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A New Scale for Measuring Socioeconomic Status in Educational Research:

Development and validation of the Australian Socioeconomic Index 2006 (AUSEI06)

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Abstract

This paper introduces a new occupational status scale, the Australian Socioeconomic Index 2006 (AUSEI06), which can be used to explore a wide range of equity issues relating to educational aspirations, early school leaving, access to higher education, literacy and numeracy levels, and other aspects of educational access, achievement, and attainment. AUSEI06 was developed in response to the introduction of the Australian and New Zealand Standard Classification of Occupations (ANZSCO) by the Australian Bureau of Statistics. The scale provides a simple means for educational researchers to convert ANZSCO codes into more sociologically meaningful occupational status scores.

The aims of this paper are fourfold: to outline AUSEI06's theoretical underpinnings; to describe the development of the scale; to validate it for use in educational contexts; and to offer some practical suggestions for its use.

AUSEI06 is a socioeconomic index. The scaling of occupations is based upon the assumption that occupations provide the means of converting a person's human capital (education) into material rewards (income). That is, the relationships between education, occupation, and income are conceptualized in terms of a simple causal chain whereby educational effects on earnings are mediated, as far as possible, by occupational attainment.

Data from the 2006 Census were used to generate the AUSEI06 scale. An iterative scaling algorithm, first developed for the International Socioeconomic Index (ISEI), was used to scale occupations in such a manner as to maximize the indirect effect of education on earnings (via occupation) while simultaneously minimizing its direct effect on earnings. The resultant AUSEI06 scale ranges from zero to 100, with labourers at the bottom of the scale and medical practitioners at the top.

Data from the Longitudinal Surveys of Australian Youth (LSAY) and the Negotiating the Life Course (NLC) project were used to validate the AUSEI06 for use in educational research. Concurrent validity was assessed by examining whether AUSEI06 was related to a range of educational outcomes in an expected way. Consistent with previous research, the results suggest that access to educational resources, school achievement, educational aspirations, school completion, obtaining a post-school qualification, and the type of qualification obtained are associated with the socioeconomic characteristics of a person's family when they were growing up as measured by AUSEI06.

In summary, AUSEI06 provides a means for educational researchers to convert ANZSCO codes into occupational status scores. In the past, parental occupational status has been linked with the educational outcomes of their offspring. Validation results suggest that family background, as measured by AUSEI06, continues to be related to these outcomes.

Introduction

This paper introduces a new occupational status scale, the Australian Socioeconomic Index 2006 (AUSEI06). AUSEI06 is the latest in the series of ANU scales that for more than 40 years have provided researchers with a means of assigning sociologically meaningful occupational status scores to data coded in accordance with the official occupational classifications of the Australian Bureau of Statistics (ABS). AUSEI06 was developed in response to the introduction of a new occupational classification, the Australian and New Zealand Standard Classification of Occupations (ANZSCO) (ABS 2006).

In this paper we outline AUSEI06's theoretical underpinnings, describe the development of the scale, validate it for use in educational contexts, and to offer some practical suggestions for its use.

Conceptual background

To set the context, approximately every 10 years the ABS releases a new official occupational classification. Most Australian survey data containing information on occupations are coded in accordance with one of these classifications. From a sociological or education perspective, however, the ABS classifications by themselves do not necessarily yield the most meaningful groupings or rankings of occupations.

The ANU scales: An historical overview

A series of measures, known as the ANU scales, were developed to allow researchers to convert data which had been coded in accordance with ABS's occupational classification of the day into an occupational status scale. The original of these scales was developed in the 1960s, and the AUSEI06 forms the latest in this series.

Over time the ANU scales have evolved, not just in response to the release of new ABS classifications, but also in response to changes in the Australian labour market and conceptual and methodological advances. Three different approaches have been

used (Table 1, Column 1). An understanding of each of these approaches is useful for understanding the rationale underlying the current scale.

Table 1: Historical overview of occupational scaling practices in Australia

Originating scale	ABS classification	Australian scale ^a	Reference
Research on occupational prestige in Australia and the United States.	CCLO	ANU1	Broom et al. (1965); Broom and Jones (1969)
Duncan SEI (Duncan, 1961)	CCLO ASCO (1 st ed.) ASCO (2 nd ed.)	ANU2 ANU3 ANU3_2	Broom et al. (1977) Jones (1989) McMillan and Jones (2000)
International SEI (Ganzeboom et al., 1992; Ganzeboom and Treiman, 1996)	ASCO (2 nd ed.) ANZSCO	ANU4 AUSEI06	Jones and McMillan (2001) McMillan, Beavis and Jones (2009)

Note: ^a Each of these scales is available for download. For the ANU scales, refer to <http://ipumsi.anu.edu.au/SiteTools/index.php>. For AUSEI06, refer to www.acer.edu.au/ausei.

The initial scale, ANU1, was a nominal prestige scale. Prestige scales measure the social standing or desirability of occupations. They are typically based upon the subjective judgements of panels of experts or population samples, who are asked about the prestige of selected occupations. For the ANU1 scale, one hundred grouped occupations were further collapsed into 16 broad categories and then ordered to form a prestige scale in broad accordance with research on occupational prestige in Australia and the United States (Broom et al., 1965; Broom and Jones, 1969).

An inherent problem with the method used to generate prestige scales is that only subsets of occupations can be judged by study participants. It would not be possible to ask people to rank an exhaustive set of occupations, so some guesswork is involved at the scale development stage if you want to cover all occupations.

This brings us to the second approach which removes the guesswork and allows the prestige scores obtained from the original studies of selected occupations to be generalized to *all* occupations in a systematic manner. A two-step approach was developed by Duncan (1961). It is based upon the knowledge that prestige is related to both education and income. Regression techniques were used to link the prestige rankings of a subset of occupations to the education, income, or other socioeconomic characteristics of their incumbents. The resultant regression weights were then used to compute a continuous socioeconomic index that covered all occupations, including those not covered in the initial prestige studies.

In Australia, this approach formed the basis of the ANU2, ANU3, and ANU3_2 scales (Broom et al., 1977; Jones, 1989; McMillan and Jones, 2000). While the methodology was standard and transparent, data became problematic over time. For each of the scales, the same prestige studies had been used to weight occupations. By the time the last of these scales was developed, the prestige studies were quite old, the labour market had undergone considerable change, and there were questions as to whether they were still valid. In addition, methodological advances facilitated a new approach

to scaling occupations which was developed for the International Socioeconomic Index (Ganzeboom et al., 1992; Ganzeboom and Treiman, 1996).

This approach was adopted for the next ANU scale (ANU4, see Jones and McMillan, 2001). In the new approach, prestige is no longer used as the criterion for weighting education and income. Occupations are viewed as the means of converting a person's human capital (or education) into material rewards (or income). So if we know information on the education and income of persons in the labour market, as well as their occupation, optimal scaling procedures can be used to assign scores to occupations in such a way as to maximize the role of occupation as an intervening variable between education and income. This approach remains the state-of-the art approach for the continuous scaling of occupations and has been used to generate national SEIs in countries such as New Zealand as well (Davis et al., 1997, 2003).

Official occupational classifications of the ABS

As mentioned earlier, ANU scale updates have also been necessitated by periodic revisions of the occupational classificatory scheme of the ABS, which have changed the manner in which much occupational data in Australia are coded (Table 1, column 2). The scale reported in this paper was developed in response to the release of a new occupational classification, the Australian and New Zealand Standard Classification of Occupations (ANZSCO) (ABS, 2006).

ANZSCO was released in 2006, replacing the second edition of the Australian Standard Classification of Occupations (ASCO) (ABS, 1997), with which the most recent ANU scale, ANU4, had been designed for use. ANZSCO is intended to take into account changes in the labour market and the emergence of new and more specialised occupations, as well as to improve comparability of occupational statistics between Australia, New Zealand, and the rest of the world. The classification comprises five hierarchical levels. The broadest or most aggregated level comprises eight major groups and differs quite markedly from ASCO (2nd ed) in how it classifies associate professionals, clerical, sales, and service occupations. The major groups, which are denoted by one-digit codes, can be disaggregated into 43 sub-major groups denoted by two-digit codes, 97 minor groups denoted by three-digit codes, 358 unit groups denoted by four-digit codes and, at its most detailed level, 998 occupations denoted by six-digit codes. AUSEI06 is designed to convert unit groups, the second most detailed ANZSCO level, into status scores.

A new naming convention

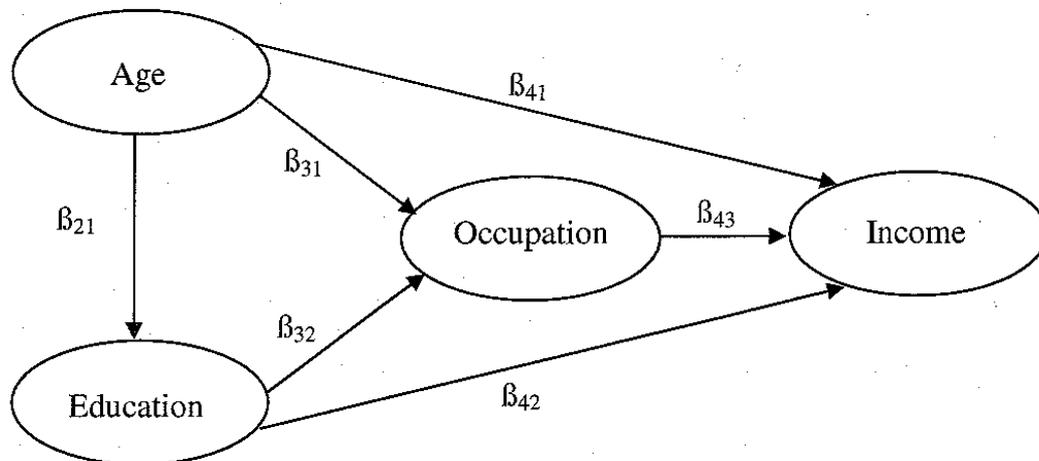
A further, purely cosmetic change has been implemented with this iteration of the ANU scale. The naming convention has been revised in order to better reflect the nature of the scale: the Australian (AU) Socioeconomic Index (SEI) 2006 (06) or AUSEI06 (Table 1, column 3). It is anticipated that the name of any future iteration of this scale will vary only in the last two digits, to indicate the year of the census upon which the updated scale is based.

Scale development

Conceptual model

As already indicated, AUSEI06 is based upon the approach used to develop the International Socio-economic Index (ISEI) (Ganzeboom et al., 1992; Ganzeboom and Treiman, 1996). Ganzeboom and colleagues conceptualise occupation as the social engine that converts educational inputs into monetary outputs, or, to put it another way, they conceptualise these relationships in terms of a simple casual chain whereby educational effects on earnings are mediated, as far as possible, by occupational attainment. In path analytic terms, the indirect effect of education on earnings is constrained to its practical maximum and its direct effect to its practical minimum. An age correction is added to take into account historical increases in average levels of educational attainment across age cohorts and a lifecycle effect whereby older persons tend to have higher occupational status and income. The basic model is represented diagrammatically in Figure 1.

Figure 1: Path model for occupational scoring



Data

Data from the 2006 Census of Population and Housing were used to generate the AUSEI06. We commissioned the ABS to produce a customised data file containing individual-level data on persons aged from 21 to 64 who were in the labour force¹. Information on occupation, as well as age, sex, education, labour force status, income, and hours worked were requested. Occupation in the 2006 Census was coded to the

¹ Funding for this component of the study was provided by the Australian Council for Educational Research.

six-digit (occupation) level of ANZSCO. Due to confidentiality issues, however, we were constrained to work at the four-digit (unit group) level and to further condense the 358 unit groups so that each group contained as close to one per cent of the Australian labour force as possible. Our aggregated classification contained 117 groups plus we distinguished unemployed persons as group 118. The other variables requested from the ABS are described in Table 2.

Table 2: Data specifications

Variable	Description
Age	21-29, 30-39, 40-49, 50-64
Sex	male, female
Educational attainment	degree or higher, diploma, certificate, and 5 groups with no post-school qualifications (Year 12, Year 11, Year 10, Year 9, Year 8 or below)
Labour force status	employed, independent, unemployed
Income	10 groups ranging from less than \$7,799 p.a. to \$104,000 p.a. or over
Hours worked per week	15 or fewer, 16-24, 25-34, 35-39, 40, 41 or more
Occupation	117 groups derived from ANZSCO unit groups, plus unemployed persons

Prior to analysis, age was recoded to the midpoint of each category. Educational attainment was converted into years of education completed, ranging from eight years for a person who completed up to Year 8 to 17 years for a person with a university degree. Income was converted into hourly income. A standard problem in estimating status scores for the self-employed is income splitting, especially among marriage partners. Therefore we inflated the incomes reported by the self-employed by a factor of 75 per cent, to allow for the high probability of income-splitting with a marriage partner or another family member (about 75 percent of the labour force is married). Persons earning less than \$6 per hour or more than \$105 per hour were excluded. These floor and ceiling estimates were based upon unemployment benefits and the open-ended income category, respectively. Around four per cent of cases were thereby excluded. The income measure used in analysis was the natural log of the ratio of each person's hourly earnings to average earnings in the sample as a whole, which represents how much better or worse than average a particular worker fared. All variables were transformed into z-scores prior to analysis, as recommended by Ganzeboom et al. (1992: 12).

Method

The model specified in Figure 1 cannot be used to estimate occupational scores in one step. Rather, an iterative scaling algorithm, first developed for the ISEI, is used to scale occupations in such a manner as to minimise the direct effect of education on income (β_{42}) (Ganzeboom et al., 1992: 10-19, Appendix C). This algorithm was also used to generate the ANU4 scale from 1996 Census data.

Results

We used ANU4 scores as our starting estimates for the iterative scaling mechanism². Three iterations were required for the regression estimates to stabilise. The path coefficients from education to occupation (β_{32}) and occupation to income (β_{43}) were 0.65 and 0.35 respectively. A comparison of the beta values obtained for AUSEI06, its Australian precursor the ANU4, and the most recent version of the ISEI are provided in Table 3. The AUSEI06 education path is roughly double that of the income path income, as was the case for ANU4. In the ISEI, the education path is also higher than the income path, although to a lesser degree.

Table 3: Comparison of beta values obtained for the Australian, International, and New Zealand Socioeconomic Indexes

	AUSEI06	ANU4 ^a	ISEI for ISCO88 ^b	NZSEI96 ^c
β_{32} Education-Occupation	0.65	0.63	0.582	0.251
β_{43} Occupation-Income	0.35	0.30	0.465	0.786

Sources: ^aJones and McMillan (2001: 549); ^bGanzeboom and Treiman (1996: 212); ^cDavis et al. (2003: 47)

The scale was recalibrated using a square root transformation in order to modify its skewed distribution, and was rescaled to range from zero to one hundred. The final adjusted scale correlates highly with the unadjusted scale (0.98).

Medical practitioners are at the top of the scale and labourers are at the bottom of the scale. Very few occupational scores moved substantially between the ANU4 scale and AUSEI06, and the two scales are very highly correlated (0.98), suggesting they are virtually indistinguishable. This is an important result, suggesting ASCO (2nd ed.)/ANU4 data can be directly compared with ANZSCO/AUSEI06 data. There is no need to convert ANU4 scores into AUSEI06 scores for the purposes of over-time comparisons.

Validation

Data

We now turn to an examination of the validity of AUSEI06 for use in educational research. Our focus is on concurrent validity; that is, we assess whether AUSEI06 is related to a range of educational outcomes in an expected way. Data from two sources – the Longitudinal Surveys of Australian Youth (LSAY) (NCVER, 2009)³ and the Negotiating the Life Course Project (NLC) (McDonald et al., 2009) – were analysed.

² In the development of the ANU4 scale, we demonstrated that the choice of starting estimates did not markedly affect results (Jones and McMillan, 2001: 547-548).

³ LSAY data were obtained from the Australian Social Science Data Archives. The National Centre for Vocational Education Research and the Commonwealth Department of Education, Employment and Workplace Relations, who carried out the collection of the LSAY data, bear no responsibility for the analyses reported in this paper.

LSAY is a longitudinal study conducted by the National Centre for Vocational Education Research and the Commonwealth Department of Education, Employment and Workplace Relations. The study tracks cohorts of young people as they move from school into post-secondary education, training, and work. This paper draws upon the first two waves of data from the 2006 cohort. Respondents were first surveyed in school in 2006 when they were 15 years old (n=14 170) and were followed up in 2007 via computer assisted telephone interviewing. LSAY contains a wide range of education-related measures. These data are used to assess whether AUSEI06 is related to access to educational resources, school achievement, and educational aspirations. However, as many members of the 2006 cohort are still undertaking formal education, it is necessary to turn to a second data source in order to examine whether AUSEI06 is related to educational attainment.

The NLC is a longitudinal study conducted by the Australian Demographic and Social Research Institute at the Australian National University, the School of Social Science at the University of Queensland, and the Australian Institute of Family Studies. In Wave 4, conducted in 2006, data were collected from the original study participants, as well as from a new sample of 2000 persons aged 18-54.⁴ The new sample was selected by random digit dialling and a structured questionnaire was administered via computer assisted telephone interviewing. As ANZSCO codes relating to family background are only available for the new sample, our analysis is restricted to that group. NLC data are used to assess whether AUSEI is related to educational attainment (school completion and highest post school qualification).

In both LSAY and the NLC, family background was measured by converting ANZSCO unit group codes relating to parents' occupations at the time when respondents were growing up into AUSEI06 scores. Where both parents were employed when the respondent was growing up, the AUSEI06 score of the parent with the highest occupational status is used. For ease of presentation, AUSEI06 scores have been split into quartiles. However, it should be emphasised that AUSEI06 can, and indeed usually is, used as a continuous measure.

All analyses are weighted so as to account for sample design and response bias. The NLC weighted sample is intended to be representative of the Australian population aged 18-54 in 2006 (Reimondos 2009). All results reported in the remainder of this paper are statistically significant.

Results

Starting with young people, the 2006 LSAY cohort were asked at age 15 to report the number of books and the availability of a range of other educational resources and cultural items in their family home, and the type of secondary school which they attended. Past research has demonstrated that access to educational resources such as these is shaped by family background, so we would expect to find significant relationships between each of these measures and AUSEI06.

⁴ Wave 4 was funded by the Australian Research Council (DP0663459).

A positive relationship is evident between the number of books in the family home and socioeconomic background (measured by parental AUSEI06 score). Around half of the young people from very high socioeconomic status families lived in homes containing more than 200 books, compared with less than one fifth of those from very low socioeconomic backgrounds (Table 4). Similarly, family background was related to the availability of a range of other educational and cultural resources in the home (Table 5). The type of secondary school a young person attends, another indicator of educational resources, is also shaped by family background. Twenty-eight percent of fifteen-year-olds from very high socioeconomic status families attended an independent school in 2006, compared with only six per cent of those from very low socioeconomic status families. Conversely, over three-quarters of fifteen-year-olds from very low socioeconomic families attended at government school, compared with less than half of those from high socioeconomic status backgrounds (Table 6).

Table 4: Number of books in the home by family background (weighted column per cent)

	Family background (AUSEI06)				
	Very high	High	Low	Very low	Parent not employed/ Don't know
0-10	3	5	6	11	12
11-25	4	8	10	15	16
26-100	21	30	34	33	32
101-200	22	23	20	21	18
201-500	29	22	21	13	14
>500	20	12	8	7	9
Total	100	100	100	100	100

Data: LSAY 2006 cohort

Table 5: Availability of educational and cultural resources in the home by family background (weighted per cent of SEI group with this resource)

	Family background (AUSEI06)				
	Very high	High	Low	Very low	Parent not employed/ Don't know
<i>Educational resources</i>					
A desk to study at	98	95	93	89	90
A quiet place to study	95	93	91	85	87
A computer you can use for school work	99	98	98	94	91
Educational software	79	77	75	69	64
A link to the internet	97	96	94	87	83
Books to help with your school work	93	89	86	83	79
<i>Cultural resources</i>					
Classic literature	59	45	38	28	35
Books of poetry	60	48	39	36	40
Works of art	83	79	67	65	68

Data: LSAY 2006 cohort

Table 6: School sector by family background (weighted column per cent)

	Family background (AUSEI06)				
	Very high	High	Low	Very low	Parent not employed/ Don't know
Independent	28	19	13	6	13
Catholic	23	27	22	17	17
Government	49	54	65	77	70
Total	100	100	100	100	100

Data: LSAY 2006 cohort

Numerous studies have consistently demonstrated that school achievement across a range of ages is related to socioeconomic background (e.g. Masters & Forster, 1997; Rothman & McMillan, 2003) and our validation study yields similar results. The LSAY 2006 cohort respondents were asked how well they were doing at school compared with most of the students in their year level. Consistent with past research, self assessed achievement (in English, mathematics, and overall) had a strong positive relationship with family socioeconomic background as measured by AUSEI06 (Table 7).

Table 7: School achievement at age 15 (self assessed) by family background (weighted column per cent)

	Family background (AUSEI06)				
	Very high	High	Low	Very low	Parent not employed/ Don't know
English					
Very well	26	20	15	16	14
Better than average	36	34	29	27	29
About average	34	40	42	47	47
Below average	4	7	13	10	10
Mathematics					
Very well	25	18	15	14	12
Better than average	32	28	24	26	27
About average	31	38	40	42	41
Below average	12	16	21	18	21
Overall					
Very well	24	16	13	14	11
Better than average	40	38	31	32	32
About average	33	42	45	47	48
Below average	3	3	11	7	9

Data: LSAY 2006 cohort

Attitudes and aspirations are one of the channels through which family background can impact upon educational outcomes. Family background has been associated with various attitudes towards education in a number of studies (e.g. Khoo & Ainley, 2005, Thomson & De Bortoli, 2008). The LSAY 2006 cohort were asked whether they intended to complete Year 12, what they planned to do in the year after leaving school, and their longer-term education and training plans. While the majority of fifteen-year-olds in 2006 intended to complete Year 12, a socioeconomic gradient was nevertheless evident, with those from very low socioeconomic backgrounds being

three times more likely than those from very high socioeconomic backgrounds to indicate that they did not intend to complete Year 12 or that their school completion plans were uncertain (Table 8).

Table 8: Plans to complete Year 12 by family background (weighted column per cent)

	Family background (AUSEI06)				
	Very high	High	Low	Very low	Parent not employed/ Don't know
Yes	93	87	78	78	73
No or not sure	7	13	22	22	27
Total	100	100	100	100	100

Data: LSAY 2006 cohort

Post-school plans were also related to family background. Young people from very high socioeconomic backgrounds were far more likely than those from very low socioeconomic backgrounds to plan to attend university and far less likely to plan to undertake other education, training or work in their first post-school year. Furthermore, fifteen-year-olds' perceptions about what their parents would like them to do in their first post-school year and what their friends intended to do followed a similar socioeconomic gradient (Table 9). Thinking beyond the first post-school year, similar socioeconomic gradients were also evident in education and training plans (Table 10).

Table 9: Plans for the year immediately after leaving school by family background (weighted column per cent)

	Family background (AUSEI06)				
	Very high	High	Low	Very low	Parent not employed/ Don't know
Respondent					
University	61	52	43	40	38
VET	15	26	38	38	37
Work	5	7	7	8	7
Other	11	7	5	5	8
Don't know	8	9	7	9	10
Parents					
University	66	57	46	45	47
VET	10	19	30	28	25
Work	3	4	6	8	6
Other	8	7	5	4	5
Don't know	12	13	12	15	16
Peers					
University	52	45	36	33	35
VET	18	23	34	33	31
Work	5	6	6	8	8
Other	4	3	2	1	2
Don't know	21	23	21	25	24

Data: LSAY 2006 cohort

Table 10: Post-secondary education and training plans by family background (weighted column per cent)

	Family background (AUSEI06)				
	Very high	High	Low	Very low	Parent not employed/ Don't know
University	76	64	50	46	46
VET	18	27	39	38	40
None	6	8	11	16	15
Total	100	100	100	100	100

Data: LSAY 2006 cohort

We now move beyond intentions to behaviours. Numerous Australian and cross-national studies have demonstrated that family background is related to whether or not a young person completes senior secondary school, with more disadvantaged groups being less likely to complete school (e.g. Curtis & McMillan, 2008; Marks & McMillan, 2003; Shavit & Blossfeld, 1993). NLC results based upon AUSEI06 are consistent with this pattern (Table 11). People who grew up in very low socioeconomic status families (measured by parental AUSEI06 score) were about four times more likely than those from very high socioeconomic status families to leave before the completion of senior secondary school (44 per cent compared with 11 per cent).

Table 11: School completion status by family background (weighted column per cent)

	Family background (AUSEI06)			
	Very high	High	Low	Very low
School non-completer	11	26	41	44
School completer	89	74	59	56
Total	100	100	100	100

Data: NLC 2006 wave

Previous research also suggests that the socioeconomic characteristics of the family home influence post-secondary educational attainment, with the offspring of high socioeconomic status families being most likely to obtain a university degree, those from manual backgrounds overrepresented in vocational education, and those from low socioeconomic status families being the least likely to obtain a post-secondary qualification (e.g. Curtis, 2008; Marks and McMillan, 2003; Shavit et al, 2007). Again, NLC results based upon AUSEI06 are consistent with this pattern (Table 12). People from very high socioeconomic status families were most likely to obtain a bachelor degree and people from very low socioeconomic status families were least likely to obtain a degree (46 per cent compared with 18 per cent). In contrast, people from very high socioeconomic status families were less likely than other groups to obtain a vocational qualification (24 per cent compared with 38-41 per cent). People from very low socioeconomic status backgrounds were the least likely to obtain a post-secondary qualification (45 per cent compared with 36 per cent of low socioeconomic groups and 30-31 per cent of high or very high socioeconomic status groups).

Table 12: Highest post-school qualification by family background (weighted column per cent)

	Family background (AUSEI06)			
	Very high	High	Low	Very low
Degree	46	31	23	18
Other qualification	24	38	41	38
No qualification	30	31	36	45
Total	100	100	100	100

Data: NLC 2006 wave

Using AUSEI06 in educational research: practical suggestions

We now turn to some practical suggestions for educational researchers wanting to convert information on occupations into AUSEI06 scores. This is a two-step process, whereby the occupational information is first coded in accordance with the ANZSCO classification, and then converted into AUSEI06 scores. Strategies for dealing with missing data can then be implemented. We outline each of these steps below.

Coding occupational data

Wherever possible, we strongly urge researchers to code their data to the unit group (four-digit) or occupation (six-digit) level of ANZSCO in order to permit use of the full version of AUSEI06. In the past, some researchers have coded data to one of the more aggregated (ASCO) levels, either assuming finer distinctions are unimportant or as a cost-cutting measure. However, groupings become increasingly heterogeneous in terms of socioeconomic characteristics at the more aggregated levels. For example, Major Group 2 (Professionals) contains occupations as diverse as photographers (2113) and surgeons (2535). Such groups would be expected to have substantially different levels of human capital and to obtain substantially different monetary (and other) rewards. Unsurprisingly, Table 13 shows that each of the ANZSCO major groups is quite socioeconomically heterogeneous. While more sociologically important distinctions are retained at the two-digit level, others are still lost. For example, Sub-Major Group 25 (Health Professionals) includes surgeons (2535) and registered nurses (2544). There is less of a problem at the three-digit (minor group) level, but it is unlikely to be any easier to code at this level of detail than at the four- or six-digit level. The ABS provides software to facilitate coding to the six-digit (occupation) level (ABS, 2007).

Converting ANZSCO codes into AUSEI06 scores

EXCEL, SAS, and SPSS files to convert ANZSCO major, sub-major, minor, and unit group codes into AUSEI06 scores are available for download from www.acer.edu.au/ausei. For researchers with data containing earlier ABS occupational codes such as CCLO and ASCO, the corresponding ANU scales (ANU1-ANU4) are also available for download from <http://ipumsi.anu.edu.au/SiteTools/index.php>.

Table 13: AUSEI06 scores for ANZSCO major groups

ANZSCO major group	Weighted AUSEI06 score	Range of AUSEI06 scores for constituent unit groups
1 Managers	58.1	34.0 – 81.5
2 Professionals	81.6	66.2 – 100.0
3 Technicians and Trades Workers	35.9	17.7 – 63.6
4 Community and Personal Service Workers	41.7	29.4 – 82.3
5 Clerical and Administrative Workers	45.6	32.9 – 67.4
6 Sales Workers	34.8	27.8 – 56.3
7 Machinery Operators and Drivers	21.0	3.4 – 35.7
8 Labourers	18.5	0.0 – 28.1

Data: 2006 Census

Dealing with missing values

In educational research, our concern is often to assign an occupational status score to parents in order to measure the socioeconomic climate to the family home. However, how do we assign scores to parents (or other persons) who are not in paid employment? A common approach is to utilize information on last (or main) occupation if that is available, or information on spouse's occupation. In the absence of such information, an alternate approach based upon the concept of occupational potential allows an AUSEI06 score to be imputed if the person's education level is known. Drawing upon the conceptual model outlined in Figure 1, the educational attainments of those not in paid employment can be viewed as providing them with the potential for entering a range of occupations. This potential can be estimated by calculating the average occupational status of employed persons with the same level of education. We first developed this approach for the ANU4 scales (Jones and McMillan, 2001: 556) and have used it to calculate imputed AUSEI06 scores from the 2006 Census data (Table 14). Our occupational potential approach has also been adopted for in New Zealand for the NZSEI96 following extensive testing against two alternative approaches (Davis et al., 2003: 80-85).

Table 14: Imputed occupational potential scores for persons not in paid employment

Educational attainment	Imputed AUSEI06 score
Left school before completing Year 9	27.0
Completed Year 9	30.4
Completed Year 10	35.7
Completed Year 11	38.6
Completed Year 12	42.8
Post-school Trade Certificate	39.5
Post-school Diploma	56.5
Post-school Degree or Higher	71.6

Data: 2006 Census

Discussion

AUSEI06 provides a simple means for educational researchers to convert ANZSCO codes into more sociologically meaningful occupational status scores. It can be used as a continuous measure ranging from 0 to 100, or split into categorical measures such as quartiles. In the past, occupational status has been linked with a range of educational outcomes. Validation results suggest that occupational status, as measured by AUSEI06, continues to be related to these factors. AUSEI06 can be used by researchers and policy analysts to explore a wide range of equity issues relating to educational aspirations, early school leaving, access to higher education, literacy and numeracy levels, and other aspects of educational access, achievement, and attainment.

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