Distance Learning for Pepper and Corn Breeding and Seed Production

Neni Rostinia*, Reginawanti Hindersah

*Faculty of Agriculture – Padjadjaran University, Bandung, Indonesia

Abstract

The one-year vocational education in seed breeding and production technology (SBP) at Padjadjaran University provide an opportunity for seed professionals to produce pepper and corn seed. Nowadays most of food-crop farmers in Indonesia grow pepper and corn by using, mainly, imported seed. The production of local pepper and corn seed reached only 10% and 35.86% of national need. The purpose of SBP program is to provide breeders which have general knowledge and practice in pepper and corn seed production. The emphasis of this education method is distance learning for develop students knowledge in simple method of plant breeding, plant variety protection, registration of plant variety for seed distribution and seed certification. However, improving practical knowledge by distance learning will not guarantee the effectiveness of the program to deliver qualified breeder and seed producer. Laboratory, greenhouse as well as field works should be performed so that students will have sufficient understanding and experience as breeder and seed producer when they work in seed company or they found their own company. To support this hybrid vocational education program, lectures from University attend and monitor student work regularly.

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*Corresponding author. E-mail address: nenithamrin@yahoo.com.
1. Introduction

Indonesian education institutions are facing a digital era which challenge us to use information and communication technology (ICT) as an important education tool. Website, blog, email, as well as the other social networking can be used for online education (e-learning) to perform classes online in distance courses. Distance learning is a way to increase the number of either high school or vocational school graduates to enter the university since in conventional universities the number of student is always limited.

General Director of Higher education of Department of Education in cooperation with Southeast Asian Ministers of Education Organization Regional Open Learning Center (SEAMOLEC) launched sustainable vocational education for vocational high school fresh graduate as well as working adults having high school certificate to enter the Diplome-1 (D-1) program in state universities. In this distance learning program, state university act as main campus which have to prepare courses program and to assure the quality control while education is conducted in Vocational high school. In D-1 program students attend only one year education in very specific education program. The goal of this program is to graduate hard worker and “independent” entrepreneur having specific skill to produce product and service.

Faculty of Agriculture in Padjadjaran University offers D-1 program in seed breeding and production technology (SBP) especially for pepper and corn, the two important agricultural commodities. Nowadays most of food-crop farmers in Indonesia grow pepper and corn by using, mainly, imported seed. The production of local pepper and corn seed do not suffice national demand. The purpose of SBP program is to provide breeders which have general knowledge and practice in pepper and corn seed production.

As a nonconventional education program, most of the one year course program are taken online by using main campus as well as vocational high school ICT infrastructure. Regularly, university lecture teach them in face to face method in vocational school. Since the education is conducted in vocational high school, the priority is knowledge transfer from university lecture to high school teacher. So that training teacher, especially in ICT, web skills and also in knowledge of seed breeding and seed production technology should be performed before program begin. However, improving practical knowledge by distance learning will not guarantee the effectiveness of the program to deliver qualified breeder and seed producer. Laboratory, green house as well as field works should be performed so that students will have sufficient understanding and experience as breeder and seed producer when they work in seed company or they found their own company. To support this hybrid vocational education program, lectures from University attend and monitor student work regularly. This paper discuss the hybrid method of seed breeding and production technology in Unpad, and the challenge related to changing learning method.

2. Literature Review

Distance learning, sometimes called e-learning, is a formalized teaching and learning system specifically designed to be carried out remotely by using electronic communication (http://searchciomidmarket.techtarget.com/). Because distance learning is less expensive to support and is not constrained by geographic considerations, it offers opportunities in situations where traditional education has difficulty operating. It is explained anywhere that distance education can be more flexible in terms of time and can be delivered virtually anywhere by online course.

Online courses, are those in which at least 80 percent of the course content is delivered online. “Face-to-face” instruction includes those courses in which zero to 29 percent of the content is delivered online; this category includes both traditional and Web facilitated courses (Allen and Seaman, 2006). The remaining alternative, blended (sometimes called hybrid) instruction is defined as having between 30
percent and 80 percent of the course content delivered online (Allen and Seaman, 2006). Based on the survey for academic officer in US, barriers to widespread adoption of online education was not significant. However the most important barriers was they need for more discipline on the part of online students and for greater time and effort to teach online (Allen and Seaman, 2006).

Critical point in distance learning is course management system which will be used to organize course experience. A course management system or learning management system are software system designed to assist in the management of education courses for student especially by helping teacher and learner with course administration (Simonson, 2007). CMS allows teacher to manage their class, assignment, activities, quiz and test, resources and more in an accessible online environment (Simonson, 2007).

There are those who ask the effectiveness of distance learning comparing with traditional learning in term of learning outcome (Ulmer et al., 2007). Faculty member in all categories will be confronted with the necessary to adapt new teaching practice. With more faculty members teaching in the blended learning mode, effective course design is critical to maintaining quality while incorporating both face-to-face and online components (Moskal and Weinstein, 2001). Lecture should learn how to develop assignments that fit the learning objectives and align with the blended format of the course. In addition, they will learn how course assignments can be used to provide evidence that students are meeting program goals (Moskal and Weinstein, 2010).

The low number of horticultural plant breeders in Indonesia, despite a high national demand, is the main reason to create distance learning program for vocational agricultural school in West Java, one of the important horticultural centre in Java. This program in not common in Indonesia, however some university in US offer distance learning.

Plant breeding is critical to the future of productive agriculture, food security, and economic prosperity. In Indonesia, special plant breeding education must be performed as quickly as possible to meet the needs of qualified seed. Nowadays, plant breeder should have the knowledge of conventional method in breeding as well as in seed production technology. However, the science extends from genomics to measuring diversity and germplasm enhancement to quantitative genetic theory to prebreeding and finished line, clone, population, or hybrid plant improvement (Baenziger et al. 2009). Distance learning in pepper and corn breeding should be performed in line with seed production since, depending upon the crop the majority of new plant resources should be finished in product development (Baenziger et al., 2009).

With the revolutions in information technology, distance education has become a compelling way to educate plant breeders because it meets the following needs (Baenziger et al., 2009)

- Distance education is not site bound as bricks and mortar campuses are. Many plant breeding stations are not located near major plant breeding universities, but have excellent internet access providing local delivery of the information.
- It can be offered for college credit or for non-credit to fit the student needs and interests. Many students are interested only in the information and not in the college credit.
- Most distance education courses are offered asynchronously so that students can take them as their schedule allows. This asynchronous delivery is particularly useful for courses that have a global reach (crossing time zones where students in the same class may be in Japan, India, Turkey, Ireland and the U.S.)
- It allows classes where there are relatively few students in any one campus to be taught. Most universities have a minimum enrolment in order for a class to be taught. However, by combining resident and distance students the minimum enrolment requirement can be more easily met.
- Distance education provides a healthy competition in the marketplace of ideas. For example, students may learn that one instructor may teach an outstanding self-pollinated crop breeding course, but another instructor may teach a better cross pollinated crop
3. Methodology

The distance education system is applied in Distance education Program (Diploma 1) of Breeding and Seed Production (40 credits) with the hybrid model. By applying the hybrid program, students required to learn by utilizing a variety of teaching materials (modules electronic, audio/video, network-based teaching materials), face to face and online tutorials. Face to face tutorials conducted by residential, students follow the teaching and learning activities for two weeks at the main campus and. The student study a teaching materials in their own places for two days per week in sub campus in one semester. Independent learn does not mean learning alone but learning is initiated by themselves or group. Students can study individually or in small groups and learning media available. Independent study here focuses on intrinsic motivation and discipline to learn. For that students need to have the ability to plan learning activities, learning materials or other sources and carry out the task itself. The success of students in the learning system is highly influenced by the discipline, creativity and perseverance students themselves. In addition students are required to form a small group of 3 to 5 people which is a forum for discussion between students in identify and solve problems, and therefore the effectiveness of self-learning can be improved.

3.1. Self-Study Program debriefing

To ensure successful students in independent study, face to face meetings is needed in the beginning of study. In this program provided students with information and skills necessary to be able to follow the activities of studying with distance education system. The material provided in this program are:

- Distance Learning System
- Learning skills
- Use ICT skills to manage information

3.2. Tutorial

To help students overcome the difficulties associated with the course materials, distance education provides a tutorial which is mandatory for every student of this tutorial is to help and tutoring program shaped face to face current and future residential in the form online via the internet when they have to learn on their own. Aims to stimulate and trigger the process of independent learning. Practice is an activity form of the application of concepts, procedures and skills in real or artificial situations are programmed and guided by lecturer in main campus. While the lab contains observations of activities, experiments or testing concepts, principles or theories held in the laboratory at the main campus/sub campus/apprenticeship places. For courses that require practice or practicum, students receive intensive guidance of lecturers and tutors.

3.2.1. Face to Face Tutorial

Activities conducted face to face tutorials during residential in each college and sub campus, long and frequency given in accordance with their respective credit courses.

3.2.2. Teaching Material

Teaching materials used in distance education Breeding and Production of Hybrid Seed Corn and Chili consisting an electronic module of teaching materials, audio-visual, and network-based CAL. In addition, teaching materials comes with practice guidelines or instructions for the subjects that require practice. Teaching materials cultivated by the program organizers by D-Cystem UNPAD. Package of teaching
materials specifically designed and developed by a team of developers (course team) involving authors, matter experts, content reviewers, instructional designers, media developers, editors, language, and typing. The development team coordinated by academic staff (lecturers) universities designated as the course manager. To be studied independently, teaching materials prepared with a complete component. Each Module Electronic teaching material consists of several chapters, or modules in accordance with the relevant credits.

3.2.3. Evaluation
Evaluation conducted to measure student competencies of a course study. Each courses have 4 tests and score of tasks with one score for residential (10% contributes towards the final grade subjects). Practicum conducted during residential or independently work with partners. There are three components of assessment in practicum courses, namely:
- Implementation of the practicum
- Report
- Online tutorial task

3.2.4. Learning Assistance Services
In addition to providing face to face and online tutorials as a learning aid services, the program is also providing other learning support services to help students succeed in learning. The assistance service is to provide access to the media guidance and academic counseling and administrative services. Guidance and counseling are support services for students learning difficulties. Help Desk located in Unpad consisting of Lecturers and Assistant to the technical facilitation by D-Cistem. Help Desk task is to answer student questions, give advice on the road and the difficulties students D1.

4. Result and discussions
Benefits of implementation of distance education programs have begun to be perceived by main campus as well as sub-campus. Benefits at the main campus are: 1) gathering of problems in agricultural areas more clearly, 2) increase the resources the main campus in overcoming problems in agricultural areas, 3) open horizons in the sub-campus faculty to take the problems in the field that gather from the students.

Benefits in the sub-campus are: 1) students in each sub-campus is mostly sub-campus residents around the region, so as to enhance human resources in local areas, 2) increase local plant genetic resources which have not cared for, 3) increase the breeder from among the educated farmers. Distance education will increase the number of practitioners who come from breeders among farmers. Practitioners of farmers who came from SMK Agriculture of the three regions in West Java will gradually increase the number of new varieties which correspond to the area or better known as the specific area.

Genetic resources that have been neglected can be recorded. Furthermore, in cooperation with local governments, Plant Genetic Resources can be legalized in the office PPVTPP and developed. Graduates of the program D1 assembly techniques and production of hybrid seed corn chili and will contribute to meeting the needs of chili and corn seed that had been still lacking despite the introduction of seed added. Implementation PJJ D1 is not easy because of the curriculum, 70% of which are difficult to carry out practical work with PJJ. Problems were found in the implementation PJJ D1:
- Practical assembly until the legality of varieties of seed varieties for circulation requires tutorial other than material provided on line to the video lab
- Readiness assistant at sub campus who do not master the science of this program
- Technical barriers of electronic relationship that is often experienced disorders internet connection
Implementation evaluation of the first year can not be provided by an assistant in the sub-campus because of unpreparedness of mastery of the material.

To overcome the barriers need to be done the following steps:

- Assistant in the sub-campus should be increased or given training about 4 months to become mentors in the sub-campus is more qualified and confidence in next five years at the time the program has been submitted to sub-campus. In addition to training four months, for a qualified assistant, can proceed to the S2 program specifically organized for teachers D1.
- Before the training done, tutorials and communication between faculty at the main campus, through the electronic media and at the tutorial
- Technical barriers must be improvement programs in the years to come
- Gradually able to take over the role of assistant lecturer from the main campus

5. Conclusions

To improving practical knowledge by distance learning will not guarantee the effectiveness of the program to deliver qualified breeder and seed producer. Laboratory, greenhouse as well as field works should be performed so that students will have sufficient understanding and experience as breeder and seed producer when they work in seed company or they found their own company. To support this hybrid vocational education program, lectures from University attend and monitor student work regularly.

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