
Project based Physics Teaching: Improving in Agriculture Sector

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Abstract—Improvement in teaching methods of physics and inclusion of ‘project based learning’ for better training of students with an example as ‘project in the field of agriculture’ can enhance the job opportunities for Physics Graduates. Analysis of the response obtained by survey through asked questionnaire from students, teachers, knowing present status of farmers as lower background of education and income, shows that (1)Agricultural sector is generally ignored by educated persons and students (2) Physics knowledge can be applied for improvement of status of farmers (3) Project based teaching/learning can increase job opportunities for Physics graduates.

KEYWORDS—TEACHING METHODS ;PROJECT BASED TEACHING ;AGRICULTURE SECTOR

I. Introduction: A teaching method used by teachers to enable student learning comprises the principles and strategies which depends partly on subject matter to be taught and partly on the nature of the learner to encourages creativity. There are two approaches for teaching (1) teacher centered and (2) student centered. **In physics teaching**, up to now mainly lecture method is used for theory classes as it is convenient and cost-efficient, especially with larger classrooms of hundred students . There are different techniques for increasing interest, attentiveness and active participation of students in teaching e.g. Demonstrations, discussions in small group, collaborative learning, effective laboratories. Teaching or learning about science (physics) necessarily require laboratory or field work. Experimentation underlies all scientific knowledge and understanding. They provide students with opportunities to think about, discuss, and solve concept based real problems. Developing an effective laboratory and teaching through them require much skills, creativity, and hard work as proposing and executing a first step for **research project**. Despite the importance of experimentation in science, introductory labs fail to generate the excitement for discovery to the majority of our students. ‘Improving undergraduate laboratory

instructions’ should become the priority in many institutions. It is important to think about its goals. Here are a number of possibilities:

1. Efforts to appreciate the role of experimentation in science.
2. Develop deepen understanding of concepts of Physics and apply them in new situations.
3. Experience basic phenomena and Learn to use scientific apparatus.
4. Develop critical thinking skills for experiments and data analysis.
5. Learn to estimate statistical errors and recognize systematic errors.
6. Exercise designing a procedure to test a hypothesis.
7. Test important laws and rules.
8. Practice collaborative problem solving.
9. Developing reporting skills orally and in written.

II. AT UNIVERSITY LEVEL ONE OF THE DEPARTMENTS NAMED AS DLLE ([HTTP://WWW.MUDLLE.AC.IN](http://www.mudlle.ac.in))

The Department of Lifelong Learning and Extension [DLLE] (known earlier as Department of Adult and Continuing Education and Extension) established on

October 12, in the Year 1978 and has been recognized as a statutory Department of the University of Mumbai since 1994 to promote a meaningful and sustained rapport between the Universities and the community. The DLLE offers flexible Continuing Education opportunities and every year students of different colleges do projects for their skill development and social services involved for the betterment of society.

III. Material and Method:

One of the College level projects designed is named as '*Project based physics teaching: Improving in Agriculture Sector*' which is the basis of the present **survey and data** are collected. The

survey is based on the questionnaire which is reported below:

III: QUESTIONNAIRE

Part A: Personal Details

1. Age- _____ years
2. Educational level: Studying in _____ (If student)
3. Professional level: Teaching in _____ (If teacher)

Part B: (Data) Questionnaire for collecting answer with response as Affirmatory Answers

Q.No	Question	Response
1	Lecture method of teaching is the best method.	80%
2	In any class 'Teacher / no of students' ratio for better interaction should be 1/ 20 .	80%
3	In your class 'Teacher / no of students' ratio is (i)1/ 20 (ii)1/40 (iii)1/50(iv) 1/70(v)1/100	73% 1/100
4	After teacher's explanation, notes should be prepared by students as home assignment.	80%
5	Some part of lecture time must be utilized for active participation of students	80%
6	Presentations/Seminars of short duration should be the part of student activities.	60%
7	Time distribution of teaching of 100 lectures. (one lecture = 1 hour session)	
7(1)	Number of theory Lectures = _____lecture(s). [50,60 ,70,80]	Avg= 60
7(2)	No of Practical explanation = _____lecture(s). [2,4,5,6]	Avg=4
7(3)	No of Practical's = _____ lecture(s). [20,30,40,50]	Avg= 24
7(4)	Demonstrations = _____lecture(s). [8,10,12,14]	Avg=8
7(5)	Visits to Industry/ Research Institutes = _____ lecture(s). [8,16, 24,32]	Avg=8
7(6)	Is mentorship helpful for studies for students.	60%
7(7)	Mentorship (one meeting of 1hour per week / <u>month</u> / semester is sufficient)	86% Per m
8	How beneficial are guest lectures? a)0% b) 25% c) 50% d) 75% e) 100%	86% (c)

9	Additional information must be given in lectures for better understanding of the topic.	80%
10	Cultural activities should be included in the curriculum	93%
11	Sports activity must be compulsory.	80%
12	Agricultural sector is generally ignored by educated persons and students.	730%
13	Tools used in agriculture are based on concepts of Physics.	100%
14	Physics can be useful for betterment of agricultural tools.	100%
15	Physics knowledge can be applied for improvement of methods of Farming.	93%
16	Short term projects based on agriculture can be associated with Physics teaching.	80%
17	Primary knowledge of agriculture sector can be included in syllabus.	93%
18	Renewable energy based projects setup in villages can be included in Physics curriculum for study.	73%
19	Which type of project you would be interested (to be involved) in -	
19(1)	Short term project for teaching basics of Physics in schools in rural areas (Donating some hours)	86%
19(2)	Development of large capacity cold storage system for (fruits, vegetables and grains)	86%
19(3)	Rain harvesting i.e. development of water storage system and irrigation facilities	86%
19(4)	Electricity generation by solar panels	80%
19(5)	Heating / cooking using solar energy	73%
19(6)	Bio-gas plants	80%
19(7)	Health camps with follow ups	86%
19(8)	Composting of organic waste	86%
20	If above options of project based learning Are considered in curriculum of Physics graduation	
20(1)	Agricultural sector can improve.	80%
20(2)	Status of farmers can improve.	80%
21	Project based teaching/learning can increase job opportunities for Physics graduates.	80%
22	One/two years practice is compulsory after completing MBBS in rural areas as project and fixed clear & great goal as social service	100%

IV. Agriculture Sector: Indian agriculture is plagued by several problems, some of them in which physics graduates can be involved making them objectives of projects as options in curriculum are-

Problem 1: Lack of mechanization: Most of the agricultural operations in larger parts are carried on by human hand using simple and conventional tools .Little or no use of machines is made in ploughing, sowing, irrigating, thinning and pruning, weeding, harvesting threshing and transporting.

P.1: Project for developing tools used in farming: There is *urgent need to mechanize the agricultural operations* so that wastage of labour force is avoided and farming is made convenient and efficient .

P.2: Project based on Electrical power generation by solar Panel: Power availability for carrying out various agricultural operations can be full filled by setting solar panel on large scale and using solar energy in villages .This can increase use of tractor,

power tiller and combine harvesters, irrigation pumps and other power operated machines modified by new inventions.

Further using **advanced electrical sensors like water level indicator, fire sensor and development of Pests, germs and weeds sensors can reduce the losses and to benefit the farmers.**

Problem 2: Agricultural Marketing: Agricultural marketing still continues to be in a bad shape in rural India. So, the farmers have to depend upon local traders and middlemen for the disposal of their farm produce which is sold at throw-away price.

P.3: Project for Human Development: For the improvement of agricultural productivity in India, the quality of farmers should be improved by imparting them with adequate general and technical education and adequate public health.

(a)Teaching farmers and their children: Short term

teaching courses or lectures based on marketing in villages can be arranged where farmers are helped by teachers and students-volunteers.

(b) Investment plane: The strategy should be made to emphasize on increasing both public and private investment in agriculture and infrastructure development in villages for making power stations.

Problem 3: Inadequate storage facilities: Storage facilities in the rural areas are either totally absent or inadequate. So, farmers are compelled to sell their produce immediately after the harvest at the prevailing market at very low prices. Such distress sale deprives the farmers of their legitimate income.

P.4: Projects for establishment of national Grid of Rural Godowns: In every village projects for estimation of requirement of number and capacity of godowns and power grids for power generation.

P.5: Projects: Application of Modern Techniques: Indian farmers must be taught to apply modern techniques of cultivation by utilizing modern equipment's, use of adequate quantity of fertilizers, high yielding variety of seeds, by adopting scientific rotation of crops and careful crop planning. Agricultural research should be carefully intensified including more no of researchers of other areas and fruits of research should be made available to the Indian farmers.

(a): Development of **weather risk management system and disease alert system** that alerts farmers when there is a danger of extreme

weather and disease alert system sends an alarm to farmers in reducing losses in Indian agriculture. Similarly, systems that **detect the need of amount of water** to a field based on the field water content, biomass, and rainfall probability, would aid in the optimization of water provision to the crop and ensure efficient crop management.

P.6: Projects: Application of Modern Techniques for improving living of animals used for help of farmers:

Arranging Health camps with follow ups for farmers and animals as well.

V: Result and Discussion: It is clear that most of the students and teachers are compelled to attend in big class of strength of nearly 100 students, so lecture method is adopted and it is difficult for a teacher to interact with each student individually. Students prefer that teacher should not provide prepared written notes, they preferably be given notes preparation as assignments for better understanding. Students should also be given opportunities for actively participating in class like short presentations, demonstrations, quiz, short duration industrial visits, Cultural activities, sports and guest lectures should be arranged considering benefits and level of students. Most important need is mentorship for students for monitoring, interacting with students at least one meeting of one hour per month is highly recommended to interact with individual learner for getting and discussing feedback also.

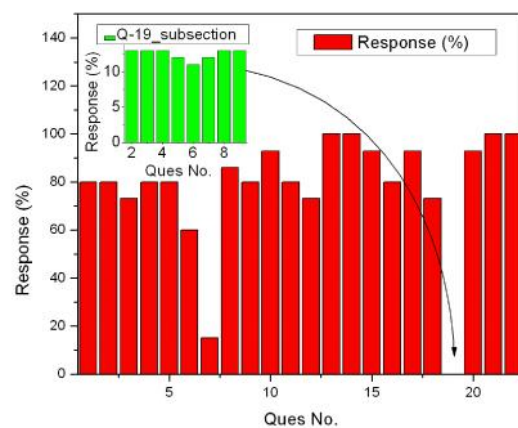


Figure.1 Analysis of different questions asked from variety of peoples. Inset shows response to various subsections of question No. 19.

Tools used in agriculture are based on concepts of Physics.

Physics knowledge can be applied for development and improvement of agricultural tools and methods of Farming because Agricultural sector is generally ignored by educated persons and students in education, which is the basis of the whole development of Our country.

Conclusion: Conclusion is ‘Project based teaching and learning’ in basic science can increase the job opportunities and profile for Physics graduates as of other professions. If projects include the options given in question no 19, considering target of development of villages also then Status of farmers and Agricultural sector can improve. At least up to some extent incidents of ‘farmers suicide ‘can be reduced which is very unfortunate and sad for naturally rich, resourceful and developing India.

Acknowledgment

[I am very thankful to Director, Dr Dilip Patil, Dept. DLLE, University of Mumbai and HOD (Physics) Dr. D.V.Kala for inspiring, continuous support and cooperation and Principal giving me the opportunity for writing my thoughts on such important survey.]

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