

# E-AKSHARA - NEXT GENERATION UBIQUITOUS SMART LEARNING PLATFORM

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## Abstract

Recent evolution in web technology has provided millions of resources that identify unparalleled challenges which can support the collaborative learning of college students. This paper attempts to provide an insight into one of the web-based solutions-“e-Akshara-Smart learning platform” which can catalyze the learning capability of the students. e-Akshara platform deploys a smarty framework which simplifies compartmentalization and allows separation of front and back logic. This Smarty framework is more flexible and secured with free and open source feature. This web-enabled platform provides continuous learning to students which will connect their pedagogical and professional knowledge. The state-of-the-art platform provides students the web interface to learn through practical labs and real time projects, surpassing the challenges associated with learner technological skills, course content development and evaluation techniques. Students can apply for internships and job placements through this portal. They can also submit their projects in public domain which will be reviewed and funded by the venture capitalists. This idea will transform the new generation students into industry-ready professionals and future entrepreneurs which will enrich the start-up culture of the country and generate more employment opportunities.

**Keywords:** eLearning, e-Akshara, SmartLab, SmartProject, Virtual Classrooms.

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## 1. INTRODUCTION

Today the world has become the knowledge hub with the help of internet. We find its presence in every walk of life i.e. education, healthcare, marketing etc. It provides opportunities to the people to gain knowledge about anything, thereby enables them to survive in this competitive world. Thus, the web-based knowledge plays a pivotal role in our life. India, being an emerging country, and having a rich demographic advantage, needs the weapon of knowledge to empower its people and improve their lives. As a whopping chunk of our population consists of youth generation, it is important to provide education to this group to harness the demographic dividend, which can be realized through the use of web-based education.

Web-based education provides a virtual learning platform which consists of eLearning resources like graphics images or photos, audio and video, prepared learning modules etc. These resources can be accessed from any geographical location and the device while providing increased flexibility, individualized learning and convenience over traditional classroom learning [1]. Due to this inherent potential of the virtual learning platforms (eLearning systems), higher educational institutions (universities and colleges) are inclined towards developing and delivering web-based courses [2]. Although these courses help the college students to enrich their domain knowledge, there is a lag between industry-specific need and the theoretical knowledge imparted. Thus we are trying to develop one of the web-

based solutions-“e-Akshara” which will bridge the gap between academic and industrial knowledge of students.

Virtual Smart Learning (e-Akshara) is a technology driven self-contained learning platform which provides online classroom to the users. It consists of industry aligned courses which help users to know the practical implications of the subject. The students can practice through the tutorials and post their related queries which would imbibe innovativeness in other users to think differently, eventually leading to brainstorming sessions. In this way, this virtual platform acts as a real arena of interaction among students and mentors that results in the dissemination of immense knowledge. This knowledge sharing process prepares the fresher graduates to get the good job. Last but not the least, this state-of-the-art platform helps students to transform their ideas into real time projects which could be funded by venture capitalists, based on their commercial value. Thus, indirectly the Virtual Smart Learning helps students to become the future entrepreneurs of the nation and enriches the start-up culture.

The organization of this paper is as follows. Literature Review of various eLearning platforms is carried out in section 2. In Section 3 we discuss various objectives. Section 4 describes the basic architecture of Virtual Smart Learning Platform with the roles of different stakeholders. Section 5 describes the implementation, including the system architecture, the features of the virtual data system, and their specific uses in the eLearning. Section 6 concludes the paper.

**2. LITERATURE SURVEY**

Virtual smart learning (eLearning) is a technology driven self-contained learning platform which provides users with online resources, accessible from anywhere irrespective of the location and device. eLearning finds its application in various fields such as medical, aerospace, security, education etc. Thus it has gained the attention of researchers for the last two decades with the onset of technological transformation across the globe. India, being a country of rich demographic advantage needs education to empower its young generation, which can be realized with the help of web-based education (eLearning). eLearning offers various advantages to the students such as creation of learning objects, administration and implementation of course content., and the interaction between stakeholders of the educational process [3].The several eLearning platforms have been discussed in literature. Some of them are as follows:

Jourjon et.al [4] propose a FORGE toolkit that utilizes experimentation facilities for the development of eLearning materials. This toolkit solves the problem of accessing and maintaining heterogeneous hardware by building an ecosystem which comprises teaching materials, tools and experiments under open scheme and policies. Similarly, Tekin, Braun and van der Schaar [5] suggest an idea for designing a customized web based education platform known as eTutor that provides systematic teaching and training methods for students to maximize their performance. This eTutor is used for training for Digital signal processing course. Moreover, a multi-tenant eLearning platform that employs workflow technologies to model the eLearning process, is proposed by Nava Jyothi, Uday Kumar, AnkitBhilwar, Swathi and Sandesh Jain [6]. This platform has the capability to manage the multiple tenant's business requirements. This eLearning system architecture also enables the educational institutions/organizations to manage, assign and assess the groups of students with the help of eLearning services.

Anand S et.al [7] discuss an online platform A-VIEW that is used for large scale online training and teaching. This virtual classroom platform is based on pedagogy principles such as learner engagement, ease of use, various types of assessment and cost-effectiveness. A-VIEW allows several users (students, teachers) to interact with each other for training and teaching purposes irrespective of their location. This platform aims to solve several issues in virtual learning classrooms. On the similar lines, EI-Seoud et.al [8] propose an open source Moodle eLearning platform for implementing asynchronous web-based modules. They present that the platform simplifies the task of teaching the adult Egyptian students, particularly under graduate ones. Further, the concept of eLearning 2.0 has been put forward by Mohamed E. Edrees [9] which is the integration of web 2.0 technologies and tools into educational and institutional practice. PremaNedungadi, Raghu Raman and Mark McGregor [10] present an online labs (OLabs) pedagogy designed to provide tutorials, theory, procedure, animations, videos and simulations to the students. OLabs also provides a complete learning environment with the assessment features including conceptual, experimental, procedural and

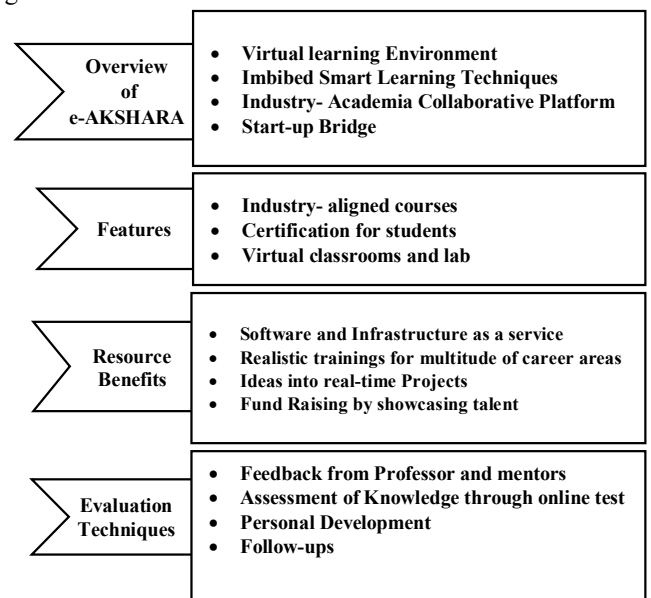
reporting skills. There are various researches conducted to evaluate the effectiveness of eLearning platforms such as, Oliveira M,Serrano J.A [11], on the basis of empirical analysis in Portugal, prove that eLearning strategy provides a more intelligent and friendly content which promotes users' participation resulting in efficient learning. Furthermore, Waldner, Nemetz and Steinberger [12] propose a new web application called eduWEAVER that integrates design, development, and deployment of eLearning scenarios. eduWEAVER consists of instructors, storage of course sequences, learning material and learning management system with certain interfaces. In this way, we have seen that over the period of years, the eLearning platforms have been put in place to cater the needs of the students. As long as the technology widens its scope, the eLearning system will enhance its features to suit the new generation requirements in education industry.

**3. OBJECTIVES**

- To propose a platform based on Smarty Framework which provides customized learning to the students of higher education that enables them to overcome professional challenges associated with technical skills.
- To simplify the hiring process of corporate by providing them the target pool of skilled students.
- To provide a pathway where students' ideas can be commercialized based on their economic value.

**4. ARCHITECTURAL DESIGN**

e-Akshara provides a learning platform to the college students which is based on the novel techniques and has emerged as an alternative to the traditional classroom education. It proposes smart learning classrooms/labs which comprise a combination of synchronous learning as well as asynchronous interaction [13] with several features like smart lab sessions, training for specialized courses etc. Based on the literature survey, the proposed framework is given below:



**Fig -1:** Framework for e-Akshara

This e-Akshara platform also offers an opportunity to its users to express their talent in public domain through real-time projects and entrepreneurial ideas. Once, the idea or the project gets selected by the mentor, the corresponding student will get the required funding. In this way, e-Akshara helps to disseminate entrepreneurial culture among its users and acts as a start-up bridge. e-Akshara enables the professor or the mentor to provide feedback to every student. Assessment through online tests is the value added feature in this platform. This platform helps the users to enhance their technical skills which help them in their professional courier. The stakeholder roles of e-Akshara platform as shown in figure 2 are described below:

**A. User role:** User of e-Akshara platform can be a student or professor of any college/institute, or a mentor of any organization.

Each user can access this platform with any web browser. User has to register on e-Akshara platform so that he gets his login details.

**B. Student role:** Once the user is registered as a student, he can avail all the services provided for e-Akshara Student. Each student in e-Akshara platform can learn various industry-aligned courses as well as subjective courses of his own interest which can be free or paid. Student can take smartlab sessions, can work on different projects which are either prescribed or of his own interest. e-Akshara platform provides certifications for each course by conducting online assessment through third party server.

**C. Professor role:** A professor in e-Akshara platform can be from any institute. Professor’s task in this platform is to provide course content with its respective lab session and its schedule to the students. Professor can access levels for the learning content by defining lesson rules, content tree, assignments, projects, feedbacks, workbooks, grade-books, forums, wikis, external resources, lesson blogs, journals etc. Professor can check the students’ lab reports and can provide feedback to them for further improvement.

**D. Admin Role:** In e-Akshara platform, admin has the authority of registering every user and distributing corresponding tasks to professor and students. Each course and its related assessment posted by the mentor in e-Akshara has to be approved by admin. Admin has the knowledge of all the user reports, standard software packages and the eLearning course classifications for data recording.

### 5. IMPLEMENTATION

The e-Akshara learning platform is developed using MySQL database system. Access to database and user interface is based on PHP and HTML through web browser. This application uses compact UwAmp server and supports Apache, MySQL, PHP and SQLite. UwAmp server contains feasible tools to manage and control Apache and MySQL servers[14]. The e-Akshara platform has different modules such as SmartLab, SmartProject and Assessment. These modules are applicable to different users like student, professor, mentor and admin. Hence they all are interconnected. In other words, we can say that the SmartProject depends on all stakeholders, viz. professor, student, admin and mentor. If a student wants to do the project, he has to take approval from both professor and mentor. Admin has to select both mentor and professor. The remaining modules are also interrelated in the same way.

**SmartLab:** This Figure3 implements the flow of SmartLab module. The user has to first register on e-Akshara platform. The user may be a student/professor/mentor/admin. If the user has already registered, he can directly go to the login page. Then he enters the username and password. If both are matching with the registered one, then he can go to the e-Akshara home page, else he has to re-enter the correct username and password. The security of password is done by the encryption process using md5 function. In the home page of e-Akshara, there is a SmartLab module, which describes the online/virtual labs of various technical languages to the students.

Student can select a lab (prescribed, beginner and advanced lab) based on his requirement and chose a programming language along with his lab id which is unique id for each lab. The prescribed lab is a pre-defined lab, beginner’s lab is useful for learners and advanced lab is for complex learning of courses. The professor provides the problem description, algorithm and input/output constraints to the students. Based on these inputs and outputs, students write programs. The SmartLab has inbuilt compiler which helps students to run programs. After completing the lab session, the student can download his lab report and logout his session.

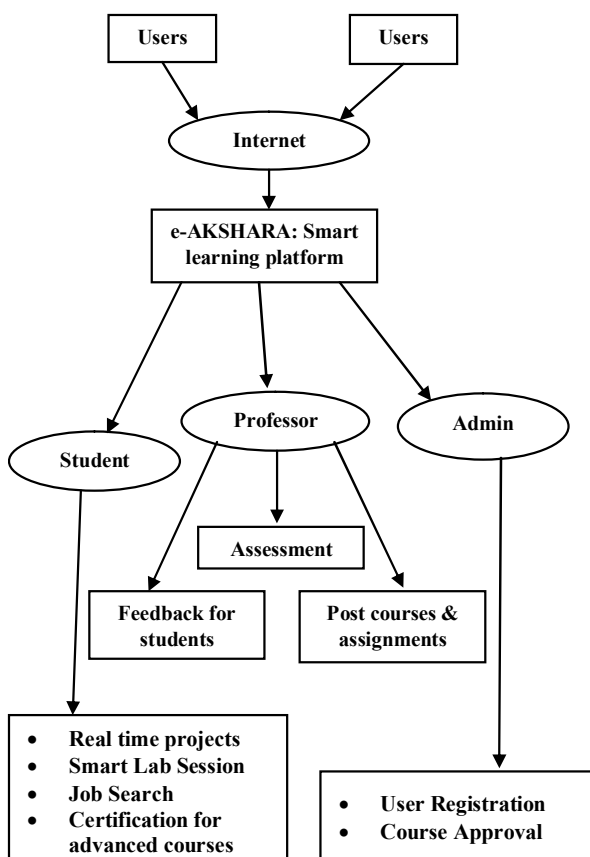


Fig 2: e-Akshara Architecture

**SmartProject:** The Figure 4 implements the flow of Smart Project module. The initial steps of registration and login process are same as that of SmartLab. In the home page of e-Akshara, there is a SmartProject module, which describes the online/virtual projects. Each student has to take approval from both professor and mentor for his project. Prescribed project is a pre-defined project by the professor which may be free or paid project.

If the project is paid, student goes through payment gateway and can later start the project guided by the professor, once the payment is confirmed. After that, student writes all the project management phases. Eventually, he can download his project report after completing the same.

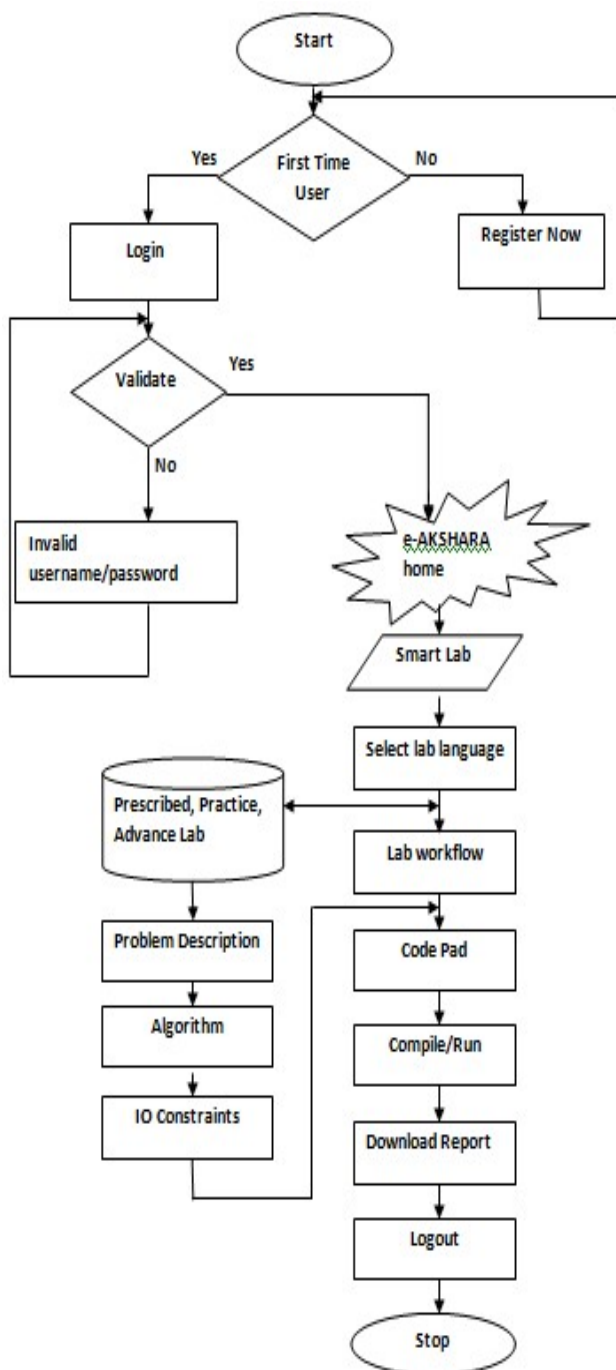


Fig -3: Flow diagram of SmartLab

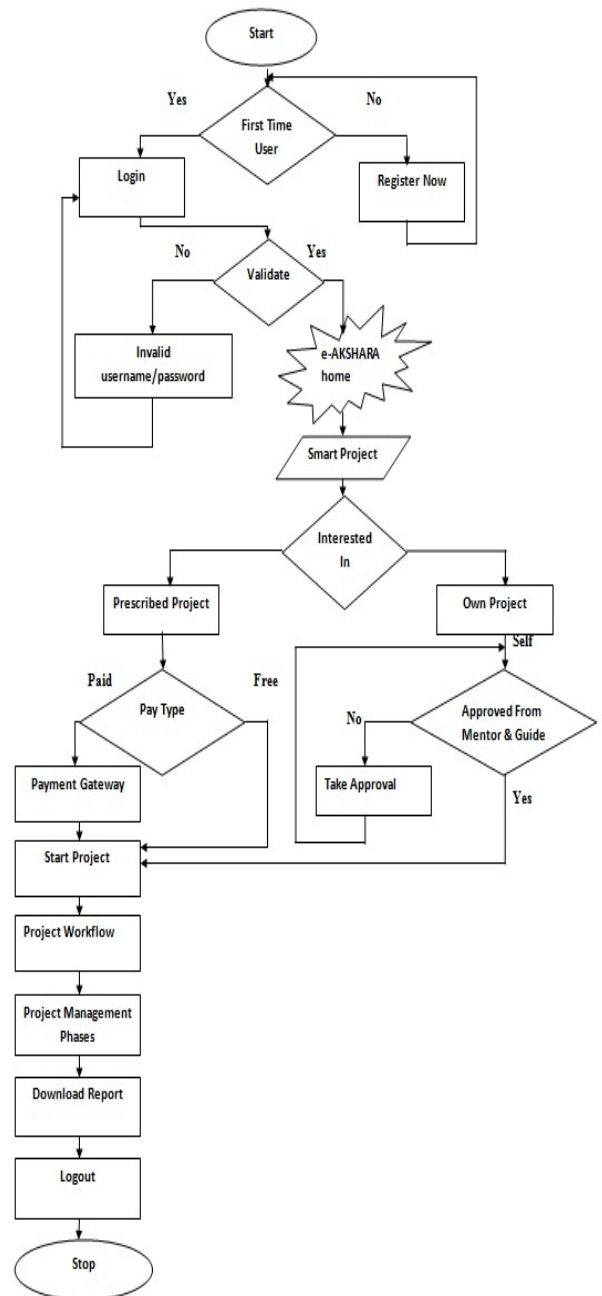


Fig -4: Flow diagram of SmartProject

**Assessment:** This Figure5 implements the flow of Assessment module. The registration and login process is same as of SmartLab. In the home page of e-Akshara, there is an Assessment module, which describes the assessment/test for each student. For assessment, the third party server gives the content part as well as tests for the students. So there is a need of client URL known as cURL which can transfer data to and from a server with URL syntax using the protocols [15].For a student to take his test, he has to register on a third party server. For this, programmer sends a registration request to a third party server. This request must be encrypted and third party server responds to the request with an encrypted data. It is in the form of Json array. The programmer needs to decrypt this array using private key provided by the third party server with the help of json\_decode().

Once the response is decrypted at caller's end, the programmer needs to check the status of the returned response. Based on the value of the status parameter i.e. "success or already registered", the programmer takes further action. If it is already registered, the programmer requests for test details, test link, test result in the same manner as encrypted form and the third party server responds to that request with a Json array of encrypted data. Once the encryption/decryption is done for each process, the test details and its results are stored in a e-Akshara server in student profile.

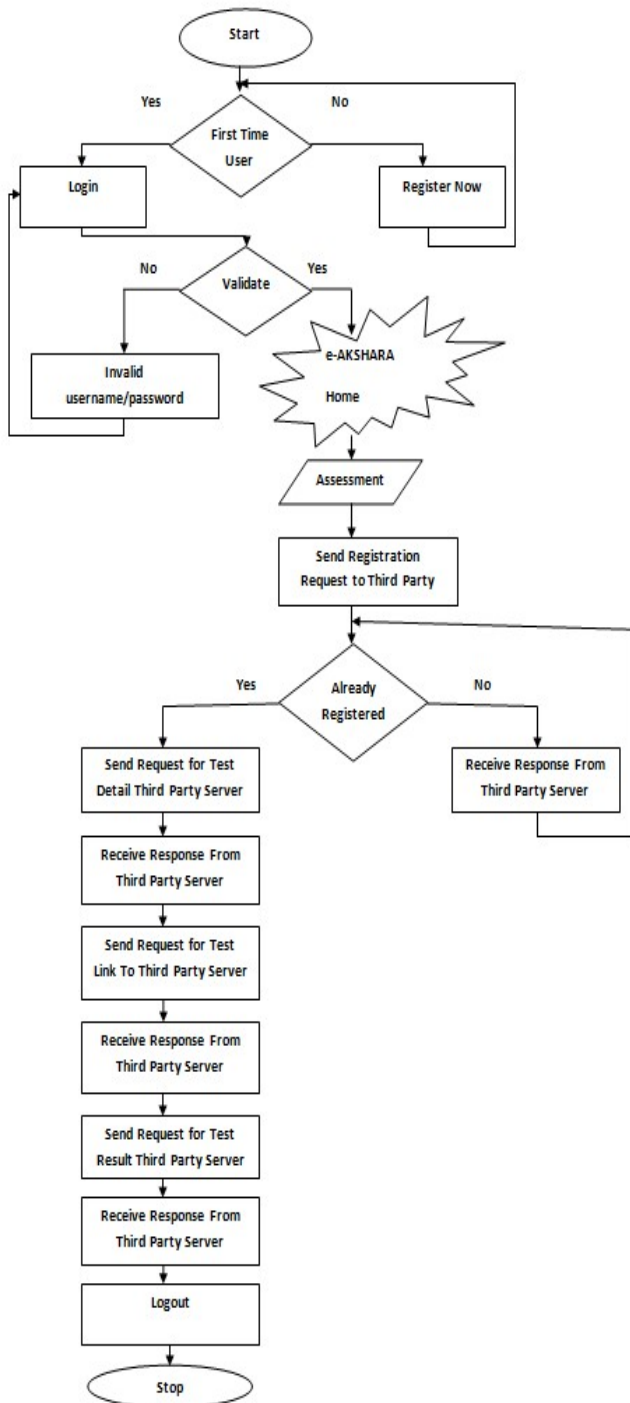


Fig -5: Flow diagram of Assessment

## 6. CONCLUSIONS

e-Akshara not only empowers the higher education, but also brings a paradigm shift in the education industry by providing virtual classrooms and practical labs using the advanced technological tools. The sole purpose of this platform is individualized learning and knowledge dissemination among all stakeholders. e-Akshara also provides a platform to the corporate to target the trained pool of graduates directly and thus, helps them in reducing training expenses. Hence, e-Akshara platform acts as a win-win situation for all, not a zero-sum game. Although, various new features are added to attract the students to use this virtual learning platform, there is always a scope of further enhancements to upgrade this based on the new requirements of students.

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