

**A CASE STUDY ON DEMONSTRATING THE INCLUSIVE
LEARNING ENVIRONMENT FOR NEXT GENERATION
(ILE_NG) LEARNERS**

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ABSTRACT

In this online-education era, educational system faces challenges to address the learning requirements of individual learners. This paper, suggest a novel approach for framing an inclusive learning environment for next generation (ILE_NG) learners, which is a learning framework with teaching approaches and assessments to ensure that all learners are included, engaged and supported fully in the process. Based case study was carefully formulated in an educational site with the learned professional's and various stake holders by including 530 participants.

The administrators, deans, professors took part in identifying the key components of proposed inclusive learning environment for next generation learners. Freshly joined teachers took part in implementing the ILE_NG approach at the case study site. The year-wise educational strategies are framed and they were practiced at the chosen educational site and also the learners' outcomes are assessed with appropriate methods.

The effectiveness of proposed approach was measured in terms of curriculum revisions, annual professional achievements and career settlements. Results show an increase of teachers' readiness from passive to active and inclusive approaches and learners' outcomes are evident (95.3%) with flourishing achievements across the years. These are encouraging the success of our proposed ILE_NG approach for technology education transformation across diversive learners.

This study contributes to inclusive educational research, as the focus is primarily on setting up inclusive TLP environment where the students can practice key personality skills, such as collaboration, through pair and group work activities.

Index Terms: *Inclusive Learning, Next-Generation Learners, Technology enabled classrooms, Collaborative learning.*

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I. Introduction

The learning environment is a purposefully organized physical, social, and informative set of circumstances, in which a learner forms and implements his/her experience: knowledge, skills, and attitudes towards himself/herself and the surrounding world” [1-2].

For any nation its tomorrow’s leaders, experts and citizens are sitting in today’s classrooms [3]. To supply the demands of today’s innovation economy, first and foremost need of higher education is to develop today's learners with content fullness, collaborative spirits, and critical skills, while shaping them as life-long of learners.

The key principles for promotion of inclusive practice are the following: listening to views of learners, particularly in cases where life-affecting decisions are made; learners’ active participation in activities at educational institutions and in society; positive teacher’s attitude towards all learners and willingness to work in cooperation with colleagues; effective teachers’ skills to deal with the diverse needs of all learners; respecting the diversity of teachers and learners [4-5].

For the next few decades, it is required to anticipate the educational needs [6] and preferences of today’s next-generation engineers (Hector R et al, 2014) by resolving their barriers in professional career settlement and societal participations (Emma. L., 2020)

But, recently the quality of engineering education offered at rural regions of South-East India is a very challenging phenomenon, in order to recognize all the students’ entitlement to a learning experience across diversity, gender, locality, economical status and medium of schooling [4]. The present educational framework requires intentionally nurturing and carefully wired scaffolds on pre-existing teaching methods [7].

With an objective of reshaping the traditional learning environment [8] and to engage the next-generation learners, this paper suggests innovative teaching methods with inclusive learner’s assessments that can foster real-world needs by building the inclusive class rooms based on proposed ILE_NG learners’ education system.

II. Proposed Framework

A. Case Study Area

In order to promote the proposed idea, National Engineering College (Autonomous) popularly known as NEC situated in Kovilpatti, TamilNadu, India with all infrastructures and resources is considered as the case study site for the proposed ILE_NG approach.

NEC offers 6 Bachelor of Engineering (BE) undergraduate degree programmes that are accredited under Tier I and offers OBE education [9] with choice based credit system (CBCS) since 2011.

B. Preparing survey questionnaire

A survey questionnaire as per Appendix-A was conducted at NEC based on fishbone analysis [10]. From NEC, 530 participants at different roles have given their opinions on requirements of inclusive educational learning environment and it was listed in Table I.

Table I Fish-bone analysis based survey for ILE-NG approach

Role of participants	Highly voted element	Responses
Administrators (6)	Social Demands	5 / 6
Deans (12)	Learners' outcomes	10 / 12
Professors (46)	Technology Enabled Class room	45 / 46
Fresh Faculty (10)	Innovations in TLP, Assessment tools	10 / 10
Final year students (456)	Employability	425 / 456
	Adaptability to technology	402 / 456
	Creativity	350 / 456

Based on their survey responses, the functional components involved for successful implementation of inclusive learning environment for higher education are drafted in Figure 1.

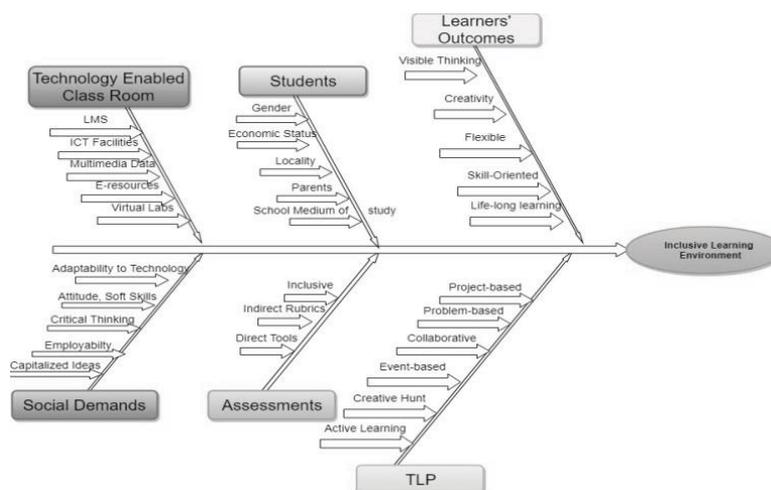


Figure 1 Fishbone Analysis on ILE_NG Learners

Each component was further analyzed to break the causes into micro details, which are addressable across the diverse learners. From this survey analysis, the action plans are derived to fulfil the educational needs of the next-generation learners.

- i. Offering new skill-oriented courses. (through curriculum advancement)
- ii. Sharpening the conceptual, critical thinking, analytical and problem solving skills. (through TLP)
- iii. Ensuring self-paced active learning platform. (through learning activities and assessments)

In order to successfully address all varieties of inclusive learners their skills have to be equipped based on technical learning capacities for 21st Century, the curriculum design must have scope for developing their global awareness along with creative thinking, collaborative problem-solving, and self-directed learning skills [11]. To address this gap the following section detail about the effective curriculum design for the ILE_NG approach.

III. Inclusive Learning Environment for Next Generation Learners

A. Curriculum Design for ILE_NG approach

Developments in curriculum change, even by modest adjustments, could work towards students' feeling less anxious about their studies and ensure a fully inclusive experience [12]. At NEC, revisions are meticulously carried out to remodel the conventional curriculum into Regulation 2015 & 2019 (R2015, R2019) based on ILE_NG learner's needs for promoting the analytical thinking of the students, and we have introduced variety of End Semester Examination Question patterns as listed in Table II below.

Table II High-Order Thinking based Question Patterns

End Semester Examination patterns	1 mark	2 marks	4 marks	10 marks	12 marks	16 Marks	20 marks	Total Marks
A	-	-	-	-	--	-	1 Qn Compulsory & 4 Qns (either or type)	100
B	-	10	-	-	--	1 Qn Compulsory & 4 Qns (either or type)	--	100
C	10	-	10 out of 12	1 Qn Compulsory & 4 Qns (either or type)	--	--	--	100
D	10	10	5 out of 6	1 Qn Compulsory & 4 Qns (either or type)	--	--	--	100
E	-	10	5 out of 6	-	1 Qn Compulsory & 4 Qns (either or type)	--	--	100
F	-	-	-	-	-	-	5 out of 8	100
G	-	5	-	2 Qns (either or type)	-	-	-	30

Especially for CSE discipline, based on program specific criteria and opinions of the Governing bodies of autonomy, industrial partners, subject experts, Alumni, exiting students, we have refined the flexible, OBE based curriculum for the ILE-NG learners.

The curricular components of R2015 and R2019 are depicted in Figure 2 below.

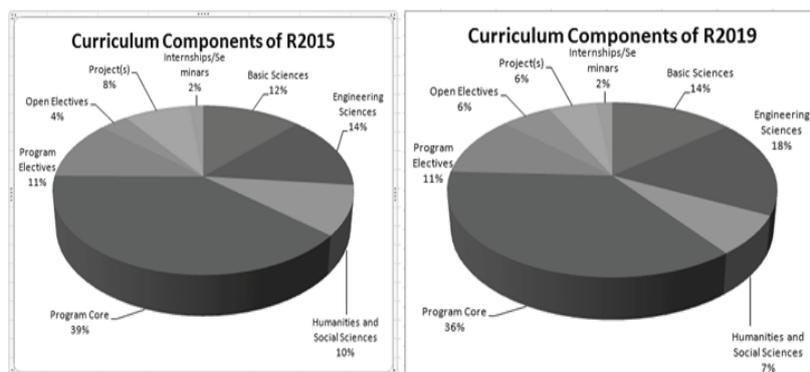


Figure 2 Curricular components of R2015 & R2019 for CSE programme using ILE_NG approach.

The predominant changes brought for ILE-NG approach in the R2019 as compared to R2015 are stated in Table III.

Table III

Contribution of credit distribution towards ILE_NG approach

Curriculum Features	R2015	R2019
Theory Core Courses - Credits	95	67
Practical courses - Credits	37	42
Programme Electives - Credits	19	18
Open Electives - Credits	6	18
Project-based Learning - Credits	12	12
Industry Intership - Credits	2	2
Online courses – Credit Transfer	3	15
Total Credits	169	165

From Table III, it is evident that more flexibility on earning credits, increased practice-based learning along with additional open electives are highlighting the opportunities provided for ILE-NG learners to personalize their employability skills.

B. Adaptations in Teaching – Learning Process for ILE_NG approach

Multi-grade teaching has potential benefits in promoting inclusive pedagogy and teacher awareness of learner diversity [13-14]. The course instructors at NEC have motivated the student's participation by creating a positive classroom environment [15], by asking effective questions, etc. They applied icebreakers (Fun activities designed to get students acquainted with course content and expectations). To build good rapport with them, instructors also responded through forums to their personal traits and keenly observed their educational needs and entrust what they are hoping to get at the time of completion of degree, via mentorship. They have clearly explained the connections between the course activities and the learners' goals. The course instructors periodically gave regular feedbacks on students' progress (for each course outcomes) which helped the learners to identify their learning patterns and progressively assessed their improvements [16].

At NEC, for implementing the ILE_NG approach inside class rooms, well-furnished technology enabled class rooms [17],[7] were established with the prime point, of addressing the diverse learning abilities of inclusive learners [13].

The facilities introduced for blended and inclusive teaching-learning platform are:

- ICT teaching aids (Smart boards, LED monitors, digital tablets, PDAs, smart mobiles)
- LMS-portals (NEC-Moodle & Google-G suite), digital library (NDL, IEEE/ACM, Science Direct, NPTEL-SWAYAM)
- Online-collaboration tools (Google Meet / WebEx/ Zoom/ GoToWebinar/ WhatsApp/ Skype), video podcasts (YouTube channels / G-drives)
- E-resources (OERs, own ppts, e-notes, audios & videos), case studies
- Real-life problem scenarios (Hackathons / Ideathons / Talent Hunts / National coding contests / Infosys Campus Connect)

The inclusive learning environment is found being helpful to plan the cyclic skill development of learners invariably on their gender, economic status, and locality as shown below in Figure 3.

This year wise learning goals need constructive planning and execution of inclusive learning based class rooms for both theory and practical courses. Based on Fig. 3, at the end of course, our

graduating engineers from NEC ensured the proper acquisition of research skills, global certifications, incorporate solutions for real-world issues, and on the whole they become capable of learning across the nation with appropriate scholarships.



Figure 3 Learners’ skill development at ILE-NG class rooms

C. Learners’ Activities and assessments for ILE_NG approach

To encourage participations for the inclusive learners, the learning techniques adopted by the ILE-NG framework at NEC and their effectiveness are depicted in Fig. 4 (below). The various active learning strategies [18-19] like discussions, collaborative learning, creative problem – based learning, and other forms of group work involve development of associated thinking. In addition to that, encouraging peer instruction based learning requires flexibility [20-22].

IV. Evaluating Outcomes of ILE_NG approach

For the past 4 years, the overall students’ professional levels of achievements towards career settlement are greatly improved and are stated below in Table IV:

**Table IV
Visible achievements by NEC-CSE learners with ILE_NG approach**

Industrial Readiness & Achievements	2018-2019	2019-2020	2020-2021	2021-2022
Internship offers	55	65	67	78
AICTE–Internshala Internships (WFH)	1	11	45	52
AICTE–Internshala training	-	105	110	135
Industrial–inhouse projects	36	48	54	68
Student Funded projects	2.7 L	7.3 L	7.2 L	10.4 L

National Contest Winners TCS (Code vita, Ninja, Digital), Wipro Talent Hunt, InfyTQ, Zoho, etc.,	12	23	43	45
Hackathons	-	3	3	8
Google/IEEEExtreme (ranked)	-	4	6	17
Placement Training hours	2hrs / week	3hrs / week	5hrs / week	8 hrs/week
Dual / Triple Offers	10	23	34	67
Global Certifications	7	15	22	35
SCOPUS publications	15	24	23	50

The statistics depicted in Table IV clearly show the success of our proposed ILE_NG learner environment setup at our premises with promising skill improvements at large. It is also evident that, even though NEC is situated in rural area, only 105 offers out of 124 students we got for CSE during the year 2020-2021, but now we have achieved 169 offers out of 112 students in the year 2021-2022, due to the successful implementation of ILE_NG approach. There are 40 students in this year have got placement offers with 5LPA – 10LPA band (among them 19 students are above 7LPA), whereas during last year this band was filled by 21 students only. This is a significant outcome of our proposed ILE_NG approach.

V. Conclusion

On the whole, through inclusive learning environment proposed by ILE_NG approach, more emphasis was placed on developing student's skills rather simply transmitting information. Learners recognized greatly that they must be valued, equal, and able to participate and contribute fully to the social, cultural, and academic life of both the institution and their disciplines. The flourishing achievements across the years encouraging the success of our proposed ILE_NG approach for technology education transformation.

Acknowledgment

The authors declare their gratitude for National Engineering College, Kovilpatti and Sri.S.Ramasamy Naidu Memorial College, Sattur for carrying out this case study. They express special thanks to all active participants of the survey for enabling the methodology of this article.

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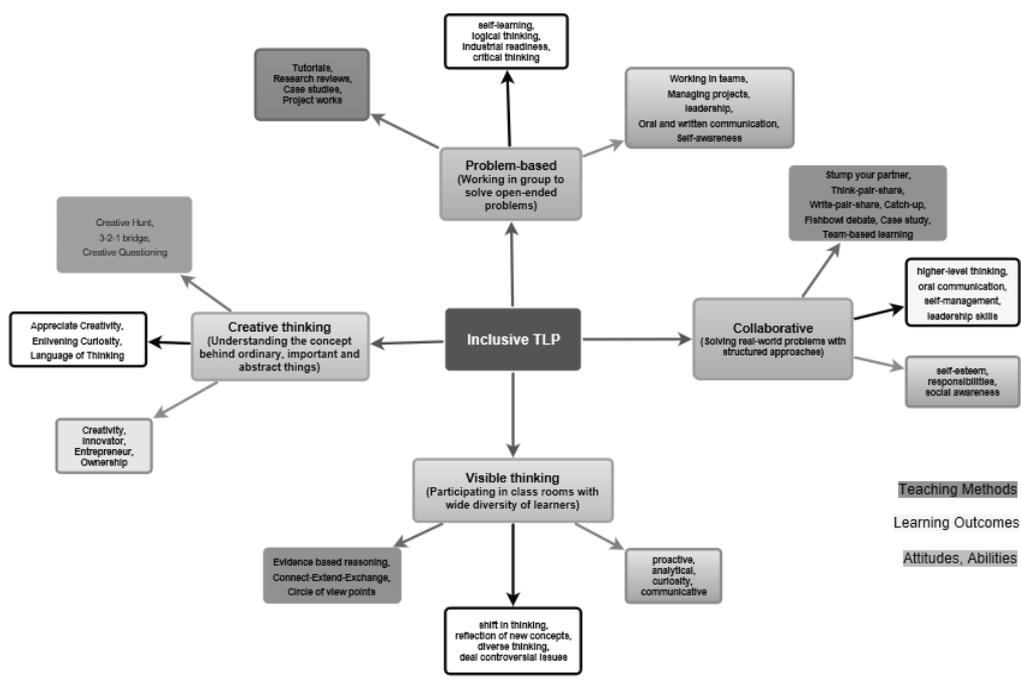


Figure. 4 Innovative content delivery, assessment strategies skill sets, and attitudes imparted for ILE_NG learners

Appendix – A: SURVEY Questionnaire for ILE_NG Approach

SURVEY for identifying the major components of ILE_NG Approach	
1.Participant Details:-	
Name	
Designation	
Email-ID	
2. Your opinion on Inclusive Learning	
3. Your opinion on present challenges in Higher Education	
4. Your opinion on role of Teachers	
5. Provide scaling (5 – Most Relevant, 4- Relevant, 3-Less Relevant, 2-Least Relevant, 1- Irrelevant) for the following components and their relationship with Inclusive environment	
Social Demands	(5/4/3/2/1)
Employability	(5/4/3/2/1)
Technology enabled class room	(5/4/3/2/1)
Innovations in TLP, Assessment tools	(5/4/3/2/1)
Learners' Outcomes	(5/4/3/2/1)
Adaptability to technology	(5/4/3/2/1)
Creativity	(5/4/3/2/1)
Date:	Signature: