

The challenge of meeting sampling and participation rates in international surveys

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Abstract

The results of the second Progress in International Reading Literacy Study (PIRLS) were published in November 2007. The outcomes of this and other large scale international surveys are used by policy-makers and often receive considerable media attention.

In order to ensure that the achieved sample represents the national population as fully as possible, the surveys have very rigorous sampling procedures and demanding response rates. Exclusion rates are also closely monitored and the achieved samples must be approved by the sampling referee before inclusion in the international report.

In some countries, schools' participation in surveys such as PIRLS is obligatory or expected, but in others, including England, achieving the sampling targets presents a major challenge for the national research centres. This presentation will outline the strategies employed by a number of the participating countries in order meet the targets, and the resulting response rates.

Introduction

The results of international comparative studies attract considerable attention in the world of education. Policy makers look beyond their own boundaries to the systems in countries which hover at the top of the inevitable 'league tables'. Politicians highlight results which endorse their current policies or use results to support educational or social reforms. The results of the studies provide a range of stories for the media. They may even lead to constructive debate about the national standards, the curriculum and the nature of schooling.

Table 1 summarises the three major international comparative surveys of school-age students.

Table 1: Summary of major comparative surveys of attainment

Study	Organisation	Age range	Subject
PIRLS: Progress in International Reading Literacy Study	International Association for the Evaluation of Educational Attainment (IEA)	Grade 4 / 9-10 years	Reading
PISA: Programme for International Student Assessment	Organisation for Economic Cooperation and Development (OECD)	Age 15	Reading, mathematical and scientific literacy
TIMSS: Trends in International Mathematics and Science Study	IEA	Grade 4 / 9-10 years Grade 8 / 13-14 years	Mathematics and science

The three surveys have many of the same features in terms of underlying methodologies. Whilst the focus on this paper is on PIRLS, much of it is applicable to both PISA and TIMSS.

In order to ensure that the results have credibility, participating countries are required to conduct the surveys following a complex and demanding methodology. One of the central elements of this concerns sampling. It is clearly imperative that the samples of schools and students from which the study's data comes are representative of the participating countries as a whole. The first stage of the sampling involves the specification of the sample. IEA offer participating countries the facility for the sample to be drawn by Statistics Canada, following rigorous internationally agreed procedures. The procedure in England and Scotland is that the various stratification variables are agreed with Statistics Canada, and they are provided with the relevant databases of schools. Statistics Canada draw samples for both the field trial and the main survey; thereafter all contact with schools is undertaken by the national research centre.

The extent to which countries meet the sampling requirements is judged to be at one of three levels:

- meet sampling requirements in full
- partially meet sampling requirements (these countries are annotated in the international report)
- failure to meet sampling requirements (resulting in exclusion from the international tables).

For the main survey, three samples are drawn. These use identical stratifying variables and, in the case of PIRLS, each consists of 150 schools. One sample is termed the 'main sample' – this consists of all the first choice schools. The other two samples are termed 'first replacement' and 'second replacement' and each school is linked with one in the main sample. Schools in these replacement samples are only invited to participate if a school from the main sample declines.

Sampling requirements – school and student level

Table 2 details the sampling requirements for PIRLS 2006 at school and also at student level. Further information is available in the technical report (Joncas, 2007).

Table 2: Categories of sampling participation

Category 1	<p>Acceptable sampling participation rate without the use of replacement school. In order to be placed in this category, a country had to have:</p> <ul style="list-style-type: none"> • An unweighted school response rate without replacement of at least 85% (after rounding to the nearest whole per cent) AND an unweighted student response rate (after rounding) of at least 85%. <p>OR</p> <ul style="list-style-type: none"> • A weighted school response rate without replacement of at least 85% (after rounding to the nearest whole per cent) AND a weighted student response rate (after rounding) of at least 85%. <p>OR</p> <ul style="list-style-type: none"> • The product of the (unrounded) weighted school response rate without replacement and the (unrounded) weighted student response rate of at least 75% (after rounding to the nearest whole per cent). <p>Countries in this category appeared in the international report exhibits, without annotation ordered by achievement as appropriate.</p>
Category 2	<p>Acceptable sampling participation rate only when replacement schools were included. A country was placed in category 2 if:</p> <ul style="list-style-type: none"> • It failed to meet the requirements for Category 1 but had either an unweighted or weighted school response rate without replacement of at least 50% (after rounding to the nearest per cent). <p>AND HAD EITHER</p> <ul style="list-style-type: none"> • An unweighted school response rate with replacement of at least 85% (after rounding to the nearest whole per cent) AND an unweighted student response rate (after rounding) of at least 85%. <p>OR</p> <ul style="list-style-type: none"> • A weighted school response rate with replacement of at least 85% (after rounding to nearest whole per cent) AND a weighted student response rate (after rounding) of at least 85%. <p>OR</p> <ul style="list-style-type: none"> • The product of the (unrounded) weighted school response rate with replacement and the (unrounded) weighted student response rate of at least 75% (after rounding to the nearest whole per cent). <p>Countries in this category were annotated in the international report exhibits, and ordered by achievement as appropriate.</p>
Category 3	<p>Unacceptable sampling response rate even when replacement schools are included. Countries that could provide documentation to show that they complied with PIRLS sampling procedures and requirements, but did not meet the requirements for Category 1 or Category 2 were placed in Category 3.</p> <p>Countries in this category would appear in a separate section of the achievement exhibits, below the other countries, in the international report. These countries were presented in alphabetical order.</p>

The agreed sampling designed required that the ‘national defined population’ for a country was at least 95% of the ‘national desired population’. In practice, this meant

that countries could exclude some schools from the sampling frame. This could include, for example, schools which were:

- geographically remote
- had very few students
- had a curriculum or structure different from the mainstream education system
- specifically for students with special needs.

Decisions made on a country by country basis are documented in the technical report (Mullis *et al.*, 2007). In the case of England, schools with fewer than eight students in the cohort were excluded, as were schools specifically for students with special educational needs. This amounted to 1.6 per cent of schools.

Methods adopted to encourage school-level participation

England's participation in international surveys has persistently been fraught with difficulties with regard to achieving the required school-level participation rates. A particular low point was reached in PISA 2003 when England was excluded from the international tables because the achieved response rate was so low. NFER took on responsibility for PISA for 2006 (achieving the response rates) and 2009, and has been the national research centre for all the PIRLS and TIMSS surveys.

In *England*, as in many other countries, schools are free to refuse to participate in international surveys, as they are in any research activities. This fact, combined with an extensive and high-stakes national assessment system, has led to a situation in which achieving the sampling targets represents a major challenge for the research centres. As a result, each project team devises a strategy designed to encourage the greatest number of main sample schools to take part. The strategy adopted for PIRLS 2006 in England included the following incentives:

An invitation pack, sent to the headteacher and to the chair of governors (school board) which included:

- A letter of invitation endorsed by the education ministry, the curriculum body (QCA), a major subject organisation (United Kingdom Literacy Association), and the Primary National Strategy, a part of the education ministry responsible for literacy and numeracy.
- A copy of the short booklet produced to summarise findings from PIRLS 2001.
- A short leaflet outlining the plans for PIRLS 2006.
- A sample of the feedback that would be provided for participating schools based on student questionnaire data.

- A promise of £200 of book vouchers (approximately €250 / \$400) for schools which completed the survey in full.

In addition to these incentives, other less tangible arrangements were made to encourage schools to take part: a long testing window, allowing schools to select a date most appropriate for their particular circumstances, and the provision of a test administrator who would supervise the testing session and organise all the materials required for the session. Initial invitations were also sent well ahead of the scheduled survey, in the autumn term, to allow for reminders to be issued to non-responding schools, and to allow time for headteachers to raise questions and for some discussion about the logistics to take place.

Concerns about the challenge of achieving the various sampling targets are not confined to England alone. What is particularly interesting is that some countries which apparently met the PIRLS' sampling targets with relative ease, such as *Sweden*, indicated that they have noticed increasing difficulties in persuading schools to participate in international studies. Researchers in *Denmark* indicated that they anticipate reviewing their approach in the next round as, with new national assessments, there are more requests for participation in assessment projects coming to schools. The current ease with which researchers in the *Russian Federation* recruit schools is thought to be a result of the historical legacy of centralised control and researchers anticipate difficulties increasing in future years.

In *Austria*, researchers do not have difficulties in meeting the targets. There are no incentives offered to schools, but schools which do not respond to the invitation to take part receive a phone call aimed at persuading them. Those that do not agree to participate at this stage apparently have to write to the education ministry and explain their reasons for non-participation. Austria achieved a 100% participation rate in PIRLS 2006.

Bulgaria achieved a reasonably high response rate in PIRLS 2006. The co-ordinator attributed this to the high value Bulgarians traditionally place on education. However, she did indicate that there were some difficulties in gaining the agreement of schools with a high proportion of Roma children and in fact three replacement schools were required. Schools with mixed age classes were also disinclined to take part.

Researchers in *Denmark* offered participating schools some class-level feedback on reading attainment compared to a national standardised score. As the national tests for students at this age are still at the pilot stage, this was thought to be an effective incentive. Two persons from each school were also offered a training day which included sessions on early childhood literacy, reading information texts, the theoretical background to PIRLS, and also procedural guidelines on the conduct of PIRLS in their school. The day was free of charge to attendees, but transport and teacher cover costs were not reimbursed. With regard to PISA, in which Denmark also participates, researchers felt that the media attention had probably meant that most schools invited to take part were interested in the study.

The situation in *Hong Kong* bore some relationship to that in England: the co-ordinator suggested that ‘principals of schools have a general view that students in Hong Kong have been over-assessed by internal exams, public exams, international assessments like PIRLS and PISA. Schools are reluctant to join international studies’ (personal communication). As a result, researchers in Hong Kong have adopted a range of strategies to encourage schools to take part including feedback on students’ performance and teacher education programmes for participating schools.

In *Luxembourg*, participation is mandatory.

In the *Netherlands*, the national research centres for the international surveys have for many years had difficulty in achieving the sampling targets. For PIRLS 2006, the centre adopted the strategy of contacting the sampled schools a year ahead of the actual scheduled survey to invite them to take part. Test administrators were arranged and attainment scores provided at student level and at school level. The teacher involved could select a book from the publications of the national research centre and when the results of PIRLS were announced, participating schools received a copy of the national report. Similar strategies were adopted for TIMSS, including the provision of released (translated) test items with a summary of the national report. The TIMSS team also attempted to raise the profile of the study in journals and newsletters.

In *New Zealand*, as is common in many other countries, there is greater difficulty in meeting participation rates for secondary surveys. A package of incentives was provided for PIRLS’ schools including the provision of the cost of teacher cover, certificates for students and feedback for schools about student attainment. Test administrators were provided for schools which requested that level of support.

Researchers in *Norway* experienced very particular problems with regard to PIRLS 2006 and in fact, failed to meet the sampling targets. At the time of the survey, there was a heated political debate in Norway about national testing which had antagonised many teachers. Researchers working on the other two international surveys, PISA and TIMSS, testing at different times, did not experience similar problems.

The research team in *South Africa* found that schools, particularly of primary-aged students, were generally very keen to participate in studies, and especially if feedback about student performance was provided. Researchers anticipate problems only if the surveys coincide with nationwide systemic evaluations.

In *Sweden*, an increasing involvement in international surveys has led to concern about achieving future participation requirements. Researchers are currently considering plans to provide more feedback to schools and to offer seminars for teachers. At present, training for school coordinators is provided and this day includes a presentation by an invited speaker.

To summarise, achieving sampling targets in international surveys remains a persistent, and possibly increasing, challenge in a number of countries. These

countries have adopted a range of measures designed to encourage schools to participate. In England, on the basis of evidence from the three international surveys that NFER administers, among the most effective incentives seem to be those that provide schools with information that they would not otherwise have available (from student questionnaires, for example) and/or that make the administration of the survey as straightforward as possible (scheduling arrangements, etc.). The involvement of individuals such as subject specialists, known to the school and able to encourage participation, was also effective in some cases.

School-level response rates achieved

Table 3 shows the school response rates achieved by 17 selected countries in PIRLS 2006.

Table 3: School response rates in PIRLS 2006 (selected countries)

Country	School participation before replacement (weighted percentage)	School participation after replacement (weighted percentage)	Number of schools in original sample	Number of eligible schools in original sample	Number of schools in original sample that participated	Number of replacement schools that participated	Total number of schools that participated
Austria	100%	100%	160	158	158	0	158
Bulgaria	88%	97%	150	147	130	13	143
Denmark	89%	99%	150	146	128	17	145
England	86%	99%	150	150	129	19	148
France	94%	97%	175	175	164	5	169
Germany	97%	99%	410	407	397	8	405
Hong Kong	91%	100%	150	144	130	14	144
Luxembourg	100%	100%	183	178	178	0	178
Netherlands	70%	93%	150	150	104	35	139
New Zealand	92%	99%	250	250	220	23	243
Norway	68%	82%	178	177	118	17	135
Russian Fed.	100%	100%	232	232	232	0	232
Scotland	69%	87%	150	150	101	29	130
Singapore	100%	100%	178	178	178	0	178
South Africa	94%	96%	441	438	422	7	429
Sweden	100%	100%	150	147	147	0	147
United States	57%	86%	222	214	120	63	183

For those of us working in countries where sampling targets are a challenge, it is remarkable to see the five countries in which all eligible schools drawn in the sample took part in the survey requiring no replacements, although as discussed above, in some of these participation is mandatory.

Methods adopted to encourage student-level participation

In some countries, there is a loss of students in participating schools as parents do not allow their children to take part. This was a particular difficulty experienced in Norway for PIRLS 2006, where there was disquiet about the introduction of a national reading test.

This is a much less developed area for surveys such as PIRLS which focus on primary-aged students and where the attention in many countries has been to engage teachers and school principals, who clearly decide at a school-level on participation. To gain cooperation of students for surveys such as TIMSS Advanced, gifts are sometimes provided for students. In *Sweden*, they were given cinema tickets and in the *Netherlands* a USB-stick. In *South Africa*, students in PIRLS are given a pencil. The provision of certificates for students, which may or not be personalised, is a relatively low cost option although a Dutch researcher felt that a poster for the school announcing participation in the upcoming survey would be a greater incentive in their culture. Whilst it probably would not determine whether a student takes part or not, it may be seen as a welcome token of appreciation by the principal or teacher concerned.

Student participation rates achieved

Table 4 shows the proportions of two forms of exclusions for the selected countries. School-level exclusions include special schools and, in many countries, very small schools. Within-school exclusions comprise students who are excluded on educational grounds (see below) but not students who are absent or those whose parents do not permit participation. The target for overall exclusions is 5% or less.

Table 4: Coverage of PIRLS 2006 target population

Country	National desired population		
	School-level exclusions	Within-school exclusions	Overall exclusions
Austria	1.4%	3.8%	5.1%
Bulgaria	2.2%	4.3%	6.4%
Denmark	0.5%	5.7%	6.2%
England	1.6%	0.9%	2.4%
France	3.4%	0.4%	3.8%
Germany	0.4%	0.3%	0.7%
Hong Kong	3.0%	0.9%	3.9%
Luxembourg	0.9%	3.0%	3.9%
Netherlands	3.5%	0.1%	3.6%
New Zealand	1.4%	3.9%	5.3%
Norway	1.0%	2.8%	3.8%
Russian Fed.	6.8%	1.0%	7.7%
Scotland	1.4%	0.9%	2.3%
Singapore	0.9%	0.0%	0.9%
South Africa	4.2%	0.1%	4.3%
Sweden	2.4%	1.5%	3.9%
United States	3.2%	2.8%	5.9%

Each country adapts the instructions with regard to within-school exclusions to national circumstances. The IEA international within-school exclusion rules are as follows:

Intellectually disabled students – These are students who are considered in the *professional opinion* of the school principal, or by other qualified staff members, to be mentally disabled or who have been tested psychologically as such. This includes students who are emotionally or mentally unable to follow even the general instructions of the test. Students should not be excluded solely because of poor academic performance or normal disciplinary problems. It should be noted that the exclusion of students with dyslexia is not acceptable.

Functionally disabled students – *Functionally disabled students*. These are students who are permanently physically disabled in such a way that they cannot perform in the PIRLS testing situation. Functionally disabled students who can respond should be included in the testing.

Non-native language speakers – These are students who are unable to read or speak the language(s) of the test and would be unable to overcome the language barrier of the test. Typically, a student who has received less than one year of instruction in the language(s) of the test should be excluded, but this definition may need to be adapted in different countries.

Whilst the terminology used in the exclusion rules is adapted within each country, the intention of maximising student participation is emphasised.

Essentially, the school determines which students are excluded from the tests. In the 2001 survey, the overall exclusions in England totalled 5.7%, including 3.9% within-school exclusions. In 2006, a caveat referring to dyslexia was added to the guidance from IEA in the guide used by the administrators. This is possibly one of the factors that led to a reduction in exclusions in 2006.

Overall participation rates achieved

The various participation rate measures are combined to produce the overall participation rates shown in Table 5. This table also includes the annotations from the international report beside individual country names (see Table 2).

Table 5: PIRLS 2006 participation rates (weighted)

Country	School participation		Classroom participation	Student participation	Overall participation	
	Before replacement	After replacement			Before replacement	After replacement
Austria	100%	100%	99%	98%	97%	97%
Bulgaria*	88%	97%	100%	97%	85%	94%
Denmark*	89%	99%	100%	97%	86%	96%
England	86%	99%	100%	93%	80%	92%
France	94%	97%	100%	98%	92%	95%
Germany	97%	99%	100%	94%	90%	92%
Hong Kong	91%	100%	100%	97%	89%	97%
Luxembourg	100%	100%	100%	99%	99%	99%
Netherlands *	70%	93%	100%	97%	67%	90%
New Zealand	92%	99%	100%	96%	98%	95%
Norway◇	68%	82%	100%	87%	58%	71%
Russian Fed.*	100%	100%	100%	97%	97%	97%
Scotland *	69%	87%	100%	94%	65%	91%
Singapore	100%	100%	100%	95%	95%	95%
South Africa	94%	96%	100%	92%	96%	98%
Sweden	100%	100%	100%	96%	96%	96%
United States* *	57%	86%	100%	96%	54%	82%

* National Defined Population covers less than 95% of National Desired Population.

* Met guidelines for sample participation rates only after replacement schools were included.

◇ Nearly satisfying guidelines for sample participation rates after replacement schools were included.

Conclusion

There is a great range in the extent of the challenge for national research centres in meeting sampling requirements in international surveys. It does appear however, that in the majority of countries in which participation is not mandatory, researchers are beginning to indicate either that it is already difficult to meet the requirements or that they anticipate it becoming more difficult.

Individual countries are giving consideration to ways in which they can encourage schools to participate. These range from opportunities for continued professional development for the relevant teachers, to more tangible incentives such as book vouchers. Experience in England suggests that no one single incentive is going to influence all principals and teachers. The advantage of a package of measures, including some tangible incentives such as books or vouchers, some recognition of student effort such as certificates acknowledging participation, provision of information difficult to obtain elsewhere (eg summary of questionnaire data) and some opportunity for continued professional development, is that there is more likely to be something that may win over a school where there is some reluctance or apathy.

References

Joncas, M. (2007). PIRLS 2006 Sampling Weights and Participation Rates. In Martin, M.O., Mullis, I.V.S. and Kennedy, A.

Martin, M.O., Mullis, I.V.S. and Kennedy, A.M. (eds.) (2007). PIRLS 2006 Technical Report. Chestnut Hill, MA: TIMSS & PIRLS International Study Center, Boston College.