

# The Taiwan Education Panel Survey

## An Overview

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The Taiwan Education Panel Survey (TEPS) is a national longitudinal project initiated by Academia Sinica and jointly funded by Ministry of Education, the National Science Council, and Academia Sinica. The objective of TEPS is to stimulate more basic research in the fields of education, sociology, economics, and psychology by employing large scale panel data on representative samples of students, and their parents, teachers, and school administrators. In a nutshell, TEPS has five distinguishing features:

- (1) *Theory driven*: The focus is on the skills, behavioral, values, and psychological consequences of schooling institutions and family environments of students. Factors that are found in the literature to affect students' learning outcomes are all included. Specifically speaking, an AOE model of learning outcomes, representing learning capabilities (**A**bility), learning opportunities (**O**pportunity), and the amount of effort made by the students (**E**ffort), serves as a guiding framework for questionnaire development. Ability and effort are more on students themselves while opportunities covers family, teachers, and school environment, peers, and for forth.
- (2) *Student centered and multidimensional and multi-levels*: Central to the project were questionnaire surveys of students. The data collection extends to cover the most influential actors in their learning environment: parents, teachers, and schools. It covered nested multiple levels of data – individual students, classes, and schools, etc.
- (3) *Panel surveys covering multiple programs and multiple cohorts*: Students in junior high (G7 to G9), senior high (G10 to G12), vocational (G10 to G12), and junior college (G10 to G14) programs were administered for data collection. All students were followed at least twice. A portion of them were followed four times at G7, G9, G11, and G12. In light of the ongoing transformation of the Taiwanese educational system in 1990s, the project started with two cohorts of approximately 40,000 students, making it possible to employ a quasi-experimental design in future analysis.
- (4) *National representative samples of the students*; Students under data collection were representative samples of the 1984/85 and 1988/89 birth cohorts. Weighing is provided according to the probabilistic sampling design.

(5) *Public goods*: Data are made available to the public as soon as the data collection and data cleaning completed, thereby providing an important resource for both academic and policy research.

## 1. The Secondary Schooling System in Taiwan

In Taiwan, community-based compulsory education is nine years, including six years of elementary schooling (1<sup>st</sup>–6<sup>th</sup> grade) and three years of junior high schooling (7<sup>th</sup>–9<sup>th</sup> grade). The secondary schooling system thus comprises three years of compulsory education (7<sup>th</sup>–9<sup>th</sup> grade) and three years of non-compulsory education (10<sup>th</sup>–12<sup>th</sup> grade). The former is labeled as junior high, while the latter is labeled as senior high in this project. Senior high schooling consists of academic, comprehensive, and vocational tracks, and the first three years of five-year junior colleges (junior college hereafter). In Taiwan, five-year junior colleges recruit junior high students (9<sup>th</sup> graders) for vocational training. The first three years are considered part of high school, while the remaining two years are college training. In the 2001, 99.45 percent of 1984/85 and 1988/89 birth cohorts were in school. In that year, there were 875 junior high schools, 720 senior high schools, and 148 five-year junior colleges in Taiwan.

School quality depends upon the sector and the program, especially in senior high schools. For instance, at the junior-high level of schooling, tuition is nominal for public school, while that for private school can be ten times as high as that for public school. Private junior-high schools enroll students who have a high SES. Academic, merit-based sorting starts when students enter higher-secondary education and higher education. Students must take different types of entrance examinations in their last year of junior high school (9<sup>th</sup>-grade) in order to pursue education beyond the nine years of compulsory schooling. Students are sorted into different schools and tracks according to their standardized test scores on senior-high school or junior-college entrance examinations. Sorting occurs between senior high school and junior college, academic track and vocational tracks, as well as public and private schools. Students are admitted to the best possible school according to their scores on the entrance examination. On the one hand, schools select the most qualified students according to the standardized scores set by the schools. On the other hand, students with high test scores are most likely to choose the academic track and public schools over vocational and comprehensive<sup>1</sup> tracks and private schools. This transitional point is crucial for educational mobility because students admitted into prestigious colleges or universities usually graduate from elite senior high schools.

During the period of 2001 and 2007, there were two major institutional changes in the Taiwan educational systems. Starting in 2003, graduates of the junior high schools are not

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<sup>1</sup> The comprehensive track is a program that emphasizes both academic and vocational learning.

required to take entrance examinations to attend high schools in different tracks or junior college. In addition to entrance examinations, graduates of junior high schools take a key competency test, which is similar to the SAT in the United States, and apply to schools by submitting their key competency scores. The senior high and junior college samples of 2001 of the TEPS were the last cohort of students who went through the old system of unified high school entrance examination. In addition, the junior high sample of 2001 was the second cohort of students who face the major curriculum changes specified in the *Guidelines of Grade 1-9 curriculum for elementary and Junior High School Education* (Ministry of Education, 2008). Thus the data permit a comparative analysis of student learning before and after the institutional change in the educational policies in Taiwan.

## **2. The Basic Framework and Timetable of the Survey**

TEPS spanned for six academic years from 2001 to 2007 for the first phase. The students are now undergone series of data collection on their experience in colleges and/or in the labor market (the Second Phase, Taiwan Educational Panel Study and Beyond, TEPS-B). Central to the project are questionnaire surveys of students in junior high, senior high, vocational, and junior college programs in 2001, 2003, 2005, and 2007.

**The Junior High Sample:** First year junior high school students were surveyed for the first time in September 2001 and followed up after entering the third year program in 2003. A subset of these students will be followed up again after entering senior high school, vocational high school, or the third year of five-year junior colleges.

**The Senior High Sample:** Second year students in academic, comprehensive, and vocational tracks were surveyed for the first time in the second half of 2001. The second survey was conducted in the first half of 2003 when the students were in the second term of their third year.

**The Junior College Sample:** Second-year junior college students were surveyed for the first time in the second half of 2001. The second survey was conducted in the first half of 2003 when the students were in the second term of their third year.

The timetable for data collection is as follows:

Nov. 1999 to Dec. 2000			2001		2002		2003		2004		2005		2006		2007		
First semester	Second semester	First semester	Second semester	First semester	Second semester	First semester	Second semester	First semester	Second semester	First semester	Second semester	First semester	Second semester	First semester	Second semester	First semester	
Preparatory operations			Junior high sample		Senior high sample		Junior college sample										
			Data collection in first year of junior high school	Data verification, collation and tracking planning		Data collection in second year of senior high school	Data verification, collation and tracking planning		Data collection in third year of junior high school	Data verification, collation and tracking planning		Data collection in second year of senior high school	Data verification, collation and tracking planning		Data collection in third year of senior high school	Data verification and collation	
			Data collection in second year of junior college	Data verification, collation and tracking planning		Data collection in third year of senior high school	Data verification and collation		Data collection in third year of junior college	Data verification and collation							

### 3. Data Collection – Methods and Content

Data collection for TEPS included two parts: (1) Comprehensive Analytical Ability test to be taken by the students only, and (2) Questionnaires designed to be completed by students, parents, teachers, and school principals and administrators.

#### A. Comprehensive Analytical Ability test

Learning outcomes of the students in TEPS refer to cognitive and non-cognitive ability, behavior, health and mental health status, civic orientations, and value and attitude. Cognitive ability was measured according to the Comprehensive Analytical Ability Test (CAAT hereafter) developed by the TEPS research team. Comprehensive ability testing was developed to assess students’ problem solving ability through analysis and reasoning rather than acquiring “knowledge” through rote learning. The subject domains of the CAAT

included general analytical ability, science, mathematics, Chinese, and English. Different versions of CAAT according to levels of difficulty were administered to students of different grades and cohorts. The design structure of the test took into consideration that the students would grow annually through the learning process which would be reflected in the way the tests were designed. As such, an equal combination of easy and difficult questions was distributed within the first year's assessment. The first year test scores are used as a starting point for us to gauge the students' growth curve in the following waves. The Report on the Psychometric Properties of the Comprehensive Analytical Ability Test for Taiwan Educational Panel Study (in Chinese) can be found at <http://www.teps.sinica.edu.tw/description/TestingReport2004-2-10.pdf>.

#### B. Questionnaires:

Questionnaires were designed specifically to cover various domains of opportunity which were deemed to affect students' learning. That is, four questionnaires designed to be administered to the students, parents, teachers and schools. They can be found at <http://www.teps.sinica.edu.tw/>. One of the special features of TEPS was the dialogue relationship among the questionnaires. The four questionnaires were designed under the same framework. Inter-related questions were provided via complementary and cross queries. In some cases, questions on a particular topic can be put to different combination of the target groups, such as the students and their subject teacher; students and their parents, students, parents and the school, and teachers and the school. This makes it possible to examine the different interpretations that different individuals react to the same situation.

##### Student questionnaires:

Data was collected from the learning opportunities provided to students by their schools, families, home environment, clubs and other organizations; the amount of time that students devoted to learning and the amount of effort they put in; friends; self-appraisal; behavioral problems; civic orientations, values, physical and mental health, etc. By average it took 50 minutes to finish the student questionnaire.

##### Parent questionnaires:

What the family could offer and the factors that would affect the students' learning opportunities. These factors included disciplinary methods, home atmosphere, household activities, summer learning, educational expectation, investment and educational expenditure, and their psychological aspect etc.

Several special methods were used to collect the parents' questionnaires. The students were asked to take the questionnaires home for their parents to fill out. The

completed questionnaires were then brought back to school to be collected by the teacher. In the case of students living in a school dormitory, the students were asked to write their parents' address on an envelope and the questionnaires were then mailed to the parents for them to fill out. The completed questionnaires were mailed back to the interviewer to download the data into the computer card. To encourage the parents to complete the questionnaires in order to increase the return rate, the project has offered in particular many prizes. For those parents who could return completed questionnaires are offered a lucky draw. It was hoped that by using this method it would be possible to increase the return rate to 100%. To verify the accuracy of the questionnaires, telephone interviews were conducted with the students' parents.

#### Teacher questionnaires

This is to collect the impact that teachers have on their students' learning opportunities. The data included teacher's personal details, teacher's appraisal of the students' quality, overall assessment of the school as a whole, teaching methods and materials, etc. The teachers were also asked to evaluate the learning attitude and ability of every participating student in their class.

#### School questionnaires

This is to collect the school factors that affect the students' learning. The questionnaire was divided between the school principal as an individual and the school as a whole (subdivided into departments and offices). Areas covered including school policy, the principal's leadership and schooling philosophy, whether or not the school is possessed with adequate resources; whether the school resources are sufficient, school resources, funds and teachers were adequately utilized, and the support provided to the teaching and research approach, etc. Taking into consideration the difference of the junior colleges and limited samples collected, no questionnaire was designed catering the junior colleges.

A summary of the content of the student, teacher, parent and school questionnaires is given in the following table:

**The Contents of the Questionnaires**

	<b>Students</b>	<b>Parents</b>	<b>Teachers</b>	<b>Schools</b>
	<p><b>I. My Life</b></p> <ol style="list-style-type: none"> <li>1. A typical day at school</li> <li>2. The learning experience in class</li> </ol> <p><b>II. My Home</b></p> <ol style="list-style-type: none"> <li>1. Family members</li> <li>2. Major home events</li> <li>3. Interaction with parents</li> <li>4. Parents' participation degree in school and learning activities</li> <li>5. Interaction with siblings</li> <li>6. Overall family relationships</li> </ol> <p><b>III. School Life</b></p> <ol style="list-style-type: none"> <li>1. School atmosphere</li> <li>2. Class atmosphere</li> <li>3. Interaction with classmates and teachers</li> <li>4. The student's life at school</li> </ol> <p><b>IV. Leisure and Entertainment</b></p> <ol style="list-style-type: none"> <li>1. Extracurricular activities</li> <li>2. Experience in school societies and leadership</li> <li>3. Experience in societies outside school and leadership</li> <li>4. Participation in talent and cultural activities</li> <li>5. Part-time work</li> <li>6. Friends</li> </ol> <p><b>V. About Me</b></p> <ol style="list-style-type: none"> <li>1. Personal details (age, gender, height, weight, eyesight, learning status in junior high school, etc.)</li> <li>2. Educational choices</li> <li>3. Personal educational goals and expectations</li> <li>4. Self-appraisal of deviant behavior</li> <li>5. Reasons for discomfort</li> <li>6. Physical and psychological perplexity (such as the issue that affect concentration)</li> <li>7. Learning attitude</li> <li>8. Personality</li> <li>9. Self-appraisal of own abilities</li> </ol> <p>Level of happiness</p>	<p><b>I. Your Family</b></p> <ol style="list-style-type: none"> <li>1. Personal details of household head (gender, marital status, education, state of health, etc.)</li> <li>2. Linguistic skill of household head</li> <li>3. Place of birth of household head</li> <li>4. Learning ability of household head</li> <li>5. Household financial status and learning resources</li> </ol> <p><b>II. Your Child</b></p> <ol style="list-style-type: none"> <li>1. Child learning ability</li> <li>2. Child learning attitude</li> <li>3. Child personality</li> <li>4. Child health</li> <li>5. Child behavior</li> <li>6. Child friends</li> </ol> <p><b>III. Your Child during Primary School and Junior High School</b></p> <ol style="list-style-type: none"> <li>1. Interaction with parents</li> <li>2. Common conflicts and the solutions adopted</li> <li>3. Consensus of your spouse at disciplinary attitude</li> <li>4. Interaction with the parents of the child's classmates</li> </ol> <p><b>IV. Relationship Between Family and the Child's Current School</b></p> <ol style="list-style-type: none"> <li>1. Interaction with the school</li> <li>2. Understanding of the school</li> <li>3. School-related expenditure</li> </ol> <p><b>V. Expectations for the Child</b></p> <ol style="list-style-type: none"> <li>1. Parents' sacrifices for the sake of the child education</li> <li>2. Expectations relating to the child's educational achievement</li> <li>3. Comparison of the child's educational achievement with others</li> <li>4. Expenditure on education</li> <li>5. Parental employment status</li> </ol>	<p><b>I. Questions to be Jointly answered by Teachers</b></p> <ol style="list-style-type: none"> <li>6. Position held in the school</li> <li>7. Educational experience</li> <li>8. Teaching status</li> <li>9. Attitude taken by students' parents</li> <li>10. Academic atmosphere within the school</li> <li>11. Problems encountered</li> <li>12. School organization and administration</li> <li>13. Teaching resources</li> <li>14. Personal details</li> </ol> <p><b>II. Questions to be Answered by the Homeroom Teacher</b></p> <ol style="list-style-type: none"> <li>1. Class details</li> <li>2. Homeroom teacher responsibilities</li> <li>3. Interaction with parents</li> <li>4. Incentives and punishments used</li> <li>5. Appraisal of student's overall performance</li> </ol> <p><b>III. Questions to be Answered by Core Subject Teachers</b></p> <ol style="list-style-type: none"> <li>1. Details of classes taught</li> <li>2. Teaching methods and materials</li> <li>3. Classroom atmosphere</li> <li>4. Appraisal of academic performance</li> </ol> <ol style="list-style-type: none"> <li>1. Appraisal of student performance</li> </ol>	<p><b>I. Questions to be Answered by the Principal</b></p> <ol style="list-style-type: none"> <li>2. Principal's personal details</li> <li>3. Basic data of the school</li> <li>4. Relations between school administration and teachers association</li> <li>5. Students' family background</li> <li>6. Awards system</li> <li>7. How the school operates in practice</li> </ol> <p><b>II. Questions to be Answered by the Director of Academic Affairs</b></p> <ol style="list-style-type: none"> <li>1. Director's personal details</li> <li>2. Relations between school administration and teachers association</li> <li>3. School entrance methods and teaching approach</li> <li>4. Curriculum planning</li> <li>5. Interaction with parents</li> <li>6. How the school operates in practice</li> </ol> <p><b>III. Student Affairs</b></p> <ol style="list-style-type: none"> <li>1. Extracurricular activities – types, number and length</li> <li>2. Incentives and punishments used</li> <li>3. Attendance</li> <li>4. School environment</li> <li>5. Types of consultation room</li> <li>6. Career planning activities</li> <li>7. Types of psychological testing used and action taken based on test results</li> <li>8. Progression status to higher levels of education</li> </ol> <p><b>IV. School Funding and Facilities</b></p> <ol style="list-style-type: none"> <li>1. Appraisal of teaching equipment</li> <li>2. Teaching-related expenditure</li> <li>3. School budget</li> <li>4. External contributions</li> </ol> <p><b>V. Personnel Matters</b></p> <ol style="list-style-type: none"> <li>1. Teaching staff</li> <li>2. Teacher seniority</li> <li>1. Teacher education</li> </ol>

#### **4. Sampling Design**

A multi-staged stratified, nested cluster sampling is employed. School class is the unit of sampling. Sample size was determined by three factors: namely the need for causality analysis, attrition rate in follow-up, and the need for multi-level analysis. Firstly, TEPS was intended to be a multidimensional database covering a minimum period of six academic years. The database was designed not only to meet the needs of statistical presentation and inference but also the need for further analysis of causation methods. The more in-depth the causality analysis, the more samples would need. Secondly, long-term follow-up was to be a key feature of the database. Whilst the setback that occurs most frequently in long-term follow-up is that of sample attrition. The general practice is to increase intentionally the sampling size from the beginning. The sample size for the first wave of TEPS data collection was decided by assuming with an attrition rate of around 20%. Thirdly, TEPS has been designed to simultaneously cover three nested groups (students, classes and schools), with multi-variant causality analysis being implemented at each level. This is a critical feature of TEPS. To achieve this goal, there had to be a sufficiently large number of schools and classes participating in the project. In order to be able to examine the differences in learning results both between schools and within schools, the database should include at least two classes from each school. However, in order to avoid the risk that incomplete data for individual students within a particular class would reduce the effective number of classes within the school for which data were available to less than two, the average number of classes per school from which data was collected was increased to three. As for the number of students sampled within each class, and in order to ensure a reasonable level of statistical stability, it was believed that classes in which data was obtained from 10 students or less should be excluded from the analysis. It was therefore decided that data must be obtained for at least 12 students in each class. But this figure was raised to 15 to allow for attrition.

Taking the above three factors into consideration, the sampling method adopted was a stratified random sampling that was based on the distribution between urban and rural areas, public and private schools, senior high and vocational schools. The schools were selected first, and then the classes, and then 15 students were selected from each class at random. In order to achieve an appropriate degree of weighting in the sample, in the case of schools with a large number of aboriginal students and schools that had been affected by the severe earthquake that took place in Taiwan on September 21, 1999, the tests and questionnaires



were administered to the entire class. For technical consideration, it was also the case in classes with a very small number of students and in all junior college classes.

In September 2001, the first phase of data collection involving G7 and G11 students was launched. In 2003, the second phase of data collection was executed on the same group of students who were then in G9 and G12, respectively. Part of G7 students were followed till they were in grade twelfth, they were labeled as the Core Panel (CP hereafter). A new sample of G11 students in 2005 (New Panel and NP hereafter), together with CP, were the target of data collection in 2005 and 2007. CP and NP as a whole constituted a representative sample of the G11 student population in 2005. In addition, the second and third year Junior College students were also included for data collection as a separate sample by using a modified set of questionnaires. The size of the sample and the actual data collection results for the first wave of data collection in 2001 are shown in the table below:

	Total	School Type				Junior College
		Junior High School	Senior High School		Senior Vocational School	
Total number of schools included in the sample	546	338	Regular	Bilateral	62	27
			163	49		
Actual number of schools for which data was collected successfully	539	333	159	48	62	26
Actual number of classes for which data was collected successfully	2,303	1,244	573	130	260	96
Actual number of students for whom data was collected successfully	39,336	20,004	8,719	2,062	4,066	4,485
Actual number of teachers for whom data was collected successfully	6,601	3,580	2,728			312

All data collected during the launch of the TEPS project have been deposited at and managed by the Center for Survey Research, Academia Sinica. Anyone interested in TEPS may visit <http://SRDA.sinica.edu.tw> and apply for access to the data.

## 5. Conclusion

There was a widespread consensus among educational researchers both at home and abroad on the need to establish a long-term education database in Taiwan. For more than ten years, educational researchers in Taiwan have been planning and trying to win support for the establishment of education databases of this kind. For various reasons all attempts failed. The establishment of a database is a complex and time-consuming task that requires the involvement of a large number of researchers over an extended period of time. Not only does the TEPS project involve six full-time research fellows (professorial equivalents) in Academia Sinica who have dedicated an enormous amount of time and energy to the project,

many scholars in related fields at National Taiwan Normal University, National Chengchi University, National Taitung University and National Chung Cheng University have also participated actively in the TEPS project.

One point that needs re-emphasizing is that the objective of TEPS is to stimulate more research in the field of education basics rather than particular education policy. Naturally, from the standpoint of education basics research, one has to consider the factors that will affect the students' problem-solving ability, such as the amount of effort made by the students themselves, learning opportunities and learning capabilities etc. The range of issues involved here is huge. From the database content perspective, it is always ideal to cover as many of these issues as possible. As it was, bearing in mind the limited resources available and the fact that this was a brand-new database, it was decided during the planning stage that the main focus would have to be on research in education basics, employing strategic selection to establish a database for Taiwan with at least two waves of data collection. The quality of data is something that builds up over time. Nevertheless, if there is not a starting point, there is no possibility for improvement, and it is impossible to have a richer content either. The quality and richness of the data produced by the National Education Longitudinal Study (NELS) in the US is widely recognized by educational experts from various countries. This is because NELS has been underway for more than 20 years, with numerous revisions and additions having been made during that time. It is our hope that not only will the TEPS project be a milestone in the history of education research in Taiwan, but it will also mark the beginning of an ongoing process of accumulating experience and the establishment of a permanent organizational framework. Ideally, management of the public asset such as TEPS should be entrusted to a national educational research organization.

※ The planning of TEPS has been undertaken jointly by the Academia Sinica, the Ministry of Education and the National Science Council. Professor Ly-Yun Chang (Research Fellow, Institute of Sociology, Academia Sinica) has been the principal investigator, while Professor Tony Tam (Associate Research Fellow, Institute of European and American Studies, Academia Sinica) the Co-principal investigator).