Improving Performance of an Agricultural Diploma Student

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Pawan Ramchandra Galande

Improving performance of students in a 3-year diploma program at a rural agricultural polytechnic college in India

Introduction

Foster and Rosenzweig[1], based on their study of 240 villages across India, pointed out that agricultural productivity growth plays an important role in poverty reduction in rural areas of low-income countries. Kumar and Mittal[2] claimed that the agricultural productivity attained by India during the 1980s was not sustained and suggested using technologies for changing the trend. Therefore, India has been focusing on improving agricultural education, especially, in its rural areas.

India's higher education system is the third largest in the world, next to the United States and China[3]. The country's main governing body at the tertiary level education is the University Grants Commission (UGC), which provides a framework and oversees its implementation at the universities under its jurisdiction[4]. Those universities affiliate sets of colleges in designated regions and are responsible for mainly academic functions of those colleges including accrediting colleges and managing academic activities such as initiating education programs, deciding their curricula and supervising examinations.

Maharashtra is one of the largest states in India. Its main occupation is agriculture. To cater to educational needs of the agricultural sector, the state has established 'Mahatma Phule' Agricultural University in 1968, which is administered by the UGC. The university offers various educational programs such as graduate (M. Sc Agriculture and Ph.D.), under-graduate (B. Sc. (Agriculture), B. Sc. (Horticulture), B. Tech. (Agriculture Engineering), B. Tech (Food Technology), B. Sc. (Agri Bio-tech), B. Sc. (Animal Husbandry)), and diploma programs in agriculture.

'Shri Shivaji Shikshan Prasarak Mandal' established a college 'Karmveer Krushi Vidyalaya' in Barshi (Solapur) in a rural area. The college is affiliated to Mahatma Phule Agricultural University. It has 30 hectares of modern farm, and facilities such as vermicompost and vermiculture production unit, soil and irrigation water analysis laboratory, nursery, earthworm production unit, medicinal and aromatic plant garden, sheep and goat farm, fruit orchard mother block, shade-net, and hydroponic project. The college has departmental laboratories that are renovated and furnished with state of the art equipment. The college is accredited by the university through 2018-19 and offers a three-year diploma program, which admits 90 students after graduating from high schools. The admissions are based on students' performances in the high school graduation examination, which is a government managed state-wide examination.

The main objectives of the diploma program are, 1) to develop competence amongst its students for solving problems related to agriculture and preparing them for careers in agriculture, horticulture, or dairy; 2) to acquaint its students with on-going thrust programs and related transfer of technology programs in agricultural and allied areas; and 3) to help its students interact with various agriculture and horticultural based industrial units in the region for internships and placements.

The college had poor performance for a few years before 2016. For example, the passing percentage of its third (final) year students in 2015-16 was merely 16%. The first author joined the college as its principal (administrative head or dean) at the start of the academic year 2016-17 and the second author joined the parent body Shri Shivaji Shikshan Prasarak Mandal of the college as its academic director at about the same time. To improve the performance of the third-year students of the college, the authors developed a performance improvement that resulted in moderate success. The main objective of the paper is to share the performance improvement program's design and results. The next section presents the design, and is followed by the result and concluding remarks.

Performance improvement program

We developed a performance improvement program based on Tinto's model of institutional departure[5] and Lee and Matusovich's[6] model of co-curricular support. Our performance improvement program had three arms – academic, social and professional integration.

At the outset, we conducted a workshop for faculty on pertinent pedagogical strategies in engineering education such as formative feedback, use of audio visual clips, and continuous assessment with the help of more assignments and tests[7]. Such strategies increase academic and social integration of the students resulting in better academic performances and development of graduate attributes. They improve the SET (Student's End Term Evaluations) rating[8], and Benton and Cashin have showed a positive relationship between students' ratings for instructors and students' learning in those instructors' classes[9].

Paola et al.[10] showed that the students, who attended a higher number of remedial lectures in Mathematics, got higher scores at exit tests. Our faculty conducted, depending on performances of students in their courses, several remedial lectures.

O'Farrell[11] argued that assessments should motivate students, and Vuma and Sa[12] pointed out that continuous assessments motivate students to study harder for their final examinations. Campbell[13] advocated using continuous assessments as they help students to improve their knowledge and skills before their final examinations. We, therefore, included around 20 assignments per course over the year and one test of one hour each per month per course towards continuous assessments.

Tucker[14] pointed out that there are many worthy videos that can enhance students' understanding of subjects. Therefore, our faculty explored the Internet, identified relevant audio-visual clips, and used them in their courses. For each course, our faculty members showed around 4 clips on topics such as processing, photosynthesis, pest and disease management, bordeaux mixture preparation, etc.

While our target was to improve our students' academic performances, we did not want to do it at the cost of improving the prospectus of their better professional performances i.e. professional integration activities. In fact, we believed that the professional integration activities such as guest lectures, campus placements, and field visits motivate students resulting in better academic performances. We had one field visit per course per year and organized two guest lectures per year per course in the areas such as vermicompost and crops processing. Moreover,

the college conducted workshops on topics such as goal setting, personality development using yoga, and screened inspiring movies to develop professional skills. We also organized a campus placement by a company, which hired three students. We focused more on academic and professional integration as our students were from similar cultural backgrounds and were socially well-integrated. However, we avoided possible side-effects of more academic and professional integration activities by making a counsellor available on the college premises.

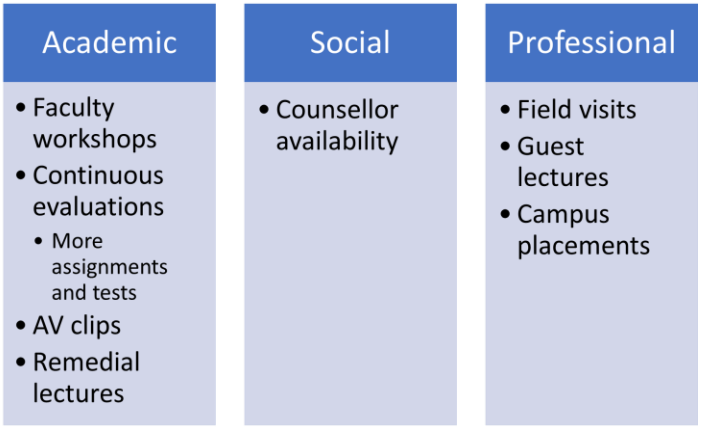

Figure 1: Performance improvement program

Results

The performance improvement program improved the passing percentage from 16% in 2015-16 to 49% in 2016-17. Table 1 compares the percentages of our college with other colleges in the region, which are affiliated to the same university. We chose the comparison colleges from many colleges in the university based on the similarity of ecosystems lending validity to the comparison. There were no statistically significant changes in performances at those comparison colleges in the same two years. Table 2 provides course-wise result of our college students, which indicates significant performance improvement in S0301, S0303, and S0304 courses. We have not yet analyzed reasons for those differential performances. The change in the passing percentage from 16% to 49% was also not due to a change in academic quality of incoming students at our college. We compared high-school graduation marks, which were the basis for admission to the program, of 2015-16 and 2016-17 batches and found no statistically significant difference (p value = 0.83) in them.

Table:1- Comparison of result with other colleges in the region

College	Passing percentage of 3rd year students in 2015-16	Passing percentage of 3rd year students in 2016-17
Our College	16	49
[redacted]	32	43
[redacted]	25	31
[redacted]	38	40

Table:2- Course-wise performance of our third-year students

Course code	Course Title	Academic Year					
		2015-2016			2016-2017		
		Appear-ed	Pass-ed	% passed	Appear-ed	Pass-ed	% passed
S0301	Principles of genetics, plant breeding and plant physiology	38	15	39	45	29	64
S0302	Fundamentals of plant protection and agriculture microbiology	38	24	63	45	25	56
S0303	Fundamentals of soil and water conservation and management	38	17	45	45	40	89
S0304	Computer science and agriculture statistics	38	18	47	45	38	84
S0305	Environmental science	38	37	97	45	44	98
S0306	Agricultural volunteers operating process and training	38	38	100	45	45	100
S0307	Projects	38	38	100	45	45	100

Concluding Remarks

Fugile et al.[15] pointed out that improving agricultural productivity is the primary defense mechanism against a Malthusian crisis i.e. food demand from rising population confronting limits of natural resources leading to famine. The productivity can be increased by a good education system. The paper describes a performance improvement program that attempted to deliver such good education at a rural agricultural polytechnic college running a 3-year diploma program.

The key elements of the performance improvement program included workshop of faculty members on the research-based instructional strategies that manifested in increased assignments and tests (continuous assessment), formative evaluation of teachers, remedial sessions for under-performers, and usage of relevant audio-visual clips and motivational movies. These activities were complemented by social integration methods such as counselling, and external interventions such as field visits and guest lectures. The school leadership's success in initiating campus interviews process also may have helped.

The effectiveness is measured by the improvement in performance of the third-year students. We found statistically significant improvement in performance from 16% students passing in all courses in 2015-16 to 49% in 2016-17. The change in passing percentage may have been due to the performance improvement program, that was developed systematically and executed meticulously. There were no similar performance improvements in other colleges affiliated with that university in that area and there was no statistically significant difference in the academic quality of incoming students (measured by high-school graduation marks, which was the basis for admission to the program) at our college.

The study limits to academic performance and does not extend to professional performance, which is a limitation as well as a future direction. Further, academic performance can be measured by development of graduate attributes, which could be closer to professional performance. We can qualitatively analyze experiences of the students and faculty members to glean some pertinent insights about the performance improvement program. We also can do detailed analysis of the third-year performance such as why students performed better in some courses than others. The study was carried out at one college and requires to be replicated at other colleges in that and different regions to validate the findings. However, the study does provide some ideas, which fellow educators may want to use in their colleges.

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