

# Agricultural Education and Training to Support Agricultural Innovation Systems

## OVERVIEW

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### EXECUTIVE SUMMARY

**A**gricultural Education and Training (AET) has a major role as a creator of capacity and supplier of the human resources that populate key segments of the AIS and enable that system to function more effectively. Past neglect and low levels of investment have prevented many national AET systems from equipping graduates to meet the needs of modern agriculture and contribute to the AIS. Aside from the technical knowledge that is the traditional focus of AET, graduates require the knowledge and tools to recognize innovative ideas and technology, catalyze communication between other AIS actors, and provide feedback to researchers and investors. Graduates particularly require new, “soft” skills, such as leadership, communication, negotiation, facilitation, and organizational capabilities. Employers increasingly demand these skills, which foster active participation in the AIS.

Serious constraints to quality education and training include weaknesses in policies that guide AET, the divided responsibilities for parts of the AET system, poor governance of AET institutions, continuing isolation of AET systems from key stakeholders, and serious underinvestment in AET systems. The major priority for reform is to develop a policy framework and (innovation) policy management capacity to guide AET. This reform underpins all others; it has wide implications for AET, interministerial cooperation,

financing, and stakeholder involvement. Another investment priority—wide-ranging, systemic reform—requires internal and external consultations with stakeholders and an analysis of gaps between stakeholders’ expectations and current academic programs. Other priorities for investment include reforming curricula and teaching methods; building capacity and stakeholder partnerships for technical education and training; and developing effective in-service and life-long learning capacity among public workers who interact frequently in the AIS. Such reforms can be supported by investments in capacity building and infrastructure for ICTs to facilitate learning, research, and global and local networking and communicating. Investments in accreditation or in a regional resource for advanced degrees may also improve the likelihood that AET delivers content that meets stakeholders’ needs.

Regardless of the chosen reform target, any change initiative will be subject to resistance, and leadership and commitment will be needed to see reforms through to the end. Depending on the location, capacity, commitment, and leadership for change, the time focus may shift to require longer-than-anticipated support; in other cases, reforms and changes may proceed faster than expected. A broad lesson for practitioners in planning reform programs of any length is to pay close attention to building constituencies of stakeholders at all levels to help ensure the program’s sustainability.

## **WHY INVEST IN AET TO SUPPORT AGRICULTURAL INNOVATION?**

Complementary investments in agricultural education have been neglected but are essential to ensure a new generation of agricultural scientists and leaders (World Bank 2004).

The growing focus on innovation systems in agriculture presents agricultural education and training (AET) with a challenge and an opportunity. The AIS creates demand for skills not traditionally developed in agricultural education—especially the “soft skills” that enable people to communicate better, listen more carefully and efficiently, nurture leadership, work cooperatively, and generally contribute more effectively to the AIS. The emphasis on the innovation system as a dynamic, highly interactive marketplace for ideas challenges AET to strengthen its role as one of the critical actors in agricultural innovation. All too often, agricultural education is failing to impart the knowledge, skills, and attitudes that can enable countries to feed growing populations, participate in international agricultural value chains, and cope with climate change, especially in the midst of grinding rural poverty.

The importance of enhanced skills for graduates who will interact with a wide spectrum of actors in the AIS is not in question; in fact, such skills assume even greater importance, given that they will have to compensate for a considerable educational deficit among the population in general. The majority of people with whom skilled AIS actors will interact in most developing countries have not had access to much more than basic education. The World Bank (2007b, 9) notes that education levels in rural areas worldwide tend to be dismally low—an average of four years for rural adult males and less than three years for rural adult females in sub-Saharan Africa, South Asia, and the Middle East and North Africa. Research in the 1980s established the relationship between primary education and annual farm output (Lockheed, Jamison, and Lau 1980; Jamison and Lau 1982; Jamison and Moock 1984). Basic education is a critical element for communication, understanding, and assessing innovations in the interactive process that prevails in the AIS.

For a very long time, governments and donors have invested very little, or only very intermittently, in AET (Willett 1998; Eicher 1999; Rygnestad, Rajalahti, and Pehu 2005; World Bank 2007b). The results are deteriorating physical infrastructure for education, overcrowded classrooms and residential accommodations, the exodus of teaching staff, outdated curricula, inadequate teaching and learning materials, and graduates’ limited skills and employment options.

At this critical juncture, AET remains the main supplier of human resources for many of the public, private, and civil-society constituents of the AIS, through its network of agricultural universities, faculties of agriculture, vocational and technical colleges, and farmer training centers which, together, constitute the AET system. The central question in this module is whether corrective investments in particular AET models, programs, and activities will enable the AET system to take its place as a forceful and valued agent of innovation in agriculture, keeping in mind that major investments in AET systems occurred decades before the concept of “innovation systems” could influence their design and that much work remains to be done.

The general outlines of an AET system that is capable of operating successfully within an innovation system must recognize that the innovation system in which it operates is dynamic. The AET system itself will need to be agile, flexible, attuned to the needs of stakeholders in the innovation system, and acutely aware of developments in technology, communications, and markets as well as challenges to production stemming from high energy costs, declining water resources, and climate change. It will also need to channel advice to decision makers on policies to guide AET at all levels.

These generalizations aside, not all AET systems are equal. Some need deep, fundamental reform and strengthening, whereas others may require only minor adjustments to become more effective within the AIS. Before discussing specific investment needs and strategies over the short, medium, and long term, this module presents a broad review of AET—its structure, weaknesses, and strengths. The module then describes investments in education and training that will equip actors in the agricultural sector to negotiate the rapidly changing agricultural landscape with greater skill, resilience, and innovation. The need for these investments to foster gender inclusiveness in AET systems is incontestable (for one example, see box 2.1). Above all, this module will emphasize that fostering a capacity for innovation on this scale will require equally large measures of persistence and collaboration—from the agricultural and education sectors and also from government, civil society, and rural people.

## **THE STRUCTURE OF AET SYSTEMS**

“Agricultural education and training” covers a range of organized programs and activities that serve the need for information, knowledge, and skills among those who work in various parts of the agricultural sector and the broader

## Box 2.1 Gender-Inclusive AET: The Example of African Women in Agricultural Research and Development

In agriculture as in other domains, innovation requires communication of many kinds at many levels. The dissemination of knowledge, information, and innovations poses a special problem among women. Few women graduate from agricultural education programs—too few to work with women in societies where women are excluded from rights to land and other natural resources. Women are also marginalized from agricultural events, activities, and programs led by men or not permitted to communicate with men outside the family. Essentially, “women have been . . . underrepresented at all levels of AET institutions, from postsecondary to tertiary and higher education, although detailed gender-disaggregated data are available only very sporadically or not reported at all” (World Bank 2009, 181). An innovative program that aims at increasing the numbers of females with higher degrees in Africa may be the beginning of a change in the gender balance in academic and research institutions.

African Women in Agricultural Research and Development (AWARD, <http://awardfellowships.org>) is a project of the Gender and Diversity Program of the Consultative Group on International Agricultural Research (CGIAR). This professional development program was launched in 2008 after a successful pilot in East Africa supported by the Rockefeller Foundation. It

*Sources:* Author.

seeks to strengthen the research and leadership skills of African women in agricultural science, empowering them to contribute more effectively to poverty alleviation and food security in sub-Saharan Africa. The two-year career development package builds on four cornerstones: establishing mentoring partnerships; building science skills; developing leadership capacity, and tracking, learning, monitoring, and evaluating fellowship-holders’ progress. The program does not provide funds for the fellows’ academic studies or offer research grants, although fellows can apply for research attachment opportunities.

Sixty outstanding women agricultural scientists received AWARD fellowships in July 2010, and the project currently supports 180 African women working in agricultural research and development who have completed bachelor’s, master’s, or doctoral degrees in selected disciplines. The fellows come from Ethiopia, Ghana, Kenya, Malawi, Mozambique, Nigeria, Rwanda, Tanzania, Uganda, and Zambia.

AWARD is a US\$15 million, five-year project with plans to expand to a second phase starting in 2013. It is supported by the Bill and Melinda Gates Foundation, the United States Agency for International Development, and the CGIAR. AWARD partners with more than 75 national agricultural research institutions.

rural space. At the apex of the system for AET are the tertiary educational institutions such as agricultural universities or faculties and colleges of agriculture within comprehensive universities. Traditionally, higher agricultural education produced graduates who found employment in public agricultural research (see module 4) and extension programs (see module 3) and other technical services offered by ministries of agriculture. Over the years, as these public agencies greatly curtailed hiring, holders of agricultural degrees, diplomas, and certificates have been more likely to seek employment with agribusinesses or with NGOs operating agricultural programs.

Other institutions in the AET system include the polytechnics, institutes, or colleges that prepare technicians at the diploma level (the postsecondary, subdegree level). This category of education, often termed “agricultural

technical-vocational education and training” (ATVET) or “vocational education and training” (VET), prepares technicians in a variety of specializations in agricultural subsectors. Some secondary schools offer agriculture as an elective (Tajima 1985), but in most developing countries these programs have a checkered history, influenced by the qualifications and experience of the teachers assigned to the subject and the motivation of the students who enroll. Probably the most successful secondary agricultural education model is the vocational agriculture program offered in largely rural districts in the United States. The program offers academic and practical subjects in school and, through a supervised youth organization (Future Farmers of America), helps students develop leadership skills and technical prowess by participating in contests and undertaking a supervised project (box 2.2).

## Box 2.2 Future Farmers of America: A Unique Young Farmer Organization

Future Farmers of America (FFA) was founded in 1928 and brought together students, teachers, and agribusiness to solidify support for secondary agricultural education. Today (circa 2011), the FFA has some 523,000 members (38 percent are female) aged 12–21 in all 50 states. Of these, 27 percent live in rural farm areas, 39 percent in rural nonfarm areas, and the remaining 34 percent in urban and suburban areas. Now known as the National FFA Organization, FFA—with its motto of “Learning to Do, Doing to Learn, Living to Serve”—is dedicated to making a positive difference in the lives of students by developing their potential for premier leadership, personal growth, and career success through agricultural education.

The FFA is an integral part of the secondary-level Vocational Agriculture program, which has three parts: classroom instruction, the FFA, and Supervised Agricultural Experience (SAE). Students develop their SAE projects in one of four categories: entrepreneurship (the student owns and operates an agricultural busi-

ness); placement (the student gets a job on a farm or at an agricultural business, school, or factory laboratory); research and experimentation (the student plans and conducts a scientific experiment, usually related to agriculture); or exploratory (the student attends an agricultural career fair or creates a report or a documentary on the work of a veterinarian or extension worker).

Through this program, more than 11,000 FFA advisers and teachers deliver an integrated model of agricultural education that provides students with innovative and leading-edge education, enabling them to grow into competent leaders. The FFA provides 23 national career development events through which members are challenged to real-life, hands-on tests of skills to prepare them for more than 300 agricultural careers. Agriculture is the largest employer in the United States. More than 24 million people work in some sector-related activity. Industry values the FFA program and its graduates, contributes to the National FFA Foundation, sponsors programs, and provides individual scholarships.

*Source:* Adapted from [www.ffa.org](http://www.ffa.org), accessed December 2010.

Agricultural training, frequently delivered in training centers or training institutes, is offered to public employees as in-service training and/or to farmers as farmer training. Ministries of agriculture are usually responsible for agricultural training programs. Public extension services offer training (largely to farmers) through formal presentations, lecture-demonstrations, field days, crop and animal field trials, farm tours, and various other media. Public agricultural research systems provide educational opportunities for farmers and extension staff, usually in the form of field days combined with lectures. Public sector researchers also act as resource persons in formal, higher-level education programs, work with extension staff to train farmers, or provide in-service training for extension staff.

### Formal AET

Traditionally, agricultural education has been supplied and supported largely by the public sector. Although the various elements in the AET delivery chain are often referred to collectively as a “system” (Bawden 1998, 1999; Rivera 2008), in many developing countries it is questionable whether these elements form a robust system in which communication

and feedback flow between institutions and allow for adjustments and improvements on a continuous basis. Agricultural education and learning (AEL) is a variation on AET that reflects a more student-centered approach to formal programs (Ochola and Ekwamu 2008).

In many countries, responsibility for education and training for agriculture and rural development has been, and continues to be, divided between ministries of agriculture and education. Typically, higher agricultural education has been the responsibility of the education ministry, whereas training for agriculture and its subsectors has been the responsibility of the ministry of agriculture. In some countries, the ministry of cooperatives is responsible for providing training for a variety of cooperatives that deal with a range of topics, including agriculture. Given the increasing interest in farmer organizations (see module 1, TN 4 and IAP 2) (especially as precursors to large, organized agricultural cooperatives), cooperative colleges are becoming an important aspect of formal AET.

Whether it is part of a robust, well-integrated system or not, agricultural education is weakened by the division of responsibilities among ministries, the isolation of individual ministries, and their failure to collaborate in designing and

delivering education and training in a manner that meets the needs of all AET stakeholders. Under these circumstances, a broad vision for AET is rarely in place. As a result, policies and strategies for modernizing agricultural education are seldom developed.

As a small but specialized element in the bigger education picture—which includes primary, secondary, and higher education together with vocational and technical education and training, teacher training, and a number of special adult education programs—agricultural education tends to lack bargaining power when investment decisions are made. This relative lack of visibility and clout is all the more critical because the mounting pressure for change in AET chiefly comes from developments in agriculture that are outside the control of AET institutions.

### **Informal AET**

Alongside the formal AET system, a dynamic, informal learning system greatly influences how information, knowledge, and skills are channeled and used in agriculture. At the heart of this system are farmers, farming families, the services they receive, and the contacts they make on a regular basis. Informal agricultural education involves awareness-raising and training provided to farmers by public extension and research services, by traders who purchase farm products and supply farm inputs, and by the media, which convey a variety of information to rural communities.

Farmer-to-farmer communication (see also module 3, especially IAP 2) is one of the most powerful forces for education within the informal system. Farmers communicate easily with their peers, observe the techniques and skills used by others, and quickly adopt what they perceive as successful practices. The actors in this AET system are linked with one another and within the broader AIS. The many roles played by graduates of AET, regardless of how structured or organized it may be in a given setting, are detailed in modules 3 and 4.

### **In-service training and development**

Public and private in-service training and development, which can be categorized as formal AET, serves employers, employees, extension workers, NGO technical staff, and vocationally oriented, self-directed learners (Rivera 2008). Similarly, the innovation system benefits from the communications and technical skills obtained by rural youth, either in or out of school, through participation in a variety of young farmers' organizations. The Future Farmers of America, described in box 2.2, is a very successful but unique

example of this kind of skill development, which makes important contributions to human resource capacity in agriculture.

### **PAST INVESTMENTS IN AET**

The 1950s, 1960s, and 1970s saw substantial, dedicated investments in AET. One of the largest investments, launched by USAID in the mid-1950s, was a long-term program that established universities similar to the United States land-grant universities in Latin America, Asia, and Africa. This ambitious program included technical assistance for administrative and academic activities and curriculum development, provided links to overseas advanced degree programs, modernized libraries, and paired the new universities with counterpart land-grant universities. The USAID program modernized the way that agriculture was taught and learned in many developing countries; enhanced the quality of education, research, and extension; provided current teaching materials; and created an international network of agricultural education professionals.

The impact of the investment was impressive but not always sustained. The quality of teaching and learning deteriorated. Changes in leadership, reduced funding, and the winding down of collaboration with individual overseas universities all reduced performance. On the other hand, a number of universities established under the program thrived and have continued to provide education leadership long after the investment program closed (the Brazilian system is a case in point; see box 2.3).

During the same period, multilateral organizations such as the World Bank, Food and Agriculture Organization (FAO), International Labour Organization (ILO), and the United Nations Educational, Scientific, and Cultural Organization (UNESCO) supported AET through free-standing agricultural education projects, training components in agricultural projects, and seminars, workshops, conferences, and in-country and international courses. With the exception of free-standing agricultural education projects, most of the other activities were of short duration. The impact of the free-standing projects depended heavily on the recipient ministry's or country's commitment to sustaining the new investment. The choice of participants for seminars, workshops, and training courses proved decisive in terms of the usefulness of these activities and the effectiveness with which the participant transferred knowledge and/or technology to the parent organization—a lesson that should not be forgotten in designing AET projects (see TN 4). By the end of the

### Box 2.3 Brazil's National Agricultural Research Program Benefits from Long-Term Investments in Human Resources

In 1963, the Brazilian government took a high-level decision to build a human capital base for a modern agricultural sector. With financing from the United States Agency for International Development, four American land-grant universities assisted four Brazilian universities in strengthening BSc level training for a decade followed by another four years of support for postgraduate education. In 1971–72 more than 900 Brazilian graduate students were studying agricultural sciences in United States universities. This experience with building human capital in programs in agriculture is directly linked to political decisions by the Federal Government and the Ministry of Education to pass the University Reform Act of 1968, which linked promotions to higher graduate degrees and required academic staff to work full time. In 1972, when the government established the Brazilian

Agricultural Research Corporation (EMBRAPA) to coordinate its national agricultural research program, EMBRAPA continued to invest in human resources. It launched a massive human capital improvement program that sent 500 agricultural researchers for PhD programs and spent 20 percent of its budget from 1974 to 1982 on training in Brazil and abroad (World Bank 2007a, 39). Today, one-third of EMBRAPA scientists have a PhD, half have an MSc, and the balance have a BSc or equivalent. The most important lesson from this experience is that Brazil did not reduce public expenditure on its core agricultural institutions some 40 years ago when foreign investment waned. Instead, by mobilizing high-level political support, Brazil built a strong human capital base to sustain a globally competitive agricultural research and extension base.

Source: Author.

Note: EMBRAPA = Empresa Brasileira de Pesquisa Agropecuária.

1970s, funding for AET began to decline dramatically (Willett 1998), overtaken by other development priorities. Numbers of AET specialists in many international organizations and bilateral donor agencies decreased. Despite pleas by numerous observers and organizations to governments, donors, and universities to rehabilitate and reform deteriorating agricultural education programs and facilities, AET continued to drop even lower on the development agenda.

A number of generic weaknesses in the planning and delivery of AET in developing countries have persisted.<sup>1</sup> Briefly, these weaknesses include a lack of university autonomy, weak links to stakeholders, lack of accountability for quality or employability of graduates, outdated curricula and teaching approaches, weak training in practical skills, the variable quality of programs, weak adoption of ICTs, and low remuneration of faculty and staff.

Diploma-level AET also exhibits weaknesses, including the absence of supporting policies, weak links to stakeholders, programs that fail to reflect labor-market needs, inadequate and inconsistent funding, and a shortage of skilled teachers/instructors. Agricultural training at the secondary level, which is not universally offered, is often chosen as an “easy pass” by students. It also suffers from a lack of qualified

teachers and is weakened by poor cooperation between v of education and agriculture.

A 2005 review of investment in AET in projects supported in Africa by the World Bank found that the same weak level of investment had persisted since the end of the 1970s (Rygnestad, Rajalahti, and Pehu 2005). One outcome of the weaknesses and low investment in AET is the reluctance of students to choose agriculture as their preferred academic pursuit (Pratley 2008; Rivera 2008; Mulder 2010). In countries where higher education is at a premium, this reluctance inevitably creates a situation where many of the students who enroll in agricultural programs have a greater interest in possessing an academic degree or certificate than in making a career in agriculture.

#### KEY POLICY ISSUES

Sound policies are essential to address the recurring weaknesses of AET systems, yet weak and fragmented AET systems cannot present a united front to government or policy makers and gain support for increasing the effectiveness of AET. Policy guidance and support are needed above all to:

*Clarify the role of AET.* Divided ministerial responsibility for agricultural education, especially for public agricultural

universities and faculties of agriculture, prevents AET from realizing its potential. Without a sense of urgency and collaboration between ministries of agriculture and education, higher agricultural education will not be reoriented and modernized to reflect the needs of a changing agricultural and rural environment. Clarifying roles and responsibilities of agricultural education in the development agenda (with clear links to the agendas of the respective ministries) would open the door to reforms that enable these institutions to fulfill stakeholders' expectations.

*Ensure sustainable, regular funding.* The allocation and disbursement of funds for AET on a sustainable and regular basis is essential for maintaining the quality and relevance of education programs. Policies that underpin AET need to recognize agriculture's broad contributions to the economy: as a producer of basic and export commodities, source of employment, provider of nutritional health, and engine of poverty reduction. It is essential that these policies are in place and implemented and updated as changes occur in the sector.

*End political interference in university administration.* Because most agricultural universities, TVET colleges, and training institutes are public entities, they are subject to political influence of one kind or another. Demand for education, especially at the tertiary level, can cause politicians to decree increases in enrollment without providing the physical, human, and financial resources to accompany higher enrollments. The lack of resources guarantees that educational standards will fall as facilities become overcrowded, teacher–student ratios become unmanageable, students struggle to study and learn in unfavorable surroundings, experienced teachers and researchers leave, and large numbers of underqualified graduates flood the job market. Appropriate policy instruments, strictly enforced, can help prevent interference of this kind.

*Improve governance in higher agricultural education.* A related policy issue is that agricultural universities and faculties of agriculture lack autonomy. Typically, universities have little or no control over budgets, hiring or firing of staff, links with stakeholders, or accountability for the fate of graduates once they leave. Policies are required to correct these weaknesses and improve the credibility and usefulness of higher agricultural education. Universities and other third-level entities need control over their programs, budgets, and staff. They also need to interact with stakeholders to better understand the changing agricultural sector and amend curricula to reflect these changes. (See also module 1, TN 1.)

*Address the gender imbalance.* An appropriate policy that stipulates active recruitment and quotas for females should

be in place. The policy would also support gender balance in the faculty and teaching staff of universities, TVET institutions, and training centers. The presence of female teachers, instructors, or trainers can make a difference when female students make decisions about pursuing a qualification in agriculture.

*Create a favorable environment for investing in AET and improve the balance of investments in agricultural research, extension, and education.* Investment is uneven in research, extension, and education—the three pillars of agricultural knowledge and information systems. Investors find it easier to deal with research or extension agencies, with their clear lines of authority and organized networks, than with multitiered educational systems, which answer to more than one ministry and are often isolated from research and extension. Policies should be in place to ensure that research, extension, and education work together to capitalize on their respective strengths and present a holistic picture of their interdependence in bringing knowledge and services to the sector. See module 6 for a broader discussion on an enabling environment.

## **INVESTING IN CHANGE: PRIORITIES AND NEW DIRECTIONS FOR AET**

Given this background—the declining quality of many AET systems, the general failure to articulate a strong policy framework for agricultural education, and the corresponding failure of educational institutions to build a strong and vocal constituency within the agricultural sector—it is clear that many AET systems must change. This section discusses some of the priorities and new directions that could reposition AET systems as catalysts and beneficiaries of innovation. These changes—carefully managed, with sustained commitment—should enable AET to attain the autonomy, agility, and human and financial capacity to produce graduates who meet the needs of the agricultural sector and its diverse stakeholders.

Priorities and new directions are discussed first to provide a broad sense of the kinds of reform that AET systems might undertake. Because the success of any reform depends to a great extent on how it is managed, the next section briefly presents guidelines, based on experience, for managing change in AET. To support this kind of change in AET systems, decision makers, AET entities, and donors can choose among a range of specific investments, which are discussed next. These investments can be of long, medium, or short duration, depending on the agreed objectives, identified needs, support time horizon, and funding availability.

Table 2.1 provides a useful checklist of future directions for AET in relation to current conditions.

more effective, this list gives an indication of the range of options for reform and the issues that often prove to be the most important.

### Investment priorities

What are the most important investments to make AET a forceful contributor to the innovation system? Although every case in every country will differ, and although it is hoped that new ways will always be found to make AET

DEVELOP A POLICY FRAMEWORK AND (INNOVATION) POLICY MANAGEMENT CAPACITY. A major investment priority is to seek policies from government to guide AET, enable it to develop effective education and training strategies, and provide it with high visibility in sector and national

**Table 2.1 Current and Potential Future Directions of AET Systems**

<b>Higher agricultural education now</b>	<b>Future directions</b>
Weak, unenforced, or absent policies	Clear AET policies with responsibilities defined and enforced
Weak governance	Strong governance inclusive of stakeholders
Little autonomy	Autonomy that enables staff decision making, financial control, and standards setting
Uncertain funding	Steady and regular funding guaranteed
Isolation (academically and from stakeholders)	Academic, rural community, and stakeholder connections established and maintained
Programs not accredited	Accreditation the norm
<b>Curriculum now</b>	<b>Future directions</b>
Outdated	Updated and current with stakeholders' needs
No stakeholder input	Stakeholder consultations; input solicited and incorporated in changes; stakeholders participate in governance
Teaching	Learning
Theory	Theory and practical application
No student attachments	Regular, organized, and supervised attachments
Inappropriate pedagogy	Effective pedagogy tailored to subject matter and learner needs
Little use of external teaching resources	External resources used in team teaching to expand knowledge and skill pool
Little use of ICT	Use of appropriate ICT the norm
<b>Technical training now</b>	<b>Future directions</b>
Heavily supply driven	Mostly demand driven
Managed by the public sector	Managed through public-private partnerships
Poorly qualified and remunerated instructors	Qualified and fairly remunerated instructors
Qualifications not certified by professional bodies	Certification ensured
Equipment in short supply and outdated	Equipment/practice areas obtained through public-private partnerships
<b>Management of human resources now</b>	<b>Future directions</b>
Weak human resource management leadership	Qualified human resource managers and trainers
Selection of trainees not based on need	All selection based on need and future tasks
Training needs assessments are not undertaken	Needs assessments are standard procedure
Little supervisor/manager involvement	Supervisors/managers consulted and involved
No evaluation of trainee performance on the job	On-the-job performance measured
Trainers not trained to instruct/teach	Qualified trainers standard

Source: Author.



development planning and implementation. This reform alone has wide implications for AET, as well as major implications for interministerial cooperation, financing, and stakeholder involvement. Specific investments to develop a policy framework might include the facilitation of interagency dialogue, technical assistance to help draft policies, consultations with affected parties at draft policy stage, and policy launching where all key stakeholders are represented. *This investment priority underpins follow-up investments that would fund needed organizational and academic reforms—in other words, all of the other investments listed here, whether they are pursued together or separately.* This reform effort also requires capacity-building efforts for policy management and the design of innovation policies. Most countries experience a chronic lack of capacity to design and implement public policies, and the capacity to design and implement policies that foster agricultural innovation is even more limited (OECD 2005; Rajalahti, Janssen, and Pehu 2008).<sup>2</sup> See also module 6, TN 1 and TN 2 for education policy and governance processes.

**SUPPORT WIDE-RANGING, SYSTEMIC REFORM.** Once the policy framework is in place, AET system reforms are the next major priority. Such reforms enable universities and other institutions of higher education to clarify their roles in relation to the educational system, to their stakeholders, and to the wider needs of the agricultural sector. Then they can make the necessary adjustments to governance, administration, curricula, pedagogical methods, the provision of in-service and life-long education for graduates and civil society, and partnerships and links with stakeholders, including the private sector.

In this “inside-out” approach to reform, the system itself (and especially the tertiary institutions) undertakes the reform process from within and reaches out to stakeholders to measure expectations and satisfaction with existing programs. Gaps between the supply, content, and quality of education and training and demand in the labor market point to reform measures that need to be taken. Investments in system reform, especially at the university level, must support internal dialogue, interaction between the educational institution and those who make policy and decisions, stakeholder consultations, analysis of gaps between stakeholders’ expectations and current academic programs, formulation of the reform strategy, a schedule for its implementation, and the related costs. External facilitators (see also module 3, TN 4) are required to manage the reflection process, carry out the needs assessment, formulate the reform strategy, and determine the final reform agenda.

**CHANGE WHAT IS TAUGHT AND HOW IT IS TAUGHT.** Very often it is a priority to invest in reforming curricula and teaching methods—in many instances, such changes are long overdue. Coursework will include practical as well as academic knowledge and skills. Traditional teaching methods will be replaced by a learning approach that enables students or trainees to discover and internalize knowledge and skills and thus equip the AIS with people who know how to communicate and share their knowledge with others. Potential employers of graduates from the AET system consistently report that they seek (and often do not find) problem-solving skills, the ability to listen, the capacity to analyze situations, and skill with information technology (including computer applications), among other skills (box 2.4).

**IN-SERVICE TRAINING: CONTINUE INVESTING IN HUMAN RESOURCES.** In-service training is an investment priority for continuing enrichment of the innovation system. Continuing training and learning maximizes use of previously acquired knowledge and skills, adds the lessons of practical peer experience, and expands human capacity by introducing new and updated technical and social information and knowledge. Well-managed, high-quality, flexible in-service training and learning for public, private, and civil-society clients expands the network of people in the innovation system with relevant information and knowledge. In many cases, they gain specific skills in communicating more effectively and supporting others in assessing the suitability and viability of agricultural innovations.

**TAP THE POWER OF ICTs.** Investments in capacity building and infrastructure that enable ICTs to facilitate learning and research, improve the delivery of subject matter, and support global and local networking and communicating are critical for effective interaction within an education system and AIS. The ICT revolution has vastly increased the flow of information and ideas throughout the rural space. It has also increased stakeholders’ expectations of AET graduates, who should be familiar with the range of ICTs and use them to communicate technical and managerial information to others in the AIS. The *Information and Communication Technologies for Agriculture e-Sourcebook* (World Bank 2011) shows how ICTs are used increasingly to provide advisory services, capture and disseminate market information, and facilitate research, learning, and communication of all kinds (box 2.5).

## Box 2.4 The Need for a Broader Skill Set to Foster Innovation

Effective innovation systems need technical specialists to investigate and elucidate the complex technical aspects of innovations. Effective innovation systems also require a cadre of professionals whose mindset and skill set extend beyond a particular specialization to encompass (for example) markets, agribusiness, intellectual property law, rural institutions, rural finance and credit facilitation, systems analysis, and conflict management. To foster these capacities, universities must reform their curricula to include innovation systems approaches and shift toward more client-oriented, vocational courses.

The demands placed on agricultural education programs are shifting so rapidly that programs in many locations cannot produce human resources capable of the sorts of innovation that the world's agricultural economies require. To respond to these requirements, AET programs will need to balance a highly technical curriculum with training in a wide range of skills and competencies. Researchers, extension agents, and other service providers will need to bolster their professional training with skills that support interaction with diverse actors to collaboratively address new challenges and opportunities and to share information and knowledge. For example, extension agents need to know how to build social capital by organizing rural actors, provide diverse services from technology transfer to marketing, and serve as facilitators or intermediaries among actors (see module 3). Researchers, rather than sequestering themselves in labs and field stations,

*Source:* Adapted from Snapp and Pound 2008, OECD 2010.

require managerial, entrepreneurial, leadership, negotiation, intellectual property law, facilitation, and partnering skills that educational institutions rarely cover.

To be capable of fostering agricultural innovation, graduates of the various levels of the AET system should possess a wide variety of skills, which may include:

**Basic skills and digital literacy:** Reading, writing, numeracy, and the ability to use digital technology and access and interpret information.

**Academic skills** to pursue disciplines in advanced educational institutions, such as languages, mathematics, history, law, and science.

**Technical skills:** Academic and vocational skills required by specific occupations and knowledge of certain tools or processes.

**Generic skills** such as problem solving, critical and creative thinking, the ability to learn, and the capacity to manage complexity.

**“Soft” skills** such as the ability to work and interact in teams, in heterogeneous groups, and across cultures; communications skills; motivation, volition, and initiative; and receptiveness to innovation.

**Leadership skills:** Building and leading teams, coaching and mentoring, lobbying and negotiating, and coordinating, with a clear understanding of ethical behavior;

**Managerial and entrepreneurial skills** to put innovations into practice and enable organizations to adapt and respond in competitive environments.

Despite the evolution from traditional lecturing to interactive, student-centered learning, many AET systems still operate in the “chalk-and-talk” era. Some systems of higher agricultural education rely on dated lecturer’s notes as the only teaching aid, and some vocational and technical programs cannot provide students with an opportunity to practice on equipment or use laboratories as they learn. Even when teachers and instructors are willing to use ICTs, budgets are insufficient to purchase them, or unreliable supplies of electricity make their use unpredictable. Investments in institutional or curriculum reform for tertiary agricultural education, agricultural TVET, or in-service training should include provisions for introducing and/or updating ICTs and training staff to use them.

MEET RECOGNIZED STANDARDS FOR QUALITY. Investing in accreditation or certification provides universities and training institutes an incentive to raise their academic quality to recognized standards. Investments that develop close working relationships with preeminent educational institutions are another means of raising academic standards. For institutes of higher education especially, these alliances lead to collaborative learning programs involving information sharing, staff and student exchanges, and joint research. The local institution, its staff, and its graduates gradually become much stronger contributors to the AIS.

PROVIDE A REGIONAL RESOURCE FOR ADVANCED DEGREES. Given the limited resources in many AET systems, many

## Box 2.5 The Potential of ICT for AET and Its Role in an Innovation System

Many AET systems in developing countries do not employ even low-level ICT in the teaching/learning process. Reasons for this include poorly trained teaching staff who have not been exposed to ICT in their training, lack of funds to purchase ICT, unreliable power access, and no supervisory pressure to adopt and use ICT. ICT can improve the quality of teaching and learning and raise the quality and relevance of AET for greater impact within the AIS through a number of means:

- **Improved competencies among teachers.** Teachers and trainers are trained in basic ICT skills and ICT-based teaching methods.
- **Improved competencies among graduates.** The effectiveness and employability of AET graduates improves because they possess ICT skills.
- **Better educational materials.** ICT enables teachers to access information sources and create, update, and share learning materials.
- **Distance education and e-learning.** ICT is integral to creating opportunities for distance and electronic teaching and learning.
- **Improved education administration and management.** Throughout the AET system, ICT enables more effective and efficient management of human and financial resources and monitoring of student performance.

Source: Author and [www.IICD.org](http://www.IICD.org).

The International Institute for Communication and Development (IICD), a nonprofit foundation that specializes in ICT as a development tool, has helped to introduce a number of ICT solutions in the education sector, which indicate the potential for ICT within AET. For example, teachers in Burkina Faso learned to build websites, find materials on the web, and use video, web publishing, and other applications to improve their lessons. Social media training helped these teachers start an active online community for sharing teaching materials with schools across the country. In a similar project, Bolivian teachers learned to create videos and CD-ROMs to support lessons; its success inspired the Bolivian government to launch a national program to put computer labs in 1,000 schools. At the Copperbelt College of Education in Zambia, one initiative requires that all graduating teachers be able to prepare lessons digitally. ICT skills also benefit vocational training and help make youth more employable. In Zambia, IICD helped set up a computer lab in a youth center, where young people learn basic ICT skills and access the web. As users learned more about the potential of ICT, the computer lab began to offer additional services, including secretarial and marketing support. Now ICT is also used to support training for tailors, carpenters, and mechanics.

universities cannot provide teaching and research opportunities at the level of excellence needed to produce graduates who can assume leadership roles in the AIS. Investments to create a center of excellence within a region can provide opportunities for qualified candidates from smaller or less-well-endowed educational systems to pursue studies at a higher level. These candidates, on returning to their academic bases, can contribute to the development of new knowledge and enhance the local AIS. See also module 4, TN 5 for lessons on organizational change.

### Long-, medium-, and short-term opportunities to revitalize the AET system

The discussion here indicatively classifies investment opportunities as long, medium, and short term to emphasize the commitment required to achieve various kinds of

objectives. Changes in AET systems, whether sweeping or piecemeal, do not always conform to the expected process or timeframe, and practitioners should plan for adjustments. *Depending on the location, capacity, commitment, and leadership for change, the time focus may shift to require longer-than-anticipated support; in other cases, reforms and changes may proceed faster than expected.*

LONG-TERM INVESTMENTS (FIVE OR MORE YEARS; SOMETIMES MUCH LONGER). Regardless of whether the pressure for change is internal or external, long-term investments to support change in AET systems largely involve wide reforms. Such investments require considerable preparation in the form of discussion, creating a vision for AET (see also module 7, IAP 4 for lessons on a vision-building process), stakeholder agreements, catalyzing inputs from facilitators, and field visits to

successful reform initiatives. Important investment opportunities include:

**Reform of agricultural universities or faculties of agriculture in comprehensive universities.** This type of reform can be classified as internally led change even though the impetus for change may originate outside the university.

**Long-term “twinning” or collaborative links to universities recognized as leaders in AET.** These links can reinforce reforms and lead to productive growth opportunities in research, teaching, and learning through staff and student exchanges.

**Investments in the creation, capacity building, and continuing support for regional institutions that offer specialized degrees,** especially at the master’s and doctoral levels. These entities could become centers of excellence in particular fields of research and education.

**The availability of competitive funds** that are tied to an agreement to bring about reforms.

**The establishment of new, privately funded and managed agricultural universities**—new in approach, vision, and autonomy, not merely newly built—also fits into the long-term investment category.

*Examples of long-term investments to support reform in agricultural education are included in one TN and several IAPs:*

**TN 1: Reforming Public Agricultural Education at the Tertiary Level.** The process, benefits, risks, and lessons from comprehensive reform in higher agricultural education are described, and an example from China is presented in detail. Efforts in other settings (Australia, Ireland) are discussed in passing.

**IAP 1: Reforming India’s State Agricultural Universities.** This IAP encapsulates lessons from a major effort to modernize university administration and management; update the curriculum; make related changes in pedagogy, learning materials, and infrastructure; set new standards for higher agricultural education; and improve human resource management in state line departments that worked closely with the agricultural universities.

**IAP 4: Innovative Training Program for Midcareer Agricultural Extension Staff: The Sasakawa Africa Fund Education Program.** This long-term investment focused on expanding the skills of midcareer professionals through degree programs featuring fieldwork as well as academic training. The program developed strong links between universities, the public sector, and rural communities that benefited all concerned.

**IAP 5: Chiang Mai University Links with Rural Communities to Focus Research on Farming Problems and Foster**

**Curriculum Change.** Some twenty years ago, the University of Chiang Mai developed a highly influential learning and research model that integrated faculty, students, and rural communities. Feedback from the community experience continues to influence the university’s research focus, its curriculum, its role in the AIS, and its international standing.

**IAP 6: EARTH University, Costa Rica: A New Kind of Agricultural University.** Founded in 1990, the private, autonomous EARTH University is an example of an institution that was newly developed to address the need to educate and train young people to deal with the region’s numerous agricultural, social, and political problems in rural areas. Its model blends academic work with practical experience and collaboration in agrarian communities and agribusiness.

**IAP 8: Agribusiness Training for Secondary School Graduates in Timor-Leste** is a relatively short-term investment that requires longer-term support to be sustained.

**MEDIUM-TERM INVESTMENTS (THREE TO FIVE YEARS).** Medium-term investments are tied to reforms and improvements in education and training organizations, in the quality of education and pedagogical skills, in shifting from teaching to learning, boosting the acquisition of practical skills, and providing life-long education and training. More specifically, they can include needs assessments with stakeholders at all levels in the AET system; reforming the curriculum; improving teaching and learning methods; building staff capacity; enhancing communications skills; using, applying, and facilitating access to ICTs; introducing or strengthening programs for technicians; creating policies to underpin higher agricultural education and TVET; modernizing governance structures at universities, colleges, and training entities; gaining accreditation for higher agricultural degree programs, technical diploma programs, and certificate qualifications; strengthening the management of in-service training; evaluating the impact of training programs on work performance; and establishing or strengthening university capacity to offer outreach education and training to external stakeholders, including the private sector and communities. A medium-term investment could also fund competitive grants to catalyze such changes.

*Several TNs and IAPs in this module discuss medium-term investments:*

**TN 2: Curriculum Change in Higher Agricultural Education.** Practical steps involved in designing programs to foster curriculum change are discussed, along with useful supporting investments and policies.

**TN 3: Education and Training for Technician Development.** TVET colleges or institutes produce technicians with the practical skills to manage farm and agribusiness enterprises, provide practical leadership to farm organizations and agricultural banks, and become entrepreneurs in their own right. This TN reviews newer approaches to technician education and training, including public-private and agribusiness approaches.

**IAP 2: Transforming Wageningen Agricultural University.** In 1997, the Netherlands Ministry of Agriculture initiated a major investment in the knowledge infrastructure for agriculture that led Wageningen University to change its focus, structure, programs, and staffing and cooperate with a wider research, social science, and stakeholder network.

**IAP 3: Curriculum Change in Agricultural Universities Strengthens Links in Egypt's Innovation System.** Curriculum change in five universities has enabled course content to respond to the needs of potential employers and proven to be a good entry point for wider institutional change.

**IAP 7: Technical Skills for Export Crop Industries in Uganda and Ethiopia.** Through cooperation between a donor, training institution, and commodity group, workers in high-value export crop industries in Uganda and Ethiopia acquired better technical skills. Demand from employers triggered the training.

**IAP 8: Agribusiness Training for Secondary School Graduates in Timor-Leste.** A one-year certificate course on agribusiness, piloted for three secondary schools of agriculture in Timor-Leste, highlights the value of such programs as well as the considerable challenges, especially in rural areas of fragile states.

SHORT-TERM INVESTMENTS (ONE TO FIVE YEARS). Even short-term investments can greatly enhance the capacity of those involved in AET to be more effective communicators and agents of innovation. For example, in-service training programs or programs of farmer training can be improved by offering short courses to teachers, facilitators, and demonstrators to enhance quality, make the content more effective, and improve the delivery of the programs. Specialized study programs for key sector staff also fit under this category of investment, provided that they are based on clearly defined needs and that recipients return to undertake a work program that is more effective as a result. In-country, regional, or international sites may be chosen for specialized learning depending on need and the quality of programs offered. Support for attachments, work experience assignments, and student community interaction also falls into this category of investment. For

rural youth organizations, investments could support organizer training, youth programs and competitions, study visits, and the production of educational and media materials.

While short-term activities do contribute to the strength and capacity of AET, it should be recognized that interventions designed to strengthen AET systems are, for the most part, a long-term undertaking: “Only through a long-term outlook on change can AET systems contribute to the development of more dynamic and competitive agricultural economies that engage farmers, entrepreneurs, extension agents, researchers, and many other actors in a wider system of innovation” (Davis et al. 2007). This observation is echoed by Eicher (2006), who reported that a number of successful AET reforms took sixty years or more and required a continuing commitment on the part of donors or other partners.

*Short-term investments are featured in:*

**TN 4: Reforming the Management of In-Service Training/Learning.** This note describes the rationale and steps involved in improving the management of in-service training and the capacity of trainers to assess needs, design programs, deliver training in a variety of modes, and evaluate its impact.

**IAP 9: Vocational Training in Egypt Combines Technical and Innovation Skills for Agriculture.** Vocational agricultural education programs in 25 secondary schools in Egypt were transformed to introduce students not only to practical training but to higher-level skills such as problem solving, critical thinking, and decision making. This effort involved additional changes in pedagogy and school management.

### Reforms require reformers

It is worth emphasizing again that the duration of reforms and the examples provided here are indicative. Short-term programs have become longer-term programs when stakeholders have championed their goals; many long-term programs have foundered when they are not institutionalized in a sustainable way. *A broad lesson for practitioners in planning reform programs of any length is to pay close attention to building constituencies of stakeholders at all levels to help ensure the program's sustainability.*

## MONITORING AND EVALUATING INVESTMENTS TO REFORM AET

Monitoring and evaluation help to determine whether investments are contributing to desired outcomes, enable

institutions to rally support for continued reforms, and enable institutions to adjust programs and administrative processes. Although each particular investment in AET will require a specific set of progress and impact indicators, most investments to reform agricultural education have common

elements, regardless of whether the reform encompasses entire systems or institutions or whether it addresses a specific aspect of AET, such as curriculum reform.

Table 2.2 shows corresponding indicators for investments in each major type of reform described in this module:

**Table 2.2 Measuring the Progress of AET Reforms**

<b>Comprehensive reform in entities offering higher agricultural education</b>		
<b>Intended outcome</b>	<b>Selected indicator</b>	<b>Needed action/step</b>
<ul style="list-style-type: none"> <li>– University an active member of the AIS.</li> <li>– Improved sector productivity through a more effective role in the AIS.</li> <li>– University offers life-long learning opportunities to stakeholders.</li> <li>– University seen as reliable and competent source of advice and in-service learning/training.</li> <li>– Improved, higher-level governance of AET, underpinned by clear policy and financial resources.</li> <li>– Reforms institutionalized.</li> <li>– Quality of university degree programs assured through accreditation.</li> <li>– Stakeholders participate in university governance, and university has closer ties with communities and employers of graduates.</li> <li>– University actively participates in and contributes to national, regional, and international AET networks.</li> </ul>	<ul style="list-style-type: none"> <li>– Tripartite body (ministries in charge of education, agriculture, and finance) established to coordinate higher-level AET.</li> <li>– Representative stakeholder membership of university board.</li> <li>– Annual university budget prepared and submitted to tripartite body.</li> <li>– Annual budget approved and funds allocated.</li> <li>– Legal status of reforms finalized and available to the public.</li> <li>– Reforms presented to tripartite body for approval and endorsement.</li> <li>– University senate approves reforms.</li> <li>– Staff pedagogical skills updated.</li> <li>– Use of ICT for learning becomes the norm.</li> <li>– Curriculum reform approved by university senate and tripartite body.</li> <li>– Community outreach program in place.</li> <li>– Student attachment mechanism working well.</li> <li>– Increase in master's and doctoral program enrollment.</li> <li>– Staff reflect improved gender balance.</li> </ul>	<ul style="list-style-type: none"> <li>– Initiate dialogue between ministries in charge of education, agriculture, and finance.</li> <li>– Prepare budgets on annual basis.</li> <li>– Present reforms to key stakeholder groups.</li> <li>– Campaign to institutionalize reforms undertaken with decision makers.</li> <li>– Carry out and analyze needs assessment to identify gaps between current program and labor-market expectations.</li> <li>– Describe and undertake curriculum adjustment.</li> <li>– Update pedagogy to focus more on learning than teaching.</li> <li>– Improve staff remuneration and incentives to attract and retain good personnel.</li> <li>– Improve student intake selection and gender and minority group balance.</li> <li>– Hold student population to manageable numbers to assure quality education.</li> <li>– Increase use of ICT to bring higher AET into contact with new sources of knowledge and support.</li> <li>– Forge links with universities at home and abroad.</li> </ul>
<b>Reform of ATVET and VET</b>		
<b>Intended outcome</b>	<b>Selected indicator</b>	<b>Needed action/step</b>
<ul style="list-style-type: none"> <li>– Role of agricultural technical education and training is defined.</li> <li>– Institution offering life-long education and training opportunities.</li> <li>– Instructors' and teachers' skills enhanced, including student-centered pedagogy.</li> <li>– Policies in place to underpin ATVET.</li> <li>– Active stakeholder role in governance of ATVET.</li> <li>– Functioning network of ATVET/VET institutions and stakeholder groups in place.</li> <li>– Status of ATVET/VET qualifications improved because of certification and support from employers.</li> <li>– Facilities and equipment adequate for supporting quality ATVET programs in place.</li> <li>– Remuneration levels in place attract qualified instructors.</li> </ul>	<ul style="list-style-type: none"> <li>– Role and management of ATVET officially approved.</li> <li>– Policies officially approved.</li> <li>– Public-private cost-sharing formula for ATVET publicized.</li> <li>– Public-private partnership agreements in place for funding ATVET.</li> <li>– Programs certified to agreed standards.</li> <li>– Employment rates for graduates satisfactory.</li> <li>– Employer satisfaction with quality and skills of graduates high.</li> <li>– Courses certified by recognized authorities.</li> <li>– Employer and student/trainee satisfaction with training/learning impacts.</li> </ul>	<ul style="list-style-type: none"> <li>– Clarify responsibility for management of ATVET.</li> <li>– Establish links to the AET system.</li> <li>– Establish attachment and work experience programs, and agree on the rules and evaluation criteria.</li> <li>– Undertake training needs assessments.</li> <li>– Train instructors/teachers in student-centered pedagogy.</li> <li>– Undertake survey of employers and graduates.</li> <li>– Carry out facilities and equipment needs assessments.</li> <li>– Review and adapt pay scale for instructors/teachers.</li> <li>– Funding arrangements between the public and private sector and trainees and their sponsors agreed.</li> <li>– Courses/programs designed to meet needs of labor market and stakeholder employers.</li> </ul>

*(Table continues on the following page)*

**Table 2.2 Measuring the Progress of AET Reforms (continued)**

<b>Curriculum change (reform)</b>		
<b>Intended outcome</b>	<b>Selected indicator</b>	<b>Needed action/step</b>
<ul style="list-style-type: none"> <li>– Curriculum reflects knowledge and skills that graduates need to meet labor-market expectations.</li> <li>– Strategy for implementing reform/change developed and implemented.</li> <li>– Functioning mechanism for continuous monitoring of sector changes in place.</li> <li>– Staff adopt appropriate pedagogy.</li> <li>– Mechanism in place for continuously monitoring the effectiveness of the curriculum.</li> </ul>	<ul style="list-style-type: none"> <li>– Curriculum change team appointed and terms of reference and work program defined.</li> <li>– New curriculum shared with key stakeholders.</li> <li>– Reformed curriculum approved by education entity and responsible ministry/ministries.</li> <li>– Feedback from employers positive.</li> <li>– Teaching staff use improved teaching materials.</li> <li>– Widespread use of ICT in teaching and learning.</li> <li>– Student satisfaction with curriculum.</li> </ul>	<ul style="list-style-type: none"> <li>– Identify leadership group to spearhead the reform process.</li> <li>– Explain curriculum change to key stakeholders.</li> <li>– Conduct needs assessment involving key stakeholders.</li> <li>– Define clear strategy and reform process steps and assign responsibilities for all steps in the process.</li> <li>– Identify curriculum gaps and prepare new curriculum to bridge them.</li> <li>– Plan and implement training program for teachers and instructors.</li> <li>– Field-test curriculum and amend as necessary.</li> <li>– Design, test, and produce materials to support curriculum.</li> <li>– Train teachers/instructors in using new curriculum.</li> <li>– Lessons from university-community interactions conveyed to curriculum change managers.</li> <li>– Design monitoring and evaluation plan.</li> <li>– Survey employers for satisfaction with graduate performance.</li> </ul>
<b>Training management and quality enhancement</b>		
<b>Intended outcome</b>	<b>Selected indicator</b>	<b>Needed action/step</b>
<ul style="list-style-type: none"> <li>– Training replaced by learning.</li> <li>– Clear role defined for the management of agricultural sector human resources.</li> <li>– Capacity for and regulations governing HRM developed and in place.</li> <li>– Training program design and trainee selection improved and based on needs assessment and analysis.</li> <li>– Training/learning records maintained and up-to-date.</li> <li>– Merit-based hiring and promotion.</li> </ul>	<ul style="list-style-type: none"> <li>– Commitment to improved HRM agreed and announced.</li> <li>– HRM strategy in place.</li> <li>– Responsibility for HRM assigned.</li> <li>– Qualified persons appointed to manage HRM.</li> <li>– Budgetary support for HRM made available.</li> <li>– Training/facilitating staff skills updated regularly.</li> <li>– Training/learning materials updated and appropriate.</li> <li>– Higher staff morale and client satisfaction reflected in surveys.</li> <li>– HRM program results reviewed regularly at ministry level.</li> <li>– Circulate detailed annual training/learning reports.</li> </ul>	<ul style="list-style-type: none"> <li>– Managers and supervisors identify training needs.</li> <li>– Prepare academic and training achievement profiles of all staff.</li> <li>– Create HRM management capacity within units.</li> <li>– Conduct HRM orientation for manager-level staff.</li> <li>– Impart needs assessment skills to training/learning staff.</li> <li>– Hire designers and create HRM database.</li> <li>– Revisit job descriptions to indicate skill packages required.</li> <li>– Upgrade trainer/facilitator pedagogy.</li> <li>– Acquire appropriate ICT equipment and tools.</li> <li>– Develop and allocate budgets.</li> <li>– Update teaching/learning materials.</li> <li>– Prepare regular and detailed documentation on HRM activities.</li> <li>– Survey impact of training/learning programs on workplace performance.</li> </ul>

Source: Author.

Note: ATVET = agricultural technical–vocational education and training; HRM = human resource management.