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RESEARCH BASED PEDAGOGY TOOL (RBPT) IN UNDERGRADUATE TEACHING: PROOF OF CONCEPT

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Abstract:

Teaching Biology to undergraduate students is a challenging task as most of the curriculum is theoretical without practical exposure. The present work is a proof of concept of two things: a) 'learning by doing' approach has long term imprinting on students as compared to classical pedagogy and, b) curricular content- real world context connections can be addressed using minimal resources. The 'Organic Farming' and 'Fungal Biology' were practically taught by connecting it with provocative and authentic contexts e.g. adverse effect of pesticides/ fertilizers on health and using mushroom (fungus) as cheaper protein source respectively.

A pest-free field was created by planting medicinal plants on periphery in a field and onions were grown organically without using any pesticide/ fertilizer. Later on, other vegetables were also grown followed by Maduraj 55 variety of paddy. This way, a chemical-free variety of paddy having low glycemic index was grown. Post-harvesting, it was observed that a huge amount of husk was generating which was of no-use. Our students suggested to cultivate mushroom on it which could further be utilized as a cheaper protein source for poor undernourished children. After lots of optimization and training, we ended up having mushroom, cultivated on the waste husk.

Thus, a content was connected with a context of real world problem. The problem was identified which had the components of research, reason and reflection. Affordable, economic, feasible and flexible activities were carried out which enhanced critical thinking, understanding, involvement and skills of the students. Lastly, a successful implementation of pedagogy approach which was based on research component was achieved which led to problem-based learning in students.

Introduction:

There are two-stake holder in this story, the teacher and the students. Beyond doubt the entire teaching community is putting their time and energy to teach the best to their students. Many a time as a teacher we feel that our age old approach of teaching is not fetching the much-desired results. During our informal interaction with students, they have mentioned though they are happy with our teaching but they want deeper understanding of the topic. Due to various reasons we have to ignore this point. As a teacher we have to do a multitasking all the time. There are deadlines to meet, syllabus completion, exam preparation, assignment checking, results making etc. The load of academic calendar sometime restrict us thinking beyond the syllabus. But slowly and surly we realized that, connect between what we are teaching and what students grasping is missing. This made us, to introspect and revisit our teaching style. After thinking deeply we realized that there is a scope for improvement. Certain changes in our teaching pattern were must, but we were not sure what and how to plan or implement them. Enquiry based learning or Research Based Pedagogy is evolving as a new tool in teaching world. A big help came when we attended the British Council- Newton Bhabha Fund ‘‘STEM Workshop on Research Based Pedagogical Tools’’ organized by Center of Excellence in Science and Mathematics, IISER Pune. During this workshop we have learned many tricks and tips to develop our own Research Based Pedagogical Tool (RBPT) based on our curriculum. We were confident but hesitant as well, will this work in our system. We started implementing it step by step in our course curriculum. Initially there was big resistance from students, slowly they started realizing the importance of enquiry based learning. After that there was no looking back, while planning on RBPT we decided to involve the students and asked them which topic they would like to work on. After lot of discussion they decided to work of organic farming. The topic was broad and we suggested them to narrow down a bit so that we will be able to work in a focused manner. In this short report we will try to convince you that how a small projects can turn into RBPT and with minimal resources.

Methodology

The green revolution has played an important role and has boosted the over all production of food grain in our country. But in the backdrop of this revolution many farmers has started using the chemical fertilizers and other toxic pesticides. The unchecked use of these chemicals to increase the production of crop is now root cause of many problems. Due to excessive use of these dangerous chemicals for longer time has resulted in reduction of the fertility of the soil. These poisonous substances have reached to a dangerous level in our food chain. Once these substances are into food chain it can start affecting the human health. The proof is very evident in the form of various cancers and other metabolic disorders. Today we all are facing this grim situation, unless we do something before it is too late.

At School of Life and Allied Sciences, ITM University & Kalinga University, Naya Raipur, we tried to develop a RBPT based on organic farming. The sole aim of this activity was to teach the students following things

- 1) How to do organic farming
- 2) How to bring down the input cost

- 3) How to increase the productivity
- 4) Awareness about organic farming
- 5) Reintroducing the low glycemic crop
- 6) Compare the nutritional value of organic crop

During this whole activity there were different learning experiments, which was performed by the students.

The whole process was done in a stepwise manner with lot of planning and each step was back by experiments and scientific observations.

- 1) Medicinal plant plot
- 2) Onion plantation
- 3) Plantation of other vegetables
- 4) Preparing the field for rice plantation
- 5) Sowing of paddy plantlet
- 6) Harvesting and ageing
- 7) Checking the nutritional value
- 8) Mushroom cultivation on paddy waste

All this started with very simple experiments; we took permission from our university administration for a 10x10 plot. In this we planted all the medicinal plants on the periphery. The idea was to create a pest free zone in the middle of the plot

Once this plot was ready with the medicinal plants boundary, we thought to plant onion to check, if the crop is pest free. (Figure 1)

To our surprise we have produced 30 Kilos of onion, with very low input cost and these onion were organically grown (Figure 2). Not a single drop of pesticide or fertilizer was used.

Then we checked the efficacy of the pest free zone by planting out vegetables like radish and other green leafy vegetables. All the plant grown in this zone was pest free. This way of doing organic farming was cost effective and produce were chemical and pest free.

After the success of this plot experiment, our students got excited and motivated. This project has also drawn the attention of print media and got published in news daily (Figure.3). It gave a encouragement to other students and slowly they also started taking part in our RBPT activities.

Paddy plantation:

After the success of these experiments, we wanted to test this method on paddy. The paddy variety which we chose was Maduraj 55 which is a variety developed by Indira Gandhi Agricultural College, Raipur (IGKV). The specialty of this rice is it has low glycemic index and good for diabetic patients.

The first challenge was to prepare the land (Figure 4) and to test the land quality. Our students did the quality check (Figure 5) like the pH, microbial load, moisture retention etc.

After that first the rice was sown in the plot, which was used in onion and other vegetable cultivation. Once the plantlet were grown in sizeable number and were pest free. These plantlet were transferred to a bigger field for cultivation (Figure.6).

After 70 to 75 days of constant monitoring we started to see the fruit of our labor. We were able to cultivate a forgotten variety of rice which has low glycemic

index organically. Also in this activity students were able to think and design various experiments and observation.

Mushroom Cultivation:

After the cultivation the harvesting was done and it came to our notice that there was lot of rice husk, which was unused or waste. Then we thought is there a way to use this husk. Then one of our student came up with idea that can this be used in Mushroom cultivation. But none of us were expert in this, the help came from the Indira Gandhi Agriculture College, Raipur (Figure 7). They provided us a one-day training for Mushroom cultivation. It helped us a lot and we came back and started working (Figure 8).

After few initial failed attempts, students were able to standardize the protocol of the mushroom cultivation in our set up (Figure 9 & 10).

In the process of optimization of this experiment student have learn various technique about mushroom cultivation and minute details of research-based learning.

Discussion:

The gist of all this activity is very evident that not only it has enhanced the skills of the students but also they are more interested in enquiry-based learning. It has made a mark difference in there thinking and understanding ability. All this was done with minimum budget and with the available resources in the University.

One good thing to add on is our colleagues are now started to believe us and wants to implement the RBPT for their classes as well. And this was the success story of Research Based Learning, a small experiment with big results.

References:

1. Informal Reasoning Regarding Socioscientific Issues: A Critical Review of Research Troy D. Sadler, JOURNAL OF RESEARCH IN SCIENCE TEACHING VOL. 41, NO. 5, PP. 513–536 (2004)

2. Argument to Foster Scientific Literacy A Review of Argument Interventions in K–12 Science Contexts [Andy R. Cavagnetto](#), Volume: 80 issue: 3, page(s): 336-371 Article first published online: September 1, 2010; Issue published: September 1, 2010 <https://doi.org/10.3102/0034654310376953>

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