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Strategies for Student Led Autonomous Technical Clubs in Primary Education System

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Abstract:

Since the advancement of the National Education Policy, computer sciences and other Information Technology-based education are hypothesized to be exposed at the primary and secondary level education nationwide. This study suggests using technical clubs at secondary and senior secondary education levels in school to act as catalyzers for students who get interested in the IT-based curriculum at early stages. This study aims the support the industry-readiness of students right from primary education.

As technology continues to evolve rapidly, the disconnect between academic curriculum and the industry-readiness of technical school graduates is becoming increasingly apparent. We offer an innovative, cyclical, and autonomous learning-based methodology as a means of bridging this gap. This methodology gives students the ability to take responsibility for their education and provides them with the knowledge and skills necessary to be successful in the business.

In the context of this study, the term "autonomous learning" refers to a situation in which students are given the authority and responsibility to take charge of their education and to make choices in the order in which they choose to acquire the skills that they have been taught. Our proposed methodology is a model that is directed by students and industry professionals and is based on feedback. This model may adapt to the ever-changing demands and expectations of the industry.

In addition, the approach we have suggested is meant to be both interactive and productive, improving it over more conventional methods of instruction. We anticipate an increase in student involvement and overall content with their education as a result of our policy of allowing students the freedom to take responsibility for directing their education and offering them opportunities to gain practical experience and industry exposure.

Keyboard: Autonomous Learning, National Education Policy, Peer Learning, Flipped Classroom

INTRODUCTION:

The primary education system in India has been facing several challenges in recent years, including a lack of resources and inadequate teacher training. One potential solution to these issues is the implementation of student-led autonomous technical clubs in primary schools. These clubs can provide students with hands-on learning experiences, help them develop critical thinking skills, and promote a culture of innovation and creativity. This research article will explore the strategies that can be used to successfully implement student-led autonomous technical clubs in the primary education system in India.

Traditional training methods, such as classroom instruction and lectures, can lay a foundation of knowledge for students. Still, they must also adequately equip them for the needs of the modern workforce. It is becoming increasingly evident that there is a disparity between the academic curriculum and the industry-readiness of graduates from technical schools as technological advancement continues to accelerate.

The evolution of a person's needs has played a crucial role in developing the economy, the sciences, and society throughout human history. When integrated, these three components add to a student's total educational experience. In response to customer needs, industries and conglomerates constantly broaden the product lines they offer by employing a vast array of technical strategies.

We suggest the development of student-led technical clubs and industry-based student initiatives to foster autonomous learning. These clubs and initiatives will act as a catalyst for members to prepare for their professions and acquire knowledge that is relevant to the industry. Students' employability and level of preparedness for the workforce are expected to improve due to the implementation of this methodology, which should also lead to an increase in the student's

knowledge and abilities that are directly relevant to the industry.

Strategies for Success:

- Involvement of Teachers: The participation of teachers is crucial for the success of student-led autonomous technical clubs. Teachers can provide guidance and support to students as they plan and implement their projects. They can also help students to develop the skills and knowledge needed to lead the club successfully.
- Active Student Participation: Active student participation is essential for the success of student-led autonomous technical clubs. Students should be encouraged to take on leadership roles and ownership of their projects. This will help them to develop important skills such as problem-solving, critical thinking, and teamwork.
- Access to Resources: Access to resources is crucial for the success of student-led autonomous technical clubs. Students should have access to materials and equipment that they need to complete their projects. This may include things like computers, software, and scientific equipment.
- Collaboration and networking: Collaboration and networking are vital for the success of student-led autonomous technical clubs. Students should be encouraged to work together and to share ideas and resources. They should also be encouraged to collaborate with other schools and organizations to gain additional resources and support.
- Recognition and Rewards: Recognition and rewards are essential for motivating students to participate in student-led autonomous technical clubs. Students should be recognized and rewarded for their hard work and achievements. This may include things like certificates, medals, or even monetary rewards.

Upgrades are undertaken to match consumer expectations and respond to the rapid changes in their needs; these upgrades can result in an expansion of a company's technology stack. Applications in industries are designed with the consumer in mind. To match consumer expectations and adapt to their ever-changing demands, upgrades are implemented. If you want to work for one of these companies, you must stay up-to-date on the various technology stacks and concepts.

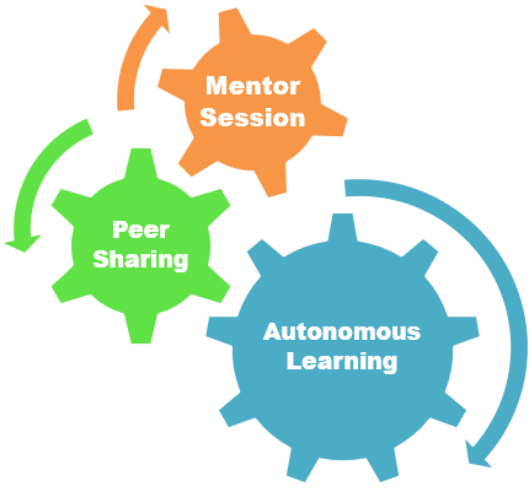
However, an institution is obligated to conform to a rigid standardized structure of education. This learning structure strives to address the demands of a wide range of students concerning all of the subject's basic features while also being cognizant of introducing the subject's specialized aspects.

While offering a way to simulate a balanced curriculum, Hnich et al. [3] underline the challenges and restrictions that arise. The fundamental goal of the academic curriculum is to be balanced in all dimensions, which is a significant undertaking in and of itself. It is challenging for educational curricula to adapt to the rapid acceleration of the rise of industrial expectations and requirements due to these variables. Due to differences in the transformation rate of organization charters, there will always be a gap between the level of application-level knowledge possessed by students in industry and academic institutions.

In this work, we offer a club enriched by peer learning and autonomous learning based on the flip-classroom paradigm. The club relies on its core components, including its domain lead and mentors, to provide a skill-development-friendly environment. This is achieved through industry-recommended sessions focused on acquiring in-depth proficiency and proactive project development mentoring across developing technological disciplines. This structure designates an industry-connected student as the entity domain lead.

This student engages in student developer ambassador programs such as Google Developer Groups, Google ExploreML, Intel Student Innovator, the Microsoft student program, Nvidia DLI Ambassador, and AWS Educate. This student is accountable for lobbying for industry resources and best practices to which they have access. This organisation promotes these among club members by hosting semester-long seminars in the style of a boot camp.

Additionally, it elaborates on these concepts by utilising industry-specific resources. The entity mentor in this context is a fellow student with experience in project development or research who actively assists the assigned mentee students in topics of interest. The mentor provides the mentee with guidance based on his own experiences to help him achieve his goals of winning hackathons, publishing research papers, receiving scholarships, and becoming industry-ready. In addition, they foster an environment that encourages individuals to develop their degree of technical skill actively.



The suggested club is a robust framework for colleges with tier 2 or lower status that lack computational or industry resources, motivated students, and are linked with universities whose curriculum cannot keep up with the quickly changing industry demands. This framework is designed for colleges with a status of tier 2 or lower. In the parts that follow, we will elaborate on the gap indicated previously and then give our proposed solution as a framework for effectively bridging that gap.

In conclusion, this self-directed learning-based methodology provides a one-of-a-kind and forward-thinking answer to the problem of a gap between academic curriculum and industry readiness. We encourage educational institutions to seriously consider implementing this strategy to better prepare their students for achievement in today's competitive job market.

LITERATURE SURVEY:

The establishment of an efficient study routine necessitates the use of a variety of educational strategies, materials, and methodologies, as well as contemporary technology.

Student clubs have grown in popularity over the past few decades and are vital to the success of any educational institution because of their potential to dramatically increase students' motivation to improve in specific areas of interest. Foubert Lauren et al. found that students who participate in extracurricular activities, such as sports and clubs, are likely to perform better in their future careers.

Students who are employed or enrolled in a non-residential program are obliged to have a reduced school attendance rate. During their time here, these students' participation in academic and institutional activities has also declined. Tinto et al. discovered that when such situations arise and clubs are formed, there is an increase in student engagement and persistence.

Through activities like collaborative learning, group projects, and cooperation, students are encouraged to learn not just from the instructor but also from their classmates and one another. Peer learning can include collaborating, communicating, and giving and receiving feedback from peers. In addition, peer learning emphasises the exchange of knowledge and ideas among students in the context of a joint effort;

Keppell et al. Personal development, community building, interdependence, felicitation, boundary management, and resource allocation are the most fundamental concepts of a peer learning system. In addition, it emphasises the importance of having a group of motivated and goal-oriented students in charge of managing the peer system. Given that responsibilities are mutually exclusive and consistent audits are conducted, hierarchy can also function successfully within the setting of a group structure; Tosey et al. [9]

The peer learning system appear to have a significant positive effect on the psychological well-being of its members, and it also promotes personal development, environmental mastery, and autonomy, according to Hanson et al. [10]

In the context of our study, "autonomous learning" refers to a situation in which students are accountable for their education and all decisions on the development of the skill they seek to acquire. In this scenario, most resources and facilitation are the learner's responsibility. In this system, most of the direction and evaluation come from the user.

Cao Y. et al. discovered a significant association between the ability to learn independently and a greater success rate in professional occupations. [11]

Autonomous learning techniques have proved their ability to stay up with the rapid introduction of new industry trends. Since the student is responsible for establishing his or her rate of learning, it has also been found to be correlated with an improvement in students' (mainly freshmen) confidence and overall satisfaction with the learning experience; Macaskill et al. [12]

The recent acceptance of the flipped classroom model has increased dramatically since it is more convenient for students and teachers. Although highly motivated, self-teaching students are an imperative necessity for the system to operate at its most practical level, this creates a challenge. On the other hand, it can be deployed rapidly and tailored to an individual's needs, enhancing performance; Bishop et al. [13].

As a result of the asynchronous nature of the flipped classroom concept, students are better able to manage their club commitments with their academic requirements. The term "holistic education" refers to an instructional approach that emphasises the "integrity" of a student's education. This curriculum emphasises the development of one's physical, intellectual, emotional, social, spiritual, and artistic identities. These variables contribute to a rise in students' self-confidence, which, in turn, improves their overall performance; Mahmoudi et al. [14]

Adapting to the specific needs of each student will be facilitated via mentorship programs based on student peers. It is generally acknowledged that peer mentoring programs can enhance student achievement. These activities also enhance pupils' communication. According to Rodger S. et al. [15], when students participate in mentoring activities, their performance improves significantly.

PROPOSED MECHANISM:

The primary education system in India has been facing several challenges in recent years, including a lack of resources and inadequate teacher training. One potential solution to these issues is the implementation of student-led autonomous technical clubs in primary schools. These clubs can provide students with hands-on learning experiences, help them develop critical thinking skills, and promote a culture of innovation and creativity. This research article proposes a holistic framework for a club that guides its members towards holistic and better professional careers through active peer learning and a student-centric flipped classroom model.

A. Domains of the Technical Club:

The proposed club aims to promote core technologies education and provide various learning skills for students in the organization. The students will be given plenty of opportunities to realise their talents and appreciate emerging technology and its techniques. The club will be headed by a faculty in charge and divided into domains, where every domain lead can act independently compared to the decisions constrained to their field solely. The proposed parts are:

- Artificial Intelligence/Deep Learning/Machine Learning
- Cloud Computing and Distributed Linux Systems
- App Development & Web Development
- Data Structures and Algorithms/ Competitive Coding

These domains can be dynamic and changeable at the end of each academic year, and new domains such as Augmented Reality-Virtual Reality, Internet of Things-Industry, and Robotics can be added at the discretion of the faculty in charge and outgoing domain leads.

B. Hierarchical Structure of the Club:

The proposed club has a hierarchical structure that consists of the following entities:

- Domain Lead (1 Position per Domain)
- Third-year Head Volunteer (1 Position per Domain)
- Second-year Head Volunteer (1 Position per Domain)
- Faculty In-Charge (2 Positions)
- Public Relations Team and Creative (2 Positions at Club Level)
- Mentor-Mentee.

This structure guarantees an optimal arrangement that delegates appropriate responsibilities in a manner that keeps the focus on upskilling constantly.

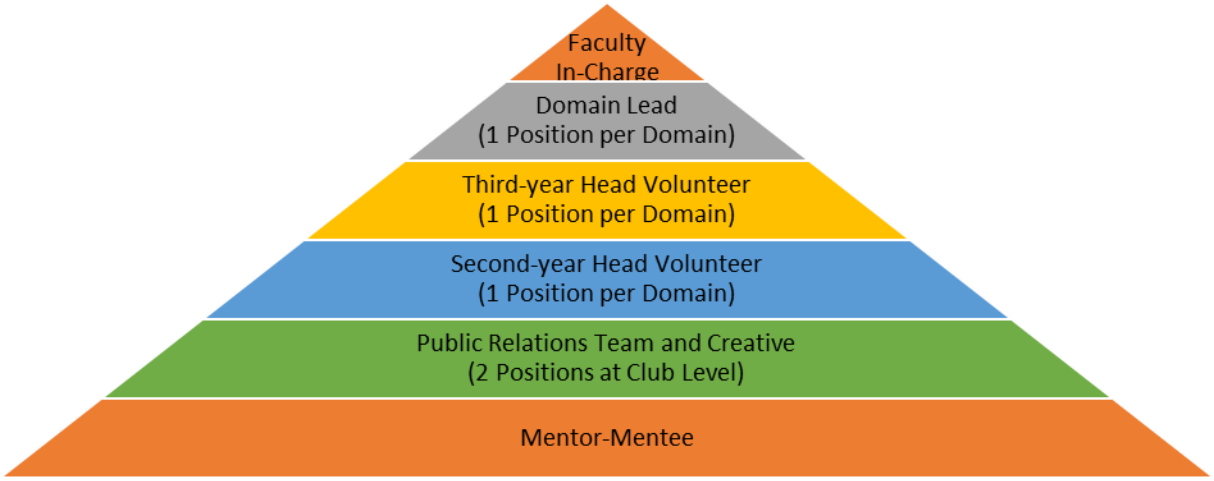


Fig.1 Hierarchy Structure of the peer learning club

C. Key Responsibilities in the Organizing Positions:

Domain Lead:

A domain lead is any student considered proficient in their domain by the outgoing leaders and faculty in charge. They must possess the ability to teach the student participants the same. The responsibilities of a domain lead may primarily consist of but are not restricted to, organising seminars, workshops, projects, and research in the community and disseminating information about other good practices and opportunities in the domain.

Third-year Head Volunteer & Second-year Head Volunteer:

A head volunteer is a student and a club member. One head volunteer is selected from the two years of experience and three years of experience within the club referred to as the Second-year Head Volunteer and Third-year Head Volunteer. The Third-year Head Volunteer is a point of contact between the committee and the students in the third year for the respective domains. The Second-year Head Volunteer serves as a point of contact between the committee and the students in the second year for the respective domains.

Faculty In-Charge:

The Faculty In-charge is responsible for overseeing the overall functioning of the club and ensuring that it aligns with the objectives of the primary education system. They also act as mentors and guides for the students.

Public Relations Team & Creative:

The Public Relations Team and Creative are responsible for promoting the club and its activities to the broader community, as well as creating engaging and informative content for the club's website and social media platforms.

Mentor-Mentee:

The mentor-mentee system is an integral part of the club, where senior students mentor junior students and help them develop the skills and knowledge needed to become successful domain leads.

D. PROCESS FLOW:

The club's Peer Learning program is also the best option for illustrating the inspiration that led to the club's formation.

The primary purpose is to promote self-learning, shared learning, and the training of skills to comprehend better and employ particular technology, ultimately resulting in enhanced community cohesion.

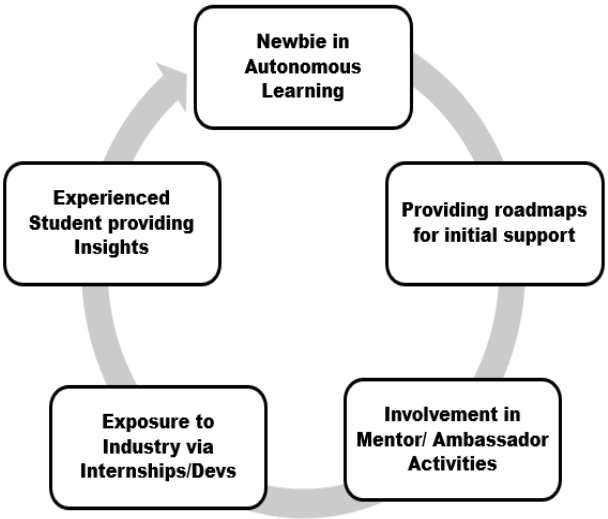
These two responsibilities will serve as the program's pillars:

i) Mentor:

The domain leaders will ultimately determine who will act as a mentor. A mentor is a person who has exhibited competence and experience in their subject area. A mentor's primary duty is to function as a guide for a single mentee or group of mentees. No one else should share responsibility for the growth of mentees with the mentor.

ii) Mentee

A mentee is an organization-affiliated student selected to participate in the mentoring program. The evaluation approach is designed so that the mentee student is involved in the formulation of the project and the development of their skills from the outset. A mentee has committed significantly to self-improvement and expanding their horizons in technology and academia. A mentee is an eager self-learner who participates in a range of hackathons, creates projects, competes for internships, and aspires to positions and events of significant renown that contribute directly to the enrichment of the mentee's experience and knowledge.



Only authentic club members can join the peer learning program's internal activities.

E. CLUB RECRUITMENT PROCESS:

The ability to learn how to learn is one of the most crucial skills to nurture for success in the modern world. Therefore, the purpose of these exercises is to inspire individuals to approach the obstacles mentioned earlier with an attitude of curiosity, with the ultimate aim of strengthening their capacity to learn from and improve upon such challenges. Version control is essential for managing changes and guaranteeing that all team members are using the most recent version of a document. This is the most critical evaluation factor to consider when employing new employees.

This strategy of performing a variety of tasks, preserving reports for each, maintaining version control, and open-sourcing their work can aid in identifying and locating people that are committed, hard-working, and skilled.

Ability to recognise the need for, and have the preparation and ability to engage in, independent and lifelong learning in the broadest context of technological change; and ability to identify, formulate, research literature, and analyse engineering problems to reach supported conclusions using open-source technologies. These are the most important lessons learned through the recruitment process.

Installing and running open-source operating systems is possible—the capability to acquire information about Free and Open-Source Software projects via Internet-based software releases and websites.

CONCLUSION:

Thus, our contributions to this effort involve identifying the gaps between industry requirements and academic education that prevent students from functioning to the best of their abilities in the sector and proposing and

testing a remedy. The solution, characterized as a robust framework supplemented by peer learning and autonomous learning, resulted in a clear and considerable increase in the students' overall rating metrics, involvement, and deliverable performance in the form of internships and scholarships. This proposed paradigm exploits the potential of peer and autonomous learning in the most efficient way with little changes in the hierarchical structure of any institution. It would also reduce the burden on institutional management to cover every topic of industrial importance and provide a proactive approach in which responsiveness to the most recent industry trends is a feature of the entire structure. This will thus continually seek to narrow the gap between Industry requirements and academic curriculum and is an efficient solution for institutes highly constrained by people and computing resources.

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