice may not be an accurate enough gauge of children's performance levels, or of the worth of schools.

SCHOOL FACTORS AND CHILDREN'S COMPETENCIES

SCHOOL COMMUNITY

As well as using the Ministry of Education's decile ratings for schools according to their students' socio-economic level, we asked teachers to rate their school's socio-economic mix.

Two groups of schools stood out in relation to children's competency scores.

All the high scores for communication, mathematics, and literacy came from schools serving a mainly middle income community (as rated by the teachers). Other research has also found this difference for middle income schools.

Children attending schools serving communities with a concentration of low income families (decile 1-2, as rated by the Ministry of Education), had the lowest scores on mathematics, regardless of their own family's income level.

They also had lower scores on communication and invented spelling (one of our two literacy measures). But for these two areas, the effects of low school decile and low family income overlapped so much that they could not be told apart.

CLASS SIZE

At age 6, the project children were in classes ranging from 7 to 38 (sometimes with two teachers). Half were in classes of more than 26 children.

Being in a class of 21 or fewer made a difference to scores on curiosity (2 to 8 percentage points higher) and social skills with other children (4 to 6 percentage points higher).

As the section on early childhood education showed, being in a small class was also linked with closing the gaps in scores on mathematics, perseverance, and social skills with adults, for those children who had had less time in ECE, or lower quality staff:child interaction.

FAMILY RESOURCES AND CHILDREN'S COMPETENCIES

FAMILY INCOME

When the children were 5, family income was linked with differences in children's scores for all but three competencies. At age 6, family income at both age 5 and age 6 was linked with scores for all but two competencies (curiosity and fine motor skills). The new link was with logical problem-solving.

But it was family income at age 5, not age 6, which made more difference for mathematics, literacy, logical problem-solving, individual responsibility, and social skills. The major differences were between children from the two low income groups (up to \$30,000) and all others.

It is now clear that family resources in the preschool years have enduring effects for children's competencies. These effects show up more fully at age 6 than at age 5.

OTHER FACTORS

At age 5, a number of family-related factors seemed to show links with children's competencies when looked at by themselves. But when family income was taken into account, it became clear that these factors were actually "standing in" for family income differences. The same thing happened at age 6:

- When family income was taken into account, there were no links between the main source of income (such as self-employment, wages, or a benefit) and children's competencies.

- ❑ Family changes such as separating parents, a parent's new partner, or the long-term absence of a parent had virtually no impact on children's competencies.
- ❑ There was only one link with whether children had one or two parents. Children from one-parent families had slightly lower scores on individual responsibility and even that showed considerable overlap with family income.

PARENTS' OCCUPATIONS, MOTHER'S QUALIFICATION AND MOTHER'S EMPLOYMENT

As well as income, some other family factors in the preschool years also continue to have an impact on children's competencies at age 6.

The impact of the father's type of occupation (professional, skilled, or unskilled) at the time when the family's first child was born grew stronger between age 5 and age 6. So did the impact of the mother's occupation at the birth of the first child.

The mother's and father's earlier occupations were more strongly linked with children's mathematics scores at age 6 than current family income was.

But as could be expected, the effects of these factors tended to overlap with family income, especially family income at age 5.

The impact of the mother's highest qualification also overlapped with family income. Her qualification was more important than current family income for mathematics, and also for literacy.

Children whose mothers were in paid employment (part-time or full-time) when the children were 6 scored better for

perseverance and social skills with other children, regardless of family income. They also did slightly better for mathematics.

OWNING A COMPUTER

When the children were 5, 142 of their families had a computer. By the time they were 6, 169 had one.

At age 5, owning a computer was an advantage for literacy, regardless of family income. However, when we went back to the children at age 6, we found that having a computer at age 6 gave no advantages over not having one.

This result was rather surprising. So we looked at four different groups of children, those who had:

1. a computer at both age 5 and age 6
2. a computer at 5 but not at 6
3. a computer at 6 but not at 5
4. no computer at all

Looking at all the competencies combined, there was little difference in scores between those who got a computer between 5 and 6, and those with no computer at all. But the groups who had always had a computer, or had one at the age of 5 but not 6, were advantaged over both the other two groups.

Obviously, owning a computer is often linked with having a higher family income, so we then took family income into account.

Regardless of family income, having a computer at age 5 made a difference for scores on mathematics and invented spelling at

age 6 — particularly for children in the lowest income families. Having a computer at age 5 also made a small difference for curiosity and individual responsibility, and an even smaller one for social skills.

Once again, this shows the importance of having a resource in the preschool years. Computer ownership at age 5 continues to make a difference after the child starts school.

GETTING A DAILY NEWSPAPER

When the children were 6, we asked about getting a daily newspaper. No matter what the family's income was, getting a daily paper made a difference for children's communication. In fact, the lower the family's income, the greater the benefit:

- lowest income — 14 percentage points
- next lowest income — 10 percentage points
- mid to high income — 4 percentage points
- highest income — 1 percentage point.

PARENTS' ASPIRATIONS FOR THEIR CHILDREN'S EDUCATION

After taking family income into account, we found that children whose parents saw the end of secondary school as the end of their child's education scored lower than others in three areas: mathematics, invented spelling, and social skills with adults.

There was a marked advantage for children from homes with incomes of less than \$30,000 whose parents had higher aspirations for them, compared with other children from homes in the same income bracket.

HOME ACTIVITIES AND CHILDREN'S COMPETENCIES

What experiences do children have at home that complement and support their learning at school? As well as family activities involving children, and reading, writing, and mathematics activities at home, parents also told us about children's favourite home activities, and the time children spent watching television.

At age 6, a third of the children watched television for much the same length of time as they had at age 5, a third watched for an hour more, and a third watched for an hour less. At age 6 the amount of time spent watching television had no links with family income, though it had at age 5.

As at age 5, Pacific Island children watched more television during the week than did others: 41 percent of them watched more than 3 hours of television on each weekday at age 6. This may be linked with their parents saying that television or video watching was a family activity.

Time spent watching television, whether at age 5 or age 6, had no significant impact on competency levels at age 6.

We looked at nine activities in relation to family income:

- Family activities relating to literacy
- Reading library books
- Reading own books
- Other home reading activities

- Writing stories/poems
- Other home writing activities
- Playing board games
- Using fractions
- Other home maths activities.

All nine were making their own impact on children’s competency levels, regardless of family income.

What kinds of home activities help children’s performance most, across a broad range of competencies? They are activities which not only “practise” the activity itself, such as counting, but also involve:

- communicating with or being aware of other people, or
- using the particular knowledge or skill in a range of different settings, with different objects (such as measuring, or using fractions in everyday situations).

For most of these activities, the advantages for children doing them tended to go across the board, and be similar in size for children in families of all income levels. For example, the overall score of a child from a high income family who was doing “other” reading activities at age 6 was higher than the score of another child from a high income family who was not doing them.

However, sometimes the impact of a particular factor was different for children from different income groups.

Children from the two low income groups who did other home reading at age 6 improved their word recognition score by 7.3

percentage points, whereas children from the two higher income groups gained 2.35 percentage points. The same marked gain on word recognition scores (given that the median was 17.3) also showed up for low income children who did “other” writing activities at age 6.

Children from the lowest income families gained particular advantages from three home activities. These were:

☐ Reading their own books

This was linked with advantages for:

Individual responsibility: 26 percentage point gain

Fine motor skills: 24 percentage point gain

Perseverance: 22 percentage point gain

Invented spelling: 19 percentage point gain

Communication: 14 percentage point gain

Word recognition: 12 percentage point gain

☐ Reading library books

This was linked with advantages for:

Perseverance: 21 percentage point gain

Fine motor skills: 19 percentage point gain

Invented spelling: 17 percentage point gain

Individual responsibility: 15 percentage point gain

Communication: 14 percentage point gain

Social skills with adults: 12 percentage point gain

Word recognition: 7 percentage point gain

❑ Using fractions

This was linked with advantages for:

Invented spelling: 14 percentage point gain

This is one of our most important findings. These three home activities brought children from the lowest income families up to the level of children from the highest income families for the competencies listed.

GENDER

At age 5, girls were 7 percentage points ahead of boys for perseverance, and boys were 6 percentage points ahead of girls for curiosity. Girls were a little ahead of boys for literacy. Allowing for family income and mother’s qualifications did not remove these differences.

At age 6, gender made even more difference for children’s competency scores, regardless of family income. Only two competencies — mathematics and fine motor skills — showed no links with gender.

Girls were now performing better than boys overall, with an average advantage of 3 percentage points per competency. Boys did better than girls on logical problem-solving and curiosity.

The appearance of this gap between girls and boys over the first school year is consistent with other research.

Table 6: Gender and Children’s Competencies at age 6

<i>Competency</i>	<i>Gender</i>	
	<i>Female n=137</i>	<i>Male n=161</i>
Curiosity	<i>60.4</i>	65.2
Perseverance	68.5	<i>62.0</i>
Individual Responsibility	84.6	<i>75.0</i>
Social Skills with Peers	68.2	<i>63.0</i>
Social Skills with Adults	75.9	<i>72.0</i>
Communication	73.7	<i>70.3</i>
Word Recognition	21.0	<i>16.4</i>
Invented Spelling	61.4	<i>55.7</i>
Logical Problem Solving	<i>51.9</i>	57.0

The highest scores for each competency are in **bold type**, the lowest in *Italics*.

ETHNICITY AND ENGLISH AS A SECOND LANGUAGE

At first, we found links at age 6 between ethnicity and children's scores for mathematics, literacy, and communication. But when we took family income into account, all but one weak link (with invented spelling, one of the literacy measures) disappeared. Much the same thing happened at age 5. So differences which seemed to be linked with ethnicity were really linked with income.

At age 6, having English as a second language showed no disadvantage, except for one weak link with lower communication scores.

HEARING PROBLEMS

Hearing problems were the only health factor linked with children's competencies. At age 6, children who had current ear infections were 3.5 percentage points behind other children, on average, across all the competencies. But what made more difference at age 6 was hearing problems at age 5.

At age 5, fifteen children had a previous hearing problem which had been corrected, and 31 had hearing loss or ongoing monitoring of a hearing problem. At age 6, these two groups of children scored less well than others on all the competencies except curiosity and fine motor skills. The differences averaged 5 percentage points for the first group, and 8 percentage points for the second group.

These disadvantages showed up for 5 more competencies at age 6 than at age 5. So while hearing problems in the preschool years do disadvantage children at age 5, the disadvantage appears to be much broader at age 6, after a year at school.

CONCLUSIONS

We made two underlying assumptions for the Competent Children Project.

First, children are not manufactured products. We cannot account for all the differences we find among children solely in terms of the family and educational factors we have been able to include in this study. This may seem common sense, but it is an important point to make in terms of how far it is possible to measure the value or “productivity” of any one factor, including education.

Secondly, children’s abilities and talents are randomly distributed among the New Zealand population. If New Zealanders genuinely want both society and individuals to benefit from these abilities and talents, action needs to be taken to narrow the differences in children’s competencies at various ages which result from different levels of resources.

EFFECTS OVER TIME

In this second phase of the study, we were able to focus on the impact of both current and past resources and experiences. We now know that:

1. Children’s competency levels after the first year at school are just as likely to reflect their experiences before the age of 5 as their current experiences.
2. Some of the impact of children’s experiences before the age of 5 shows up at the age of 5, but some does not show up until at least a year later.

3. The full impact of family resources, home experiences and early childhood education cannot be seen by taking snapshots at a single point in time.

EARLY CHILDHOOD EDUCATION

4. To keep the social mix of ECE centres as broad as possible, access to early childhood education should not depend on family income.
5. To ensure that ECE centres serving mainly low income communities can offer high quality staff:child interaction, these centres should be provided with more support.

This would mean improving staff:children ratios in kindergartens, ensuring all ECE staff are well trained, and providing more resources to encourage mathematics, literacy, communication, logical problem-solving, and perseverance.

The Books in Homes scheme could be tried out in such ECE centres, and extended to a new “Games at Home” programme — but without requiring such centres to find funding for these schemes.

MEASURING CHILDREN’S PERFORMANCE

6. It is unrealistic to expect to be able to find consistent measures of children’s early performance which can be repeated at different educational stages, such as early childhood education and school.

7. Except for mathematics, scores at age 5 are poor predictors of scores at age 6. It would be unwise to make decisions which are crucial for children in the early years of school, or seek to measure school performance by the “value” it adds to children’s performance over this first school year.
8. Parental expectations play a part in satisfaction with children’s progress at school, sometimes outweighing actual achievement levels. It would seem unwise to place too much emphasis on parental choice as a measure of school “value”.

TEACHERS

9. Children’s approaches to difficulties encountered in their school work showed signs of being shaped by the content of the school work, and its context. They could also be shaped by home experiences—for example, familiarity with dictionaries. Teachers have an important role in showing children strategies which work, particularly for literacy.
10. A significant minority of parents had concerns about their child’s first year progress. This highlights the need for clear teacher-parent communication, regular parental contact with the child’s teacher, and both making the effort to communicate.
11. Some boys had difficulty in the first year at school. We need to know more about teaching approaches or resources which could improve their experience.

SCHOOLS

12. Differences in school resources do make a difference for children. Children attending the lowest decile schools generally achieved less well on our competency measures than other children. This finding confirms the results of the National Education Monitoring Project and the IEA mathematics study. It shows that this impact begins at the very start of school.
13. The lowest decile schools need improved resourcing and external support to close the gap between the performance of their students and that of children at other schools.

FAMILIES

14. Family income showed stronger links with children's competency levels than any other family factor. Family income at age 5 had even more impact than income in the child's first year at school.

The low income families in the Competent Children study had a third to a quarter of the incomes of families in the highest income bracket. If such gaps in income remain, or widen still further, it will be difficult to close the related gaps which are evident in children's competencies even from an early age. Children from low income homes will not approach life on a "level playing field", but will find their opportunities more circumscribed than others do. Society will also draw on a narrower range of abilities and talents.

15. In terms of children's competencies, the most important factor is adequate incomes for families with young children. This has implications for policies on employment and on income support for families.

HOME ACTIVITIES

16. Children's current home activities also matter, regardless of family income.

Having a computer in the preschool years, and getting a daily newspaper, benefit low income children more than other children. The home activities which help low income children most are reading their own books, reading library books, and using fractions. Activities which put skill or knowledge to work in a practical way, or in social contexts, make a broad difference for children's competencies over time.

17. There are implications here for parents, teachers, and policymakers regarding the support children can be given at home, and the value of free access to public libraries.

OTHER PUBLICATIONS FROM THE COMPETENT CHILDREN PROJECT

SPREADING THEIR WINGS

Cathy Lythe

This report describes the results of a telephone survey of 767 Wellington and Porirua families whose children turned five in late 1993-mid 1994. The survey was designed to confirm the findings of the companion main study of the longitudinal *Competent Children* project with a larger sample of children. The study provides data on the children's early childhood education experiences, and also home resources and experiences.

NZCER 1997 Price: \$19.80

FIVE YEARS OLD AND COMPETENT

Cathy Wylie

What makes a competent 5-year-old? This book gives a summary of the research report – *Competent Children at 5*. It highlights the impact of the children's family resources and early childhood experiences on the development of their cognitive, social, communicative, and problem-solving competencies. Thought-provoking and very readable.

NZCER 1996 Price: \$9.00

COMPETENT CHILDREN AT 5 FAMILIES AND EARLY EDUCATION

Cathy Wylie, Jean Thompson, and Anne Kerslake Hendricks

The aim of this project was to discover what impact children's family resources and early childhood education experiences have on the development of their cognitive, social, communicative, and problem-solving competencies. This report is from the first phase of the longitudinal project.

NZCER 1996 Price: \$29.70

SIX YEARS OLD
&
COMPETENT

THINKING CHILDREN

Anne Meade with Pam Cubey

How can we help our children to develop their thinking? This book from Anne Meade focuses on young children's thinking as they explore mathematical and science related schemas with the support of understanding adults. The children in the study were aged between four and a half and five years old.

With increasing interest in schema theory and practice throughout New Zealand and England, this book adds to the understanding and presents this learning theory in a manageable way for practitioners and parents.

NZCER and VUW 1995 Price: \$27.00

For those interested in the methodology and detailed findings a researchers' edition is also available: "Competent Children and Their Teachers".

NZCER 1995 Price: \$13.50

AVAILABLE FROM:

NZCER Distribution Services, PO Box 3237
Wellington, New Zealand. Fax 04 384 7933

SIX YEARS OLD
&
COMPETENT

The Competent Children project, funded by the Ministry of Education, follows a group of about 300 New Zealand children from around the age of 5, when they are still in early childhood education, through until they leave school.

The main aim is to explore whether home and education have different roles in the development of New Zealand children's competencies, and whether those roles change over time and as children have other experiences.

The project also aims to chart the differences in home and educational resources and experiences that exist for children, and the impact these differences can have for them.

The first stage of the research looked at the children at age 5.

This book describes the second stage of the research, and returns to the children at age 6, after they had been at school for a year.

