

EQUITV Program Impact Assessment

1. Background

The EQUITV program has been carried out with many years of support from Japan. Even simply from direct cooperation activities carried out by JICA, two technical cooperation projects have been carried out over a total of seven years since 2005 as well as three follow-up programs and the dispatching of individual experts. Through these efforts, EQUITV teaching materials have been developed¹ and revised², policies have been formulated³, and EQUITV has been expanded nationwide⁴. Also considering the construction of a media center⁵, support for a pilot project⁶, enhancing of equipment⁷, and provision of teaching materials⁸, it is apparent that Japan's support for the EQUITV program has been long term and comprehensive.

Through past activities, the EQUITV program has been accepted by the PNG Department of Education (DOE) and is currently in the process of being established as its own independent program. While many challenges remain for further expansion and use of EQUITV, the program can be said to have had sufficient results from the view of providing a program oriented towards PNG's geographical environment and educational circumstances through cooperation that covers every step from pilot testing to launch and expansion.

That said, the focus until now has been placed on establishing the EQUITV program, and the effects of the program on the quality of education have not been sufficiently verified. As we are starting phase 2 of the EQUITV program in which we step back from providing direct support from JICA, we performed impact assessment in cooperation with the PNG office and the Evaluation Department to evaluate the effects of the EQUITV program on education in PNG with the aim of verifying the quality provided by the EQUITV program. While impact of the program can be considered from many viewpoints, such as

¹ Technical cooperation project: Project for Enhancing Quality in Teaching through TV Program (EQUITV PROJECT) (FY 2005-2008)

² Follow-up project: Project for Enhancing Quality in Teaching through TV Program (FY 2009-2011)

³ Long-term expert: Audiovisual Education (FY 2001-2005), individual expert: Distance Learning Advisor (FY 2008-2010)

⁴ Technical cooperation project: Project for Enhancing Access and Capacity of EQUITV program (EQUITV Phase 2) (FY 2012-2015)

⁵ Grant aid project: Project for the Development of the Facilities for Education Media Programme (FY 1999)

⁶ Development partnership project: Distance Education by Utilizing Recording of Live Classroom (FY 2002-2004)

⁷ Grant aid project: Project for the Improvement of Media Education Equipment (FY 2012)

⁸ Non-project grant aid (FY 2011)

strengthening of the PNG DOE capabilities and quality improvement in teachers, we limited the present assessment to verification of the effects on student learning.

2. Purpose

To verify the effects of implementing the program on students' learning.

3. Data set and method of analysis (see details in the appendix)

We verified how the effects on student learning varied with differences in implementation, frequency, and number of years of the EQUITY program based on the PNG DOE's national examination data for each school and student and monitoring data for each school concerning the implementation status of the program collected in EQUITY2.

Nationwide data from the final examinations for grade eight students for basic academic school collected annually by the DOE was used as the national exam data. As the EQUITY program is focused on math and science and is taught in English, analysis was performed on math, "combined subject" (comprehensive subject that is 30% science and the remainder social studies and includes various constituents), and English (with a total of 50 points maximum). Those results were combined with monitoring data on EQUITY program usage and frequency of use collected by relevant provinces through interviews with school inspectors and so on to create a data set.

Although data was obtained from almost all schools in provinces implementing the project, this assessment was limited to analysis of the East Sepik Province and the New Ireland Province that had a certain number of schools that had used the EQUITY program for three years and had four years of test results, in order to analyze the effects of use of the program over time.

Utilizing the benefit of being able to use data for four years from the same school, we analyzed each subject after the EQUITY program was used for one, two, or three years. In addition to whether or not the program was used, we also analyzed the data by frequency of use per year⁹. When performing analysis, a school-level fixed-effect model was used to control factors for the level of schools that did not change over time.

4. Data analysis (see details in the appendix)

When we performed analysis, we saw the following trends.

⁹ Three patterns of EQUITY use were compared: (1) Used (at least a little) versus not used even once, (2) used at least three months a year versus not used even once, and (3) used at least six months a year versus not used even once.

- (1) For all subjects and frequencies of use, student exam scores increased only when the EQUITY program was used continuously for three years (90% level of statistical significance for math and 95% for the other subjects).
- (2) For all subjects, exam scores tended to increase with increasing frequency of use of EQUITY in a year.

Underlying the above trends may be the following three points that were suggested based on reports from technical cooperation project experts working on the EQUITY program and the results of various types of on-site observation, for example.

- (A) The reason for the tendency of schools that implemented the EQUITY program for three full years to have higher student exam scores may be that improved teaching methods by teachers from using the EQUITY program may have led to better understanding of the learning content by students. As specified in the Terminal Evaluation Report, the EQUITY program model lessons acted as opportunities for teachers who had not mastered basic teaching methods (e.g. method of asking questions, of using group work, or of having students give presentations) to see and learn how to hold and teach classes, even if only by watching another's example. Also, after becoming accustomed to the model class format, some teachers would add their own explanations for their lessons partway through model lessons or occasionally mute the video and explain the lesson themselves. In schools that used the DVDs, teachers would pause the DVD before the student in the model lesson answered a question from the teacher and have his or her own students answer the question. These improvements in the teaching methods of the teachers may have led to a better understanding of the learning material by students.
- (B) The reason for the tendency of student exam scores to increase with increasing frequency of use of the EQUITY program each year may have been that, even in classes with teachers who do not have sufficient knowledge of the subject material, more lessons without mistakes in content were being held through use of the EQUITY program. In addition, as frequency of use increased, improvement in the teaching methods of teachers may have started to affect the quality of student learning, similar to (A). Moreover, as students frequently had lessons using the EQUITY program and watched students in the model lessons, they may have become accustomed to lessons that include activities like questioning from the teacher, group work, and presentations, leading to an increase in their understanding of the learning materials in the lessons.
- (C) Combined subject that was one of the subjects being analyzed had only 30% questions about science that was a target of the EQUITY program, and the remaining portion comprised questions about social studies and other subjects. The reason why scores in this type of subject also tended to increase as seen in the present analysis may have been that improvement in the teaching methods of

teachers from use of the EQUITY program in math and science lessons, as mentioned in (A), had a ripple effect, also improving teaching methods in other subjects or increasing the quality of students learning.

5. Conclusions

The results of analysis in the present assessment suggested that three years' use of the EQUITY program in a school has positive effects on student exam scores that increase with increasing frequency of program use in a year. Due to data limitations, the assessment only analyzed two provinces. However, it may be possible to use the results of analysis as one material that can effectively increase the quality of education of the EQUITY program as it is continued and expanded to other provinces in PNG.

Note that this assessment analyzed grade eight student final exam scores for each year at each school, and therefore did not explicitly analyze the results of students continuing to use the EQUITY program over multiple years. Considering 4. (B), that type of analysis could provide even more useful findings. Furthermore, regarding 4. (C), as the combined subject exam used in analysis in this assessment included questions about subjects other than science, it may be possible to obtain more significant results by analyzing science on its own. These are the challenges we wish to address next.

Appendix: Detailed EQUITY Program Impact Assessment Analysis Results

References:

Mihoko Sakai, Hiroshi Nishino (2016) "Papua New Guinea; The Effects of Implementing Distance Classrooms with TV and DVDs on Academic Performance," Compilation of Presentation Abstracts for the 17th National Convention of the Japan Evaluation Society, The Japan Evaluation Society

Detailed EQUITV Program Impact Assessment Analysis Results

1. Method of analysis

The effects of intervention were estimated with the following estimation formula.

Regression equation

$$Y_{ijt} = \beta_0 + \beta_1 D_{1,jt} + \beta_2 D_{2,jt} + \beta_3 D_{3,jt} + \beta_4 X_{jt} + \beta_5 Z_{ijt} + \mu_j + \tau_t + v_p * \tau_t + \varepsilon_{ijt}$$

where

Y_{ijt}	Outcome (test score of student i at school j at time t math, English, combined subject)
$D_{1,jt}$	Dummy variable for intervention (1) (1 when the EQUITV program was adopted in year t): Effects of one year of use
$D_{2,jt}$	Dummy variable for intervention (2) (1 when the EQUITV program was adopted in year $t-1$): Effects of two years of use
$D_{3,jt}$	Dummy variable for intervention (3) (1 when the EQUITV program was adopted in year $t-2$): Effects of three years of use
X_{jt}	School-level characteristics (number of students taking examinations (proxy variable for size of school), squared value of that number)
Z_{ijt}	Student-level characteristics (gender, age, square of age)
μ_j	School-level fixed effect
τ_t	Dummy variable for year
$v_p * \tau_t$	Cross term for dummy variable for province and dummy variable for year
ε_{ijt}	Error term

2. About the sample¹⁰

(1) Definition of intervention group and comparison group

	Intervention group	Comparison group
Analysis 1	Students at schools that used the EQUITV program (at least a little)	Students at schools that did not use the EQUITV program even once
Analysis 2	Students at schools that used the EQUITV program at least three months a year	Students at schools that did not use the EQUITV program even once
Analysis 3	Students at schools that used the EQUITV	Students at schools that did not use the

¹⁰ In accordance with the purpose of the analysis, this analysis was limited to the following samples.

- Used only two provinces that had a certain number of schools that had used the EQUITV program for three years and had four years of test score data (the East Sepik Province and the New Ireland Province).
- Used only schools that had a certain number (10) students or more.
- Used only students between age 14 and 20.
- Excluded schools that were using the EQUITV program in 2011.

	program at least six months a year	EQUITV program even once
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(2) Number of students examined in analysis¹¹ (N)

Year	Analysis 1			Analysis 2			Analysis 3		
	Comparison group	Intervention group	Total	Comparison group	Intervention group	Total	Comparison group	Intervention group	Total
2011	6,063	0	6,063	5,609	0	5,609	3,476	0	3,476
2012	4,761	1,705	6,466	4,294	1,585	5,879	3,016	818	3,834
2013	4,135	2,909	7,044	3,655	2,784	6,439	2,655	1,583	4,238
2014	2,577	4,972	7,549	2,577	4,307	6,884	2,659	1,998	4,657
Total	17,536	9,586	27,122	16,135	8,676	24,811	11,806	4,399	16,205

(3) Number of schools examined in analysis

Year	Analysis 1			Analysis 2			Analysis 3		
	Comparison group	Intervention group	Total	Comparison group	Intervention group	Total	Comparison group	Intervention group	Total
2011	268	0	268	233	0	233	152	0	152
2012	205	63	268	180	51	231	128	23	151
2013	175	88	263	153	74	227	116	34	150
2014	111	156	267	111	119	230	113	38	151
Total	759	307	1,066	677	244	921	509	95	604

3. Analytical results

In analysis 1, 2, and 3, the results of analysis on the effects of using the EQUITV program for 1, 2, or 3 years are shown for each subject (unit: score).

Analysis 1

	Math	English	Combined
Used 1 year	0.286 (0.45)	0.328 (0.35)	0.548 (0.40)
Used 2 years	0.104 (0.61)	0.545 (0.46)	0.594 (0.49)
Used 3 years	1.224* (0.67)	1.325** (0.56)	1.389** (0.56)
Number of students (N)	26,696	26,709	26,702

* p<0.10, ** p<0.05

¹¹ The number of students (N) used in analysis varied by subject.

Analysis 2

	Math	English	Combined
Used 1 year	0.636 (0.48)	0.540 (0.36)	0.820** (0.40)
Used 2 years	0.247 (0.63)	0.732 (0.45)	0.705 (0.52)
Used 3 years	1.210* (0.67)	1.337** (0.54)	1.436** (0.56)
Number of students (N)	24,437	24,452	24,446

* $p < 0.10$, ** $p < 0.05$

Analysis 3

	Math	English	Combined
Used 1 year	1.426 (0.90)	0.776 (0.73)	0.865 (0.73)
Used 2 years	0.731 (0.97)	1.495** (0.68)	0.845 (0.79)
Used 3 years	1.892** (0.93)	2.048*** (0.73)	1.996*** (0.74)
Number of students (N)	15,672	15,688	15,681

** $p < 0.05$, *** $p < 0.01$

*1 Omitted the following control variables from the tables: gender, age, scale of school, dummy variable for year, and province x dummy variable for year.

*2 Values in parentheses show school-level cluster-robust standard errors.