Chapter 8
Enhancing the Capacity of Science Teachers in Palestine: A Case of Triangular Educational Cooperation between Jordan, Palestine and Japan

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1. Introduction

This chapter shares the experience of a successful triangular educational cooperation project between Jordan, Palestine and Japan. Intended to enhance the capacity of primary school science teachers in Palestine, the project has promoted activities designed to improve the teachers' capacity to encourage pro-active attitudes in their pupils, so that they think independently and try science experiments on their own, rather than simply listening to and absorbing the teachers' instructions.

In my view the project has been successful, and its achievements have been made possible by three distinctive features. First, the project was designed so that it brought together the development interests of the participating countries. On the one hand, Jordan and Palestine were eager to accumulate advanced human capital as a basis for sustainable economic growth,[1] while on the other hand, Japan wanted to share its experiences in developing human resources for student-centred education. Secondly, this project was carried out within a favourable policy environment. Official support from their governments served to encourage the teachers and staff members participating in the project. And thirdly, this triangular cooperation took advantage of many important lessons learned from a previous bilateral educational project, implemented by Jordan and Japan. We will look at these features in turn.

1. Jordan and Palestine do not possess enough valuable natural resources, by comparison with neighbouring countries. Therefore, historically, both governments have based economic growth policy on developing human capital (Yousef 2003).

2. Background and Programme Overview

2.1 Educational needs in Palestine and usable resources in Jordan

Around the time when the idea of this triangular cooperation project came to be discussed, education in Palestine was facing enormous challenges. Although it had achieved remarkable strides in the 2000s, during which period the net primary education enrolment rate reached more than 95 per cent, the quality of education displayed various deficiencies (JICA 2009). It had been negatively affected by the rapid expansion of the primary school population and the prolonged regional conflict, which had resulted in serious shortages of well-trained teachers and adequate facilities. Recognizing these pressing educational challenges, the Palestinian Ministry of Education and Higher Education had already taken a number of actions including facilities improvement,[2] strengthening teacher training and curriculum revisions.[3] To further these efforts, the Palestinian government decided to seek innovative approaches to bring about a more fundamental change in science teaching in the country. At that time, primary school education depended primarily on the traditional 'chalk and talk' method of teaching that emphasizes rote learning. The teachers gave little emphasis to hands-on experiments and faced difficulties in introducing other teaching methods and tools such as information, communication and telecommunication (ICT) technologies for effective schooling because of a lack of human and/or financial resources (Alkhawaldeh 2010).

Recognizing these needs in the Palestinian education sector, JICA worked as an intermediary to connect these needs with potentially useful – and usable – resources available in Jordan. Having worked with Jordan, JICA was aware that the know-how to disseminate good and innovative practices in science teaching was already in place, particularly at the Queen Rania Al Abdullah Centre for Educational Technology (QRC), whose capacity had been developed through JICA-supported technical cooperation from 2006 until 2009. The JICA offices in Jordan and Palestine decided to facilitate an opportunity for Palestinian officials to visit QRC, observe the practices there and exchange ideas with QRC's professionals. During the visit that took place in 2012, the QRC side in Jordan under the leadership of Director Dr Majali expressed their willingness to share their expertise and experiences with the

2. The government of Japan, through JICA, has provided a series of capital grants for the rehabilitation of primary schools in Palestine.

3. The current sector strategy is the Education Sector and Cross-Sector Strategy 2011–2013.

Palestinian side. Following this exchange, the idea of Jordan's QRC hosting a training programme for science teacher education for Palestine started to emerge. This process was facilitated by the bilateral cooperation framework of the Japan–Jordan Partnership Programme (JJPP).[4]

2.2 Programme overview

Through continuous dialogue, the three parties reached agreement in 2012 that they would cooperate in organizing a joint training course. The training course is entitled 'Capacity Development for Science Education utilizing ICT in Palestine' and falls under the third country training programmes (TCTP) scheme within JICA's operations. The programme aimed to share the core knowledge that had been developed and operationalized in Jordan through the earlier Jordan–Japan programme of 'Science Education Enhancement and Development' (SEED). Hence the triangular training programme in Palestine was referred to as TCTP-SEED.

Under TCTP-SEED, Jordan's QRC, under the Jordanian Ministry of Education,[5] served as the main host organization. The main Palestinian counterpart organization was the Ministry of Education and Higher Education. The main target group of the programme was Palestinian science teachers for 1st to 4th grades.[6]

In view of the Palestinian needs, it was decided that TCTP-SEED's objective would be to help Palestinian teachers acquire new teaching skills to empower students to think and try experiments by themselves in the classroom. Under this objective, TCTP-SEED set out to achieve three main outcomes:

a. Training selected science teachers as core trainers who would then train other science teachers to understand the concept of the new teaching skills and to utilize these skills to empower students to think and try experiments by themselves;
b. Capacity development of supervisors and staff in the Ministry of Education to monitor and advise the core trainers; and

4. The JJPP was constituted in 2004 between the two countries to encourage closer and more systematic collaboration in triangular cooperation with Jordan as the pivotal country. For a general discussion on such partnership programmes, see Chapter 5 of this volume.

5. The headquarters of QRC is located in Amman, the capital of the Hashemite Kingdom of Jordan.

6. Belgian Technical Cooperation has implemented a similar project for 7th to 10th grade teachers.

c. Implementing the new teaching methodology through trained science teachers at classroom level.

In addition to these three objectives, the Palestine Authority has requested new technical support from JICA to achieve three further outcomes:

a. Strengthening an institutional framework and system of science teachers' in-service training (INSET), in order to develop the capacity of teachers as well as their trainers (i.e., core instructors of the SEED approach, who themselves are teachers) in effective science teaching;
b. Developing, maintaining and monitoring INSET teachers' training courses in learner-centred science education at core schools in the region, designated as Science Resource Centres; and
c. Developing the capacity of the Palestinian Curriculum Developing Centre to design an efficient curriculum for effective science education.

As the list above indicates, TCTP-SEED was designed to attain a wide range of outcomes that were not necessarily limited to the development of narrowly defined teaching methods. Thus the programme contents developed by QRC and the Palestine Ministry of Education consisted of multiple modules.

Another notable aspect of TCTP-SEED's programme was its active utilization of ICT as a supplementary teaching aid, as has been the practice with SEED in Jordan. To support activities within the component, JICA provided QRC with the necessary ICT equipment,[7] which was subsequently handed over to the Palestinian side for follow-up actions throughout the country.

2.3 The SEED approach: The core knowledge of the programme

As mentioned previously, the basis and core element of this triangular programme comes from a project developed and widely applied in Jordan through a JICA-supported bilateral cooperation between 2006 and 2009. Prior to this project, Jordan faced a similar situation to that which Palestine is now striving to overcome; that is, science teachers in Jordan were spending most of the time teaching theories using textbooks while offering little or no chance for students to conduct

7. The equipment includes PCs as well other computer accessories.

experiments on their own in the classroom. In its quest to develop capable human resources to contribute to national growth, the Jordanian government decided to adopt a learner-centred approach in science teaching, and sought Japan's support. Through a four-year bilateral technical cooperation project with JICA, Jordan, with QRC as the main partner organization, succeeded in adapting and operationalizing student-centred teaching methods, and developed an effective approach for disseminating these methods nationally through the governmental administrative structure. The entire package comprising this body of new teaching methods and the systems for scaling-up the approach was named 'Science Education Enhancement and Development' (SEED), as part of a national communication strategy to enhance its recognition.

What is interesting about SEED in the context of south–south knowledge sharing is that its core knowledge is largely built on concepts and approaches developed in the South, namely in Kenya, where the bulk of the knowledge had been developed in a science teacher training initiative supported by JICA called 'Strengthening Mathematics and Science in Secondary Education' (SMASSE). At the core of the body of knowledge developed in SMASSE was a concept known as ASEI–PDSI – Activity, Student-centred, Experiment and Improvisation – Plan, Do, See and Improve. Recognizing the applicability of the knowledge and systems of SMASSE to Jordan, QRC adapted it to suit its own country (JICA 2012).

The SEED package contains three key elements. First was the learner-centred teaching method which forms the very core of SEED. Rather than developing a wholly new approach from scratch, QRC decided to employ the ASEI–PDSI approach of SMASSE. It is an approach that drives a fundamental shift of teaching away from a teacher-centred method, with heavy bias towards knowledge content, and towards a student-centred one with more emphasis on hands-on practice and experiments. ASEI–PDSI is complemented by the idea of locally available materials, which aims to utilize easily available everyday items for science experiments.

The second element of SEED was the frequent use of ICT in preparing teaching materials, which was in line with the Jordanian government's priority on the active use of ICT in education. This was also a strength of

QRC.[8] SEED encouraged teachers to use ICT (e.g. flash, movies and animation), rather than relying on textbook teaching alone, to help students deepen their understanding of concepts and theories. Active use of ICT in classes was also expected to further foster students' interest in science. Simulated science experiments using computers were expected to be an effective alternative to real experiments in classrooms and laboratories, which are not easy to conduct in most schools in Jordan and Palestine because of various constraints.

The third element was the strategy of widely disseminating learner-centred teaching methods. Learning from SMASSE, SEED employed the cascade system.[9] Under this system, Jordanian experts first trained Palestinian science teachers to become core trainers. These Palestinian core trainers then imparted what they had learned to other primary school science teachers. The science teachers who participated in these trainings then shared the knowledge and skills they had acquired with their colleagues at their schools, by giving demo lessons in their classrooms. After finishing the cycle of training in the cascade system, designated Science Resource Centres monitored and supported teachers to continue implementing effective science education.

These are the components of the knowledge shared with Palestinian teachers through TCTP-SEED. They had been developed based on the projects that had been implemented between Jordan and Japan, with necessary modifications.

Left: Palestinian trainers observe pupils learning ICT skills in a primary school in Jordan.
Right: A seen from a school in Palestine.
Source: JICA

8. This is an original element in SEED which was not borrowed from the SMASSE approach. In Jordan, universities and technical vocational colleges have been making efforts to attract international students for their ICT degree programmes, with resultant rising numbers of international students.

9. In SMASSE, core teachers' training lasted only one week, whereas the period of core teachers' training in SEED was two months. This is one example that shows how SEED has not simply imported the practices of SMASSE but has actively adapted and localized these to suit the context of both Jordan and Palestine.

3. Progress Report

3.1 Current state of progress

TCTP-SEED has progressed in two phases as shown below:

First Phase: June 2012–May 2013

A total of 39 Palestinian core members (9 members from the technical management team mainly consisting of Ministry of Education staff, 19 members from the core training group including teachers and supervisors and 11 IT professionals) made study trips to Jordan. A total of 19 Palestinian core trainers and supervisors and 11 Palestinian IT experts participated in the trainers of trainers (ToT) training in Palestine three times during this period.

Second Phase: May 2013–July 2014

Twenty-five selected core trainers who had been trained in the first phase will participate in two training sessions in Palestine and start the implementation of cascade training in their own district. Another 24 new participants will participate in ToT training four times in Palestine to prepare for cascade training in the following year. The expected total number of participants by the end of the project is 154.

The Palestinian Authority recognizes the importance of this project, knowing that the method has been tried in Jordan and has been successful and which meets Palestinian educational sector needs shifting to student-cantered learning. Thus the Palestinian Ministry of Education is currently planning to introduce this teacher developing model based on SEED all over the country and to provide training opportunities for all science teachers from 1st to 4th grade. The Ministry of Education's decision to allocate finance to expand the SEED approach nationally indicates a government commitment.[10] To ensure success of the efforts, the Palestinian Authority has requested from the government of Japan further support for a forthcoming national scaling-up exercise as a new technical cooperation project.

The Ministry of Education's request for a new technical cooperation project includes two new activities closely linked to TCTP-SEED. One is to develop a system to monitor and evaluate the achievement of teachers in order to ensure its sustainability. The other has to do with the curriculum. The Ministry of Education is planning to review science

10. The Ministry of Education in Palestine is planning to go further in mainstreaming the new teaching methods into national in-service teacher training programmes.

curricula and supplementary materials, and to provide advice to and training opportunities for staff members of the Palestinian Curriculum Centre of the Ministry of Education as well as to science teachers, in order to redesign and improve their curriculum to be more in line with the recommended teaching methods.

3.2 Prospective outcomes from the assessment results of the SEED initiative in Jordan

As the actual implementation of TCTP-SEED begun only in 2012 and is still ongoing, it is too early to make any full assessment of this triangular initiative. Given this limitation, we will, instead of looking directly at the impact in Palestine, look at the performance of SEED in Jordan, to approximate what we can reasonably expect from TCTP-SEED.

According to a questionnaire survey undertaken at the final evaluation of the SEED project in Jordan, over 95 per cent of the participants were satisfied with the contents of the training. The survey of the QRC staff members involved in SEED also reported that SEED was effective in upgrading the competence of teachers in learner-centred teaching to the extent that the teachers are now capable of applying the acquired knowledge and skills in the classroom. JICA's evaluation report also found that more than 75 per cent of the schools were satisfied with the training outcomes, saying that their teachers improved their teaching skills after participating in the SEED training (JICA 2009). Other evaluation reports suggest that students in the target areas of SEED have expressed greater interest in science than those in other areas in Jordan. These evaluation results indicate that the teachers who participated in the SEED training are actually practising what they have learned in order to improve students' satisfaction. This might sound obvious, but it is actually noteworthy in the sense that, in reality, teachers often fail to practise what they have learned during training programmes for various reasons. These tangible results from SEED have thus been highly regarded by the Jordanian stakeholders.[11]

Despite its encouraging performance thus far, as an on-going project TCTP-SEED needs to be monitored further to see if it will lead to a real

11. After the satisfactory results of the bilateral initiative in Jordan, QRC currently plans to apply this cascade training system to other other teacher training programmes, such as one for talented children. ICT utilization methods could also be used for other training.

change in science teaching in Palestine, as the programme's ultimate goal is to develop pupils' ability to nurture their scientific thinking by actively conducting more science experiments. In particular, as the Palestinian Authority is now gradually trying to move forward to the second stage of national scaling-up, we have to carefully monitor to what extent the initiative will contribute to a significant transformation of science teaching methods in Palestine.

4. Key Factors Contributing to Good Progress

4.1 Ownership and commitment

Strong ownership in both Jordan, as the pivotal country, and Palestine, as the beneficiary country, has been instrumental in encouraging the progress thus far of this triangular initiative. First, the Jordanian government and QRC were strongly committed to this enterprise. Behind such strong ownership in Jordan may have been its sense of commitment to contributing to the region's peace and prosperity, as the most politically stable country in the region. As such, Jordan has historically received a large number of refugees from neighbouring countries, including Palestine.[12] This sense of commitment has provided a firm basis for the cooperation demonstrated by Jordan.

Secondly, there is a shared ownership between the two countries in this triangular cooperation, which is largely influenced by their common challenges. Unlike other resource-rich Middle Eastern countries, Jordan and Palestine are endowed with only limited natural resources, and the development of well-trained human capital had been a longstanding challenge for both of them. Strongly recognizing the urgency of promoting innovation and furthering technological advancement to accelerate and sustain their economic growth, the two countries have prioritized education and human resources development over the years.[13] Thanks to their past and recent endeavours, the level of education in the two countries, measured by such parameters as school enrolment and literacy, are relatively good compared with most other countries in the region. However, they wanted to go further. The Palestine government demonstrated this by making a swift political

12. In 2012, for instance, Jordan received about a half million refugees from Syria.

13. Thanks to the government's commitment and the enthusiasm for education among Jordanians, the country has already attained a high quality of education in the region, which is well known among its neighboring countries. Jordan spends the highest proportion of its GDP on education of any country in this region.

decision coupled with generous budget allocations to integrate learner-centred teaching methods into its regular in-service teacher training.

This shared sense of ownership and commitment to education have certainly helped the effective collaboration between the two countries.

4.2 Knowledge adaptation and localization

With JICA's support, QRC took the utmost care in designing the contents of TCTP-SEED so as to ensure the relevance of the programme. First, QRC staff recognized the importance of tailoring teacher education materials to suit the Palestinian context. In fact, this was what the Jordanian specialists in QRC themselves had gone through during their cooperation project with Japan. Hence, QRC experts consciously provided opportunities and space for Palestinian teachers to prepare the teaching materials. With Jordan's support, Palestinian teachers were thus encouraged to improvise the useful teaching materials and teaching guidebook taking into account the local context, with the fresh skills and knowledge they had acquired during the triangular training programme.

Secondly, localizing the contents of teacher training, as was the case in SEED, worked also in TCTP-SEED. In the training courses in SEED, QRC staff members used not only ICT, but also locally available materials. The localization of teaching materials was initiated also in TCTP-SEED, as introduced by the core trained teachers, and was adapted to the situation of primary schools in Palestine, most of which did not yet have computer facilities.

4.3 Practical orientation

TCTP-SEED focused on providing participating Palestinian teachers with practical methods of making teaching materials during the training. In the training periods, TCTP-SEED provided practical opportunities for teachers to develop teaching materials on their own. These practical approaches took more time than simply giving lectures. However, as a result of this relatively long period of training, the Palestinian teachers were able to develop their knowledge and skills robustly and apply these for the benefit of their pupils in the classroom.

4.4 Leadership, ownership and support

Jordan's efficient leadership and Palestine's strong ownership created a

situation in which JICA's support also worked well as a catalyst. JICA did not send any experts to take part in TCTP-SEED; Jordanian experts and staff have taken these roles by utilizing the experience and knowledge derived from the bilateral SEED project. Thus, JICA was able to focus on playing a catalytic role in supporting the smooth progress of the project. Concretely, JICA has offered coordination and advice on the use of SEED to the Palestine Ministry of Education in terms of long-term education development.

Moreover, the JICA office network in the region and the close relationship between QRC and JICA that was developed over the years of the earlier bilateral project have enabled JICA to provide timely and flexible support for TCTP-SEED. This relationship and division of roles has obviously provided effective project implementation.

5. Concluding Remarks

5.1 The importance of capacity development for and through triangular cooperation

Along with strong ownership and commitment to triangular cooperation on the part of both countries, the relatively high capacity for knowledge acquisition not only in Jordan but also in Palestine was also instrumental. During the bilateral cooperation implemented previously, QRC staff members had demonstrated their high capability to acquire new knowledge and adapt and apply this in their practice. These abilities were instrumental in implementing TCTP-SEED; the QRC professionals took advantage of what they had experienced during the bilateral cooperation and applied it to the triangular project. In fact, those who took leadership roles in the implementation of TCTP-SEED were the core trainers and management staff members of QRC who had received practical training in Japan during the preceding bilateral project. This helped their Palestine counterparts to do likewise.

Triangular cooperation benefited not only the Palestinians but also the Jordanian professionals. Through teaching, they could deepen and systematize their understanding of the subject, which is expected to lead to improved quality in their subsequent activities. Likewise, by actually managing training programmes, QRC enhanced its capacity as a knowledge centre. Thus the experiences of this triangular cooperation have contributed to Jordan, and particularly to QRC, by enabling it to

enhance its organizational and staff capacity as an effective training centre.

5.2 Remaining challenges

For educational development cooperation projects to succeed, especially those that aim at the improvement of teaching methodology, a holistic approach which aims not only at the introduction of new teaching methodologies, but also at the revision of curriculum monitoring systems and textbook production, is indispensable. These other factors are essential if the outputs of teacher training programmes are to be maintained and take root. For teachers to use newly acquired teaching skills and knowledge in their classes, they need appropriate textbooks, but not only that, they need appropriate curriculum and teaching environments. Therefore, a holistic approach is important to ensure the effectiveness of a project. Such a holistic approach was a guiding principle of SEED in Jordan, and Palestinian Authority recognized the importance of this holistic approach.

As mentioned earlier, as of 2013 the Palestinian Authority has acknowledged the worth of TCTP-SEED and is planning to scale it up throughout the country. One must be cautious, however, about the prospects for the national scaling-up process; in many similar projects aimed at improving teaching skills, it often happens that teachers face difficulties in actually using the new teaching methods in their classes, as other systems such as the national curriculum and national exams are not made compatible with the new teaching skills. In the case of Jordan, its core trainers and QRC staff have recognized the importance of revising the teaching environment while simultaneously providing enabling conditions for utilizing the new teaching skills. The importance of recognizing this has been conveyed to Palestine. The Palestine Authority is already planning to develop a monitoring system for teachers and to revise its science curriculum. This revised curriculum would align with new teaching skills, and would encourage teachers to utilize the new skills in the classrooms. Though TCTP-SEED is essentially a teacher-training project, its impact and influence will be more widespread in other education sectors, rather than simply the area of teaching skills improvement. It remains to be seen how this triangular educational cooperation project will help Palestine to deal with all its daunting challenges.

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