

How do we innovate teaching to create innovators?

The context

All Educational institutes today face a major challenge to create a progressive roadmap to get both their faculty and students 21st-century ready. The focus has now shifted from preparing students as job seekers to job creators and to programming their thinking skills to solve the unforeseen. This herculean task needs to orient students for opting for suitable subject combinations and train educators to modulate their teaching methodology to transform learners into thinkers that can address the contemporary challenges of tomorrow through innovation.

Implementation plan of the school

“Innovation resembles mutation, the biological process that keeps species evolving so they can better compete for survival” [1]. A unique roadmap for both educators and learners to a common target of skill development is a mandate today for progressive evolution. The goal of education today is to cultivate and support the scholarly development, investigation and dissemination of innovative and evidence-based teaching and learning.

According to an Organization for Economic Cooperation and Development (OECD) report, “the pressure to increase equity and improve educational outcomes for students is growing around the world” [2]. Therefore, there is an urgency to design an impactful teaching-learning model that is research-oriented and interdisciplinary so that students can understand the connections between diverse forms of human knowledge and experience learning to develop 21st-century skills that is a major focus of National Education Policy 2020

Interdisciplinary Faculty learning community to sensitize students to make informed choices

Instead of being guided by a handful of teachers at the end of their schooling, students of our school are mentored about their potential from the very beginning by teachers of all the subjects. Our school has an interdisciplinary group of faculty that meet monthly as the Hybrid Course Design faculty learning community. Representing nine (Languages, Maths, Science, Art, Music, Sports, Psychology, Social science, Computer science) academic units, the group considers questions around the building and implements plans to foster learning in hybrid courses. They discuss the calibre and inclination of each student to orient them towards the most befitting subject combination in future. Students are oriented by proper career counselling through the experts and well-renowned personalities of the field through both online meetings and offline sessions. Not only this but the parents are also sensitized about the new subject options available according to NEP2020 and its career options.

1. SDG activities through innovative IPL mode: Help students realize that taught concepts are everywhere

Students do not usually recognize the significance of learning varied subjects in their daily lives. Instead of letting students continue to see subjects as unnecessary chores. The school has decided to create an IPL mode of teaching and learning that would encourage them to explore taught concepts and skills and, at the same time, realize how useful they are.

Teachers Initiate Plan to Lead Students to Identify, Produce and Learn. IPL model has been an innovative way of inducing 21st-century skills in both educators and learners keeping one SDG as a major goal. Teachers on

the one hand have initiated the design of new pedagogical methods which are project-based, game-based and activity based, produce targeted lesson plans and lead their proper implementation in respective classes. Students, on the other hand, will Identify a contemporary unaddressed problem of Indian society that can be addressed to some extent at the school level either through research or action, and work together in teams to Produce a project-based solution and Learn (IPL) during the activity. It has further ensured flexibility, adaptability, responsibility and development of integrating different concepts.

Both teachers and students were motivated by various online and offline workshops to motivate them to work in a manner as never before where they have to pin a common point between the ideology of 21st-century skills to the reality of the existing Indian school education system (Figure.1).

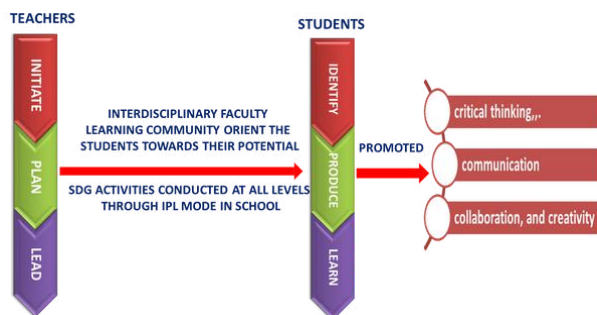


Figure.1 The innovative IPLmodel to craft innovators

Evidence of implementation by the school

Workshops upskill teachers and equip them with newly evolved teaching methodologies to become better educators so that they can guide students more effectively. Workshops are instrumental in orienting the students towards better career options and the latest subject combination (Table.4). The students in our institution were skilled by the close

collaboration of research centres and teachers in school to design various innovative prototypes that had the potential to solve unaddressed problems of society and were recognized by the government and private agencies (Table. 2). Each innovation was designed to bolster the objectives of SDGs.

Glimpses Of Some In-House Workshop Organized For Educators



CPD Workshop 19th to 27/5/2022



Reimagining Education Workshop- 18/11/2022

Glimpses Of Some In-House Workshop Organized For Our Students



Career Counselling Seminar (Queen's University Belfast, UK)- 06/04/2022



MAAC Workshop-26/08/2022



**Motivational Talk by Mr. B L Vohra
- 20/07/2022**



Robotics clubs



Orientation session By AMITY University 9/11/2022




Table. 1 Glimpse of some workshops attended by teachers & students

	Identification of local problem	Planning of affordable solution	Learning outcome
1	Lack of microscopes in schools due to lack of funding	Plastoscope, a microscope from waste plastic bottle costing Rs 250 was designed.	Adjustment of lenses in microscope. SDG 4 QUALITY EDUCATION
2	Pollution due to cigarette butts and mosquito borne illnesses	Larvaecidal cakes that attracts and kills the mosquito and its larvae was composed in lab.	Production of carbon dioxide by fermentation and it acting as a bait for attracting mosquitoes and lethal action of nicotine. SDG 3 GOOD HEALTH & WELL BEING
3	Presence of invisible but harmful radiations	Ecodos, first radiation tracker was made using non pathogenic strain of bacteria <i>E.coli</i> . Done in Nuclear Research Laboratory, ICAR-IARI, New Delhi under Dr. Bhupinder Singh Principal Scientist & Radiation Safety Officer	Bacterial growth curve and mode of action of gamma radiation SDG 3 GOOD HEALTH & WELL BEING
4	Crop destruction due to late detection of pathogenic fungal attack	A simple apparatus that pumps free aid to help invisible fungal spores settle down on slide that can be periodically checked for the pathogen presence in the air.	Fungal pathogens and famines caused by them SDG 2 ZERO HUNGER
5	Electricity wastage due to working of fans and lights in public places even if there is no user	Smart electric circuits were designed that switches on only when there is user	Electric circuits and sensors SDG 11 SUSTAINABLE CITIES
6	Unhygienic Indian public toilets due to irresponsible users	Self-cleaning, sanitizing Indian public toilets based on sensor based circuits	Electric circuits and sensors SDG 11 SUSTAINABLE CITIES
7	Water wastage on one hand and depletion of underground water on the other hand	Quencher were designed	Conservation of water SDG 11 SUSTAINABLE CITIES

Table. 2 SDG-directed award-winning prototypes designed by students

Reflection

The research-to-practice gap has been narrowed by the effective implementation of a multilevel model that identifies factors that influence implementation quality in school settings. The teachers and students have effectively innovated new teaching methodologies and conceptual models that were acknowledged by multiple renowned educational government agencies (Table 3).

S.no.	REFLECTIONS	
	Vivekananda Sustainability Award-23042022	
1	Contribution to Vidyadaan: National portal for CBSE	<p>https://diksha.gov.in/play/collection/do_31307360996459315213259?contentId=do_31307180109248102411329</p> <p>https://diksha.gov.in/play/collection/do_31307360996459315213259?contentId=do_31307180255659622411371</p> <p>https://diksha.gov.in/play/collection/do_31307360996459315213259?contentId=do_31307180019803750411909</p>

S.no.	REFLECTIONS	
1	Contribution to Vidyadaan: National portal for CBSE	<p>https://diksha.gov.in/play/collection/do_31307360996459315213259?contentId=do_31307179751524761611466</p>
2	National publications on research and innovation	<p>Project Based Learning: An Informal Way of Meaningful Science Education. Educational Quest- An International Journal of Education and Applied Social Sciences, Year : 2019, Volume : 10, Issue : 2, First page : (85) Last page : (90), Print ISSN : 0976-7258. Online ISSN : 2230-7311. Article DOI : 10.30954/2230-7311.2.2019.3 Dr. Shilpa R Chauhan.</p> <p>Poor scientific prominence of science education in schools of developing countries: Challenges sorted by customized teacher's training Proceedings of ICSS Bhopal 2019- International Conference on Emerging Trends and Innovations on School Sciences. 6-8 Feb, 2018. Dr. Shilpa R Chauhan.</p> <p>Scientific Temper in India: History, Current Situation And Role of Teacher. Proceedings of CBSE Teachers' Conference –16th and 17th May 2018. Dr. Shilpa R Chauhan.</p> <p>"Why to learn if already a leader" In National Conference on School Leadership Practices 2020, 26th - 28th February 2020, organized by the Department of Teacher Education, NCERT, New Delhi Dr. Shilpa R Chauhan.</p> <p>Systemic Treatments: Is it making Cancer Patients more Vulnerable to COVID 19 Journal of Global Public Health. Dr. Shilpa R Chauhan 2021; 3(1): 23–26.</p> <p>Zip Lock Model For Educating Indian Tribals: A Multipronged Approach for Educational, Social and Economic Equity" Priyanka Barara, Shilpa Raghuvanshi Chauhan, 2023; Proceedings of the National Conference on School and Teacher Education, organized by SCERT, New Delhi.</p>
3	Pedagogical Innovation	<p>1. Dr. Shilpa Raghuvanshi Chauhan, PGT Biotechnology designed a pedagogical innovation that was a Stapoo game to help students understand structure and working of human heart. The objective of the project was to help students enjoy learning long biological processes that can be retained for a longer time through games that are affordable. These games can be easily designed so that students from all sections of society are benefited from them. It was ranked first in Delhi under Vidya Amrit Mahotsav is an innovative pedagogy festival in which SCERT, Delhi invited all the teachers and school leaders to submit their innovative practice as projects on the DIKSHA app.</p> <p>2. Ms. Deepika Sharma, Assistant Teacher from Salwan Public School, Rajendra Nagar, contributed two of her game based group activities designed for upper primary classes, which have been selected for publication in SCERT resource that was launched to provide a platform to the creativity and innovative pedagogies practised by the teachers in elementary classes</p>


S.no.	REFLECTION		
1	National awards for innovation	Plastoscope, a microscope made of waste plastic bottle, National award INSPIRE MANAK. Awarded by Vice president of India. Showcased at IIT Delhi, IISc Bangalore and ISRO under DHRUV program.	
		Larvaecidal cake from waste cigarette butt. National ATL Marathon Award by NITI aayog	https://aim.gov.in/pdf/Coffee Table Book Final.pdf Innovation covered in National NITI Aayog Book Pg107
2		Beside national awards the students have innovated multiple scientific projects that were funded and awarded by government of India like Ecodos: World's first biological radiation tracker, Color based BP detectors for villagers, Fungal spore detector for Indian farmers, quencher: a device to channelize waste water to replenish underground water etc. Not only scientific temperament the students have bagged numerous awards at state and district level in field of languages, sports, art, music etc	https://salwanpublicschool.com/achievements/

Table. 3 Reflection in terms of research and innovation by faculty & students of the school

Stepwise working module standardized for maximum impact on students and teachers

While most students today are proficient in solving paper questions, they may not be proficient at providing optimal solutions to pragmatic project-based problems that require systematic learning strategy, innovation, problem-solving, and execution.

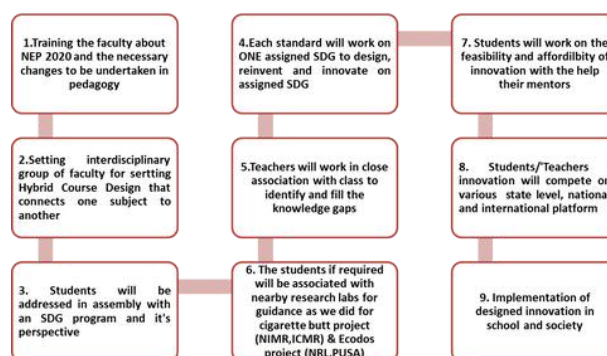


Fig. 2 Stepwise standardized working module for students and teachers

A stepwise time-based module has been standardized to ingrain 21st-century skills in our students & teachers ingrained to sow innovation at each level of learning and teaching today and in future.

Reference

1.Hoffman, A. and Holzhter, J. (2012), "The evolution of higher education: innovation as natural selection", in Hoffman, A. and Spanghehl, S. (Eds), Innovation in Higher Education: Igniting the Spark for Success, American Council on Education, Roman & Littlefield Publishers Inc., Lanham, MD, pp. 3-15.

2.Vieluf, S., Kaplan, D., Klieme, E. and Bayer, S. (2012), Teaching Practices and Pedagogical Innovation: Evidence from TALIS, OECD Publishing, Paris, available at: [www.oecd.org/edu/school/TalisCeri%202012%20\(tppi\)-Ebook.pdf](http://www.oecd.org/edu/school/TalisCeri%202012%20(tppi)-Ebook.pdf)



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