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Development Impacts of Long-term Aquaculture Training Programs Conducted in Kenya and Thailand

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Abstract — This paper reports the results of a survey conducted to assess the development impacts of USAID-supported aquaculture training programs conducted at three institutions of higher education in Kenya and Thailand. All program participants interviewed reported that they acquired specific knowledge, skills, and attitudes during the training and that it has had an important impact on their professional development. The programs have also had a marked effect on the institutions where the participants now work. Short-term training in the U.S. and short-term training in one's home country were rated as more effective training models than long-term training in the U.S.

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1. Introduction

Many of the problems in developing countries can not be solved without the use of science and technology. Harnessing science and technology to meet local needs depends on the skills of scientists in these countries, so they must have strong systems of higher education to produce and sustain these skills.

Higher-education systems in developing countries used to receive considerable donor assistance, particularly in the 1950s and 1960s, when universities played key roles in the development of newly independent countries. But several decades later, critics charged that costs per student were too high, and rates of return to the home countries and professional employment were too low, so the support waned dramatically. The World Bank reported that

higher education should not be prioritized in development strategies (World Bank, 1994) and cut the amount of its worldwide education-sector spending that went to higher education from 17 percent in 1985–1989 to 7 percent in 1995–1999 (Bloom et al., 2006). At the U.S. Agency for International Development (USAID), the number of students who received support to earn higher-education degrees dropped from more than 15,000 per year in the early 1990s to fewer than 1,000 in 2006 (Demment, 2006).

Many developing countries and donor agencies now recognize the importance of higher education in the development process (World Bank 2000, 2002, 2008a), and as it has become clear that higher education produces both public and private benefits (e.g., Bloom et al. 2006; World Bank 2008a), higher-education systems have rapidly expanded. But investment in higher education alone is not a

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sufficient condition for lasting development. Its efficiency and effectiveness must be measured to determine if the investment is, indeed, having an impact on development.

2. Method

This survey assessed the development impacts of long-term training of 24 former and current students from Kenya and Vietnam supported by USAID's Aquaculture Collaborative Research Support Program (Table 1). The 19 Kenyan students were enrolled at two Kenyan universities

(Moi University and the University of Nairobi), and the 5 Vietnamese students were enrolled at the Asian Institute of Technology, an international institution of higher education in Thailand. Most were enrolled in Master of Science degree programs.

The students were interviewed in face-to-face interviews (16 in Kenya, 4 in Vietnam) or by e-mail (3 in Kenya, 1 in Vietnam) using a questionnaire modified from the one used in an impact assessment of the African Graduate Fellowship program and the Advanced Training for Leadership and Skills Project program (Aguirre International, 2004). The face-to-face interviews were conducted

Table 1. Information on interviewees

Home country	Sex		Training location	Degree program			
	M	F		BS	MS	PhD	MS and PhD
Kenya	11	8	Moi University	1	16	0	0
			University of Nairobi	0	2	0	0
Vietnam	2	3	Asian Institute of Technology	0	3	1	1

Table 2. Kirkpatrick's (1994) four-level model used to assess training effectiveness

Level	Evaluation type	Description
1	Reaction	The trainee's impression of the program; how he or she responded to the training
2	Learning	The acquisition of skills and knowledge from the training
3	Behavior	How trainees use their skills or apply their new knowledge in the workplace
4	Results	Changes that the trainee's performance brought to the organization in efficiency, productivity or profitability

during 5-20 June 2009 in Kenya (Nairobi and Eldoret) and 17-26 July 2009 in Vietnam (Ho Chi Minh City and Can Tho City).

Interview responses were analyzed based on Kirkpatrick's (1994) four-level model for assessing training effectiveness (Table 2). Impact was defined as change attributed to training at the three highest levels (2-4).

3. Results

3.1 Learning

The survey results indicate learning was high; all 24 participants reported that they acquired specific knowledge, skills, and attitudes (KSAs) during the training. Self-assessment is subjective and can not verify that learning occurred, but the participants could justify this assertion by citing examples of acquired KSAs (Table 3). The credibility of their responses is further supported by the fact that all participants reported the training had either an "important" or "very important" impact on their professional development, with most choosing "very important" (Table 4).

Table 3. Most important knowledge, skills and attitudes acquired

Question: <i>If you acquired any specific knowledge, skills or new attitudes from your academic program, indicate examples of the three most important ones that you acquired:</i>		
Kenya:		% of respondents
	Scientific methods/data collection and analysis	42
	Pond construction and management	32
	General aquaculture knowledge	32
	Hatchery management/seed production	26
	Artificial propagation of catfish	26
	Business/economic aspects of fish farming	21
	Teaching and extension	21
Vietnam:		% of respondents
	Research skills	80
	Scientific writing skills	60
	Teaching skills and methods	40

Table 4. Contribution of academic training to professional development

Question: <i>In relation to your professional development, the contribution that the training has made to your professional development has been:</i>					
	Very important (%)	Important (%)	Neutral (%)	Not important (%)	Total (n)
Male	85	15	0	0	13
Female	82	18	0	0	11
Total	83	16	0	0	24

3.2 Behavior and Results

For training to contribute to capacity development, trainees must do more than simply learn; they must apply the acquired knowledge and skills in the workplace. For this more demanding criterion, all of the participants reported that they applied their newly acquired KSAs at the workplace either “a great deal” or “a lot” (Table 5). The credibility of these responses is supported by the examples of applied KSAs provided by the participants (Table 6). All participants (excluding the two full-time students) reported that their organization’s output has changed due

to the KSAs they acquired in training, and most reported that it has been “very easy” or “fairly easy” to apply their KSAs in the workplace (Table 7). The most common difficulties encountered after returning to the workplace have been the lack of facilities, equipment and resources.

All participants reported that they have shared their KSAs with co-workers, and all but one reported that their supervisors have been supportive when they applied their newly acquired knowledge at work (Table 8). Of the 15 participants who returned to the same organization where they worked before the training, 14 reported their work responsibilities have increased (Table 9).

All but two of the participants have applied their KSAs

Table 5. Application of knowledge, skills, and attitudes at the workplace

Question: <i>If you acquired specific knowledge, skills, or new attitudes from your academic training, how much of the knowledge do you apply in your work?</i>						
	A great deal (%)	A lot (%)	Some (%)	A little (%)	None (%)	Total (n)
Male	58	42	0	0	0	12
Female	60	40	0	0	0	10
Total	59	41	0	0	0	22

Table 6. Skills most commonly applied at the workplace

Question: <i>If you apply “a lot” or “a great deal” of your knowledge, skills or new attitudes in your work [see Table 6], which ones have you applied</i>		
Kenya:		% of respondents
	Teaching and extension	21
	Fish breeding	16
	Artificial propagation of catfish	16
	Scientific methods; data collection, analysis and reporting	16
	Hatchery management/seed production	11
	Fish nutrition	11
	Project planning and management	11
Vietnam:		% of respondents
	Research	80
	Teaching	40

Table 7. Degree of difficulty in applying knowledge, skills, and attitudes at the workplace

Question: <i>How difficult or easy it is to apply your knowledge, skills and new attitudes at the organization where you work?:</i>						
	Very easy (%)	Fairly easy (%)	Possible but tdifficult (%)	Very difficult (%)	Impossible (%)	Total (n)
Male	9	73	9	9	0	11
Female	50	40	10	0	0	10
Total	29	57	10	5	0	21

Table 8. Degree of support from work supervisors

Question: <i>How supportive are those people who supervise your work when you apply your newly-acquired knowledge?:</i>						
	Very Supportive (%)	Somewha supportive (%)	Neither supportive nor resistan (%)	Somewhat resistant (%)	No Opinion (%)	Total (n)
Male	58	33	0	8	0	12
Female	89	11	0	0	0	9
Total	71	24	0	5	0	21

Table 9. Change in workload following training

Question: <i>If you now work for the same organization where you worked before the training, have your responsibilities increased, stayed the same, or decreased since your return from training?:</i>				
	Increased (%)	Stayed the same (%)	Decreased (%)	Total (n)
Male	90	10	0	10
Female	100	0	0	4
Total	93	7	0	14

Table 10. Application of knowledge, skills, and attitudes outside the workplace

Question: <i>Have you been able to apply the knowledge, skills or new attitudes acquired in the training to other areas of your life, such as within your family, in other professional relationships, or in the community?:</i>			
	Yes (%)	No (%)	Total (n)
Male	100	0	14
Female	80	20	10
Total	91	9	23

Table 11. Involvement in private companies

Question: <i>Have you been involved in the creation, expansion, or ongoing management of a private for-profit company or companies?:</i>			
	Yes (%)	No (%)	Total (n)
Male	27	73	11
Female	38	62	13
Total	33	67	24

outside of the workplace (Table 10), and about one-third have been involved in creating, expanding, or managing private for-profit companies (Table 11).

3.3 Effectiveness of training models

Participants were asked to rate the effectiveness of different types of training types based on their potential to contribute to aquaculture development in their home countries. Both short-term training in the United States and short-term training in the host country were rated as more effective models than long-term training in the U.S. (Table 12). The most commonly cited problems with long-term training in the U.S. included the high cost and lack of focus on species and issues relevant in the host countries.

The training type rated “least effective” was distance education over the Internet. The key problem with distance education, particularly in Kenya, is the lack of student access to the Internet.

4. Discussion

USAID-supported aquaculture training programs conducted at local and regional universities in developing countries have had marked impacts on the participants. All reported that they acquired KSAs during the training and that the training has had an important impact on their professional development. The training programs have also had a marked effect on the institutions where the

Table 12. Effectiveness of different training models

Question: <i>Rate the following training types based on their possible contribution to aquaculture development in your country. Indicate your rating on a scale of 1 to 5, with 1 being “least effective” and 5 being “most effective”</i>			
Training type	All	Men	Women
Short-term training in the U.S.	4.1 (0.8)	4.3 (0.8)	3.9 (0.8)
Short-term training in home country	4.0 (0.9)	3.8 (1.0)	4.1 (0.6)
Long-term training in the U.S	3.5 (1.2)	3.8 (1.1)	3.0 (1.0)
Distance education over the Internet without long-term residency in the U.S.	2.3 (1.0)	2.3 (0.9)	2.1 (1.1)

Standard deviation in parentheses.

participants now work. All participants reported that they have shared their KSAs with others at their work and that their organization's output has changed due to their training. Individual learning does not guarantee workplace performance outcomes, so enhanced capacity development requires both good training design and an appropriate organizational and institutional context in which to apply the learning acquired during training.

Noting the importance of focusing thesis research on local and regional topics and problems, participants rated both short-term training in the U.S. and short-term training in one's home country as more effective training models than long-term training in the U.S. The training model rated least effective was distance learning. The information and communication technology (ICT) revolution is fueling a growing demand for higher education, but its high capital costs and the need for continuous upgrading create an international 'digital divide' between have and have-not countries (Lu, 2001), and in some countries such as Kenya, a similar divide can occur between rural and urban areas. Future projects to develop ICT for infrastructure-poor settings must consider their limited bandwidth and high access costs.

Most participants have applied their KSAs outside the

workplace, and one-third have helped create or manage private companies. Developing links between higher education and local communities is important for nurturing small and medium-sized private enterprises, which can contribute significantly to poverty reduction, and sustainable social and economic growth (Juma, 2008). One of the biggest challenges facing developing countries is transforming knowledge and innovation into goods and services through business.

As higher education returns to the aid agenda, a better understanding is needed of how graduate-degree training programs compare with other capacity-development instruments. This will require systematic monitoring of the impacts of training on capacity-building objectives to identify training weaknesses and improve training performance. Training is one of the main ways development agencies try to build the capacity of countries to reduce poverty, however the results of these training are seldom adequately monitored or evaluated (World Bank, 2008b). Future training evaluations must report in terms of workplace behavior and impact on development capacity rather than simply the number of persons trained or degrees granted.

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