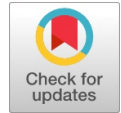


# Emerging Software and Tools in Higher Education Institutions

Shailaj Kumar Shrivastava, Chandan Shrivastava



**Abstract:** Due to digital revolution, new software and tools has been developed by many companies, organizations and higher education institutions which have created a kind of ease to automate our systems. For institution different software offers wide range of feature like automation, online data management, collaboration, planning, videoconferencing, plagiarism detection, language learning and many more. It has been found that the number of software and tools are being developed every day, therefore it is important to choose and install particular software from different resources. The quality of software is dependent on the process to be followed; therefore, it is necessary to investigate their different features. The risks associated with software include data security, unreliable backup systems, compatibility issues, system glitches, poor user interface, lack of control etc. In this paper, an attempt has been made to provide information about different software and tools that has been used recently in educational institution.

**Keywords:** Software Tools, Application Software, Data Security, Higher Education

## I. INTRODUCTION

The emerging artificial intelligence (AI) powered learning environments, machine learning, block chain, robotics, simulation, gamification of learning, augmented and virtual reality (AR and VR) and big data technologies play an important role in new age education framework. The impact of digitalization [1] is seen in almost every dimension of higher education and as a result large number of skill oriented new jobs has been created. It is now necessary for a person to change their professional profile. They have to be self-responsible for their own qualification. The syllabus is designed to prepare students for the ongoing digital era through exposure to key technologies that are shaping the world. Industry related skills along with coding and computational thinking skills are being promoted through effective vocational training. The time of Edu-tech, digital learning and online education has come. The purpose of new tools and software is to make most part of education system more effective and efficient.

Data analytic tools are being implemented and developed by many higher educational institutions [2]. The use of software tools is creating an upward trajectory for the institution as a whole. The scope of software tools in the education industry is increasing with the influx of artificial intelligence-based software. Google Chrome, Microsoft internet explorer and Mozilla Firefox are Web browser software used to access various types of information on the internet. Application software like word processing software (WordPad, MS Word, WPS writer), spread sheet software (Google sheet, MS Excel) and data base software (SQL, Oracle, dBase) are now commonly used in institutions. In this article, various software tools widely used in institutions are briefly discussed.

## II. SOFTWARE DEVELOPMENT TOOLS

Software development tools are computer programs used by the software developers to create, edit, maintain and debug software applications, framework and programs [3]. These tools are used to develop computer programs including websites, webapps, web services and mobile apps. *Atom* is an integrated software development tool having free text and source code editor compatible to work with windows, macOS, and Linux operating system. *GitHub* is software development tools used for tracking and managing computer files. It is completely AI powered developer platform to coordinate work among programs that are collaboratively developing, sharing and reviewing source code during software development. *Azure* is a software development tools that supports various programming languages, framework and operating system. *Bootstrap* is an open-source web development framework for creating responsive websites with HTML and JS. *Dream weaver* software development tool helps us in creating, publishing and managing dynamic websites. *Sendbird* enable us to add chat, video and voice capabilities in our apps. *Ultraedit* is text editor having capability of handling large files.

## III. PROJECT MANAGEMENT SOFTWARE TOOLS

Project management software tools provide a dashboard for the fast visualization of project statuses, and have the ability to generate reports. This software quickly organizes, prioritize and show the progress of all the projects assigned to the team. Project management software tools assist in planning, organizing and managing IT projects [4]. Project management tools *JIRA* enable tracking of project backlogs, bug resolution and patching. *Wrike* is a cloud-based project management tool that simplifies project planning and help in tracking.

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*Asana* is a project management tool that allows collaboration, planning and execution of task quickly. *Trello* is project management tools that improves accessibility to any type of project plan and create an environment of team work. Vulnerability management software (*Qualys*, *Tripwire*, *BreachLock*, and *Nessus* etc.) proactively and continuously scans entire system to identify vulnerabilities across the network, endpoints and workloads. It works to patch vulnerability to reduce future cyber-attack. *SmartSheet* is a software project management tool with main features that include online project management, collaboration, file sharing etc.

## IV. HELPDESK SOFTWARE TOOLS

Helpdesk software tools track all incoming IT requests, provide status updates, assist in managing IT support services, and resolving technical issues [5][15][16]. *ProProfs* manage multiple email accounts with the shared inbox features. *Front* provides features that connect all communication channels like e-mail, SMS, whatsapp, live chat etc. in better way. *Helpscout* manages all parents and students request with the capabilities to access and communicate across multiple channels. *Zendesk* manages user request over social media through messaging. *HappyFox* allows for any technical help needed with laptop, printers, projectors, login credentials etc. *Freshdesk* helps in monitoring messages on Facebook and twitters and provide online forum to encourage student discussion and collaboration. *Gmelius* is having shared draft features and allows discussion on email messages using quick notes. *Deskero* offers live chat features and helps in proactive interaction with end users. *Solarwinds web helpdesk* offer round the clock assistance on any complaints and requests with SMS alerts.

## V. NETWORK SECURITY SOFTWARE TOOLS

Software security techniques are applied during software development. It helps in protecting software applications against malware and ransom ware attacks. Network security tools [6] provide network performance troubleshoot issues and ensure smooth operation. A *firewall* is software that helps in protecting the computer from unauthorized access. *Nexpose* is network security software that provides real time information about vulnerabilities and reduces the threats in a network. *Wireshark* is an open-source network protocol analyzer that helps organizations in capturing real time data and track, manage and analyze network traffic. *Metasploit* is security software that contains various tools for executing penetrating testing services, improving the computer system security, cyber defense strategies and maintaining complete security assessments. *Nessus professional* can detect software bugs and general security problems in software applications, IT devices and operating systems. *Tor* is a network security tools that ensures the privacy of user while using the internet. *Nagios* help to monitor IT infrastructure components, including system matrices, network protocols, application services, server and network infrastructure. *Force point* restricts users from accessing specific content and provides tracking of any suspicious behavior.

## VI. ANTIVIRUS SOFTWARE TOOLS

Antivirus software is a computer program used to detects, prevents, identifies and eliminates computer viruses and other malicious software's. Some of the antivirus software are *Norton 360 with LifeLock*, *McAfee Antivirus Plus*, *Quick Heal*, *Kaspersky Antivirus*, *Bitdefender Antivirus Plus*, *Last pass* etc. *Last Pass* offers protection against several types of malwares, viruses, spyware, phishing etc. *Bitdefender* antivirus software operates on AI and machine learning technology to detect and stop potential threats in real time. *Quickheal* offers the security against the latest viruses and cyber threats.

## VII. DATA STORAGE AND MANAGEMENT TOOLS

Microsoft teams/one drive, drop box, Google drive are commonly used to manage data storage and the flow of files. Data recovery tools are needed in the event of cyber-attack or accidental loss of data, having a recent data backup is crucial. Examples include *Tableau*, *PowerBI*, *QlikView* and *Google Analytics*. Data base management tools are used to design, develop and manage databases. They assist in data modeling, querying and performance optimization. Cloud computing platform provide infrastructure, storage and computing resources over the internet. Example includes Amazon Web Services (AWS), Microsoft Azure, Google Cloud Platform (GCP) and IBM Cloud.

## VIII. LEARNING MANAGEMENT SYSTEM

Learning Management system (LMS) is a software application where teachers and professional can upload and organize course materials for student access. The LMS includes *Moodle*, *Blackboard learn*, *Google classroom*, *Paradiso*, *Open EDX*, *Chamilo*, *Sakai*, *Absorb*, *Pro Profs*, *Eduwave* etc. *Canvas LMS* is a fully SaaS learning environment that allow teacher to identify students who may need support, monitor student performance, predict how student will respond to the exercises assess the effectiveness of their teaching strategies and make a quick overview of student's achievement in the course. *Google classroom* is education software that facilitates teachers to create and manage lessons quickly, provide timely feedback, and communicate with their students. *Google classroom* can be used with phone, tablet and laptop. *Moodle* is an open-source education platform, a course management system with hundreds of millions of users around the globe. *Top Hat* allows teachers to take attendance, present slides, create live discussions. Teacher can build and deliver formative assessments to evaluate ongoing student progress.

## IX. LIBRARY MANAGEMENT SOFTWARE TOOLS

The library management software tools automate the task of the librarian by allowing better management of the library resources such as acquisition, cataloguing, circulation, serial management and information services [7].

CodeAchi is library application software that offers a powerful search engine for librarian and users using categories and tags to streamline the issue and return process. *Libero* is digital library software that is used in public libraries, academic libraries and corporate library. *Mandarin M5* is web library management software allows librarian to search for any materials using any languages including Chinese, Arabic and Hebrew. *LIBSYS* is library management software that has outstanding features like acquisition, cataloguing, circulation, serials, OPAC, web OPAC and article indexing. *Koha* software provide an integrated library management tool, covering all major function of library, such as acquisitions, bibliographic database management, user management, transactions, serial control, online end user searching on local and external bibliographic databases. *Smartlib* is cloud-based library management software that provides systematic methods of managing and accessing the entire task of a library within a few clicks and keeps a record of all the editions, copies of books that are rented or returned. *Libraryworld* is a web-based library management system that online, emails and 1-800 number support. *Alexandria* offers OPAC, periodicals, Management, fee collection and serial management. *Kooba* is web based multiuser library management software simplify the administration circulation and acquisition of Books. *Eloquent* is an online library management system offers serial management, barcoding, inventory management, periodical managements, fee collection at one place.

Digital library management software helps to manage libraries digital resources such as e-books, e-Journals and digital archives. *Green stone* digital library software offers an innovative way of organizing and sharing large collection of digital documents over the internet-*print* is free software that collects preserves and disseminates research output in digital format allowing researchers to deposit their preprint, post prints and other scholarly publications using web interface and organizing these publications for easy retrieval[8].

## X. SCHOLARSHIP MANAGEMENT SOFTWARE

Scholarship management software manages scholarship programs. Digitizing scholarship applications with user-friendly software can make the process simpler and more accessible for both students and reviewers. E-mail notification and personalized applicant portals keep applicants informed about the status of their applications. *Awardspring* is a powerful, intuitive and smart scholarship management platform for all type of institutions. *SmarterSelect* provides a comprehensive yet easy to use online application management solution for scholarship. *Submit.com* is web-based software that streamlines the collection, management and evaluation of any online submissions. It is ideal for government grant, scholarship and award management. *ScholarUnited* provides online scholarship management solutions for universities to manage their scholarship applications. *Submittable* enables to quickly collect and compile grant and scholarship applications. *Open water* is a cloud-based application that automates the award, grant or fellowship program for students to use, making the scholarship application process convenient. *Jotform* provides an efficient way to collect data that inform scholarship candidate review process.

## XI. ASSESSMENT AND EXAMINATION SOFTWARE TOOLS

Examonline is an AI based remote proctoring software which is extremely versatile and allows us to conduct cheating free exams. *MercerMettl* proctoring allows conducting credible online exams globally. *Workable* is recruiting and applicant tracking software that analyses the resumes to find out the most suitable candidate. *EasyLMS* is well-developed online examination software supportive on all devices. *Conduct Exam* is online examination software for creating the online exam and online test. *UbiAptitude* is online testing software used to find best applicant in no time and reduces bad hiring up to a great extent. *Eklavya* is an online assessment software help to prepare environment and process to conduct assessment of the candidate undergoing vocational training. *E-skill* is online exam assessment software that help organization to hire, train and retain top candidates.

## XII. PLAGIARISM SOFTWARE TOOLS

Different software is used for diagnostic innovative checking of plagiarism like *Turnitin*, *Urkund*, *iThenticate*, *Drill Bit*, *Copyscape*, *Docos*, *Duplichecker*, *PlagScan*, *Unicheck*, and *Viper* etc. Plagiarism system checks all documents against three central source areas such as the internet, published materials such as Journals, books etc, and previously submitted students' materials (e.g. Memoranda case studies and examination works). Plagiarism detection software enhances quality and prevents plagiarism in research / academic publications [9].

## XIII. LANGUAGE LEARNING SOFTWARE

Language learning software is designed to help users to learn, increase their knowledge of foreign language skills for career advancement or personal satisfaction. Language learning software includes *Speexx*, *Duolingo*, *Rosetta Stone*, etc. *Speexx* supports in 13 languages and offer digital language skill training. *Duolingo* uses gamification to make language learning more entertaining. *Rosetta stone* language learning software offers innovative technology driven language, literacy and brain fitness solutions.

## XIV. INTERACTIVE E-LEARNING SOFTWARE

H5P is an innovative technology platform that helps user easily create and share interactive contents such as quizzes, presentation, videos etc. *Randerforest* offers users the best online tools to create high quality videos, graphic designs, logo, mockups and websites with minimal time and effort. *Canva* allows users to create social media graphics, presentations, posters, documents and other visual content. User can choose from many professional design templates, and edit the designs and upload their own photos through a drag and drop interface.



## XV. VIDEO CONFERENCING AND COLLABORATIVE TOOLS

Video conferencing [10][17] and collaborative tools facilitate communication and collaboration among team members, even in remote environments.

Google meet, Microsoft teams and zoom are examples of collaborative tools that offers live video communications. This platform provides the facilities that include chat, call and collaborative services. Zoom offer video and audio conferencing, collaboration, chat and webinar platform. Cisco Webex provides the facilities to draft virtual lesson plans, schedule class sessions and meet with students.

## XVI. PRESENTATION SOFTWARE TOOLS

Presentation software tools [11] are used to display information in a slideshow formats. Microsoft PowerPoint is the most widely used presentation software that offers dozens of slide template. ZohoShow is a cloud-based program having customizable tools like background settings, text formatting, animations, transitions, embedding tweets and image editing. Venngage as a presentation software is the extensive library of infographic elements having drag and drop interface which allows us to customize our presentations. Google Slides enables real time collaboration and easy access from any device having internet connection enabling real time editing and having auto saving features. Prezi is cloud-based tool that include interactive elements, such as embedded videos, images and hyperlink to create interactive presentation offering multiple users to collaborate on a presentation in real time. Canva offer user friendly interface, extensive template options, intuitive drag and drop interface, ability to share presentation is a popular, simple online graphic design tool and can import images, use templates to design banners and logo. Visme is a web-based tool that creates presentation reports, infographics and even webpages. Pikto Chart is presentation software that can create a variety of design visuals from infographics to social media stories. Piktochart is a web-based tool that allows users to create visual content such as presentation, infographic etc. Emage is an online presentation tool that enables us to create impressive presentation with its wide range of templates. 3D effects and video backgrounds. Emage features 3D templates, autosave support and having HTML capabilities. Graphic design software like Adobe Photoshop, Clip Studio, Adobe illustrator allows editing digital images or videos.

## XVII. ALUMNI MANAGEMENT SOFTWARE

The Alumni management system builds an interaction between alumni, admin and students and able to manage alumni data of a college and provide easy access to the same [12][18]. The Alumni Management and networking provides a platform for institute to create profile, connect with fellow alumni and offers opportunities for alumni to contribute to the institution's success through membership, volunteering and other form of support [13]. Alumni management software enables institutions to stay in contact with their alumni through communication tools that are very helpful in preserving alumni relations and generating new opportunities for them. Vaave offers huge range of options to maintain a successful connection with alumni and to keep track of things

with proper database construction and maintenance characteristics. Vaave can be used to run leadership and mentoring programs that will help alumni to grow and access many opportunities. Almalbase makes use of a vast alumni network to generate funds. Graduway is best alumni management software having multiple AI integrated features, it incorporates for community building, fund raising etc. Alumnforce is an alumni management system that offers end to end solution like career boosting opportunities, virtual job fairs and algorithm based mentoring programs. It helps alumni stay connected to their alma mater and offers effective reach to organization and institutions. Forthambit is cloud-based tools that are quite helpful for managing campaigns like job fairs and fund-raising events.

## XVIII. ACCREDITATION MANAGEMENT SOFTWARE

Accreditation management software is designed to streamline the accreditation process. It allows managing workflow, tracking process, checking compliance against standard, adding comments, finding issues and sending automated alerts [14]. It gathers the documentation essential to achieve and maintain appropriate accreditation status. Jura is accreditation management software that provides end to end solutions designed for webapp and offers reviewer portals, user access permission, and work flow management at one place. WizeHire is grant management software that manages the entire grant process from a single platform. Qualtrax provides end to end solutions designed for windows and offers workflow management, document management and requirement management. JetPack is online accreditation management software that offers collaboration, compliance management, document management, requirement management, user access permission and workflow management etc. and automates the accreditation process for document generation, management and report submission. P4DT software tools continuously evaluate an institute with accreditation and seamlessly integrate college, students, faculty and parents. CLOBAS is designed to help educational institution to accelerate growth and enhance their operational efficiency. SPOL offers workflow management, road mapping, scorecards, document managements, user access permission. Campus labs provides end to end solutions designed for webapp and offers higher education, mobile app, communication tools, event calendar and location tracking. Weave is cloud-based accreditation and assessment software offering assessment, faculty credential, management, strategic planning, program review and unlimited customizable templates. Armature software offers organization and people management, process management and assessment set up, allows managing the complex accreditation process in easy way. Armature software is highly configurable and can create new questions and forms, set user roles and assign permissions, build report templates, update and manage standard. Safety culture allows storing all accreditation documents need in one place.

The tool is used to automate processes, track documents and streamline the entire accreditation process by gathering relevant data and generates reports that are necessary for accreditation.

## XIX. ACCOUNTING SOFTWARE

Accounting software is designed to manage and streamline the financial activities of the institution. It offers automation of account payable and receivable, general ledger, budgeting, purchasing and payroll. It helps in bank reconciliation and creating online invoices. *Ellucian Banner finance* enables higher education institution to access and manage financial information, automate all financial transaction, monitor budget and grant related activities. *Zoho books* is well designed user friendly online accounting software that allow to manage multiple accounting and financial processes such as accounts payable and receivable, time tracking, payroll, transaction management, inventory control and banking. *Xero* is online accounting software that updates finances and cash flow in real time and provides unlimited user logins. *AccountEdge* is accounting software that has features of invoicing, payroll, inventory, accounting and banking etc. *Quick books* are online accounting software that simplifies accounting and keep track of income and expenditure and help in preparation of taxes.

## XX. CONCLUSION

As we are becoming more reliant on software, it becomes more important that software systems are safe and secure. The inclusion of tools and software among various choices should be the best for our specific requirement. It is necessary that before inclusion of software and tools for specific task, their characteristics and their impact on the final result and its understanding during various circumstances is essential.

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**Chandan Shrivastava** is B.Tech final student of computer science engineering department at International Institute of Information Technology (IIIT), Hyderabad interested in software development and technology. He has experience of various software development and application development intern at different organisations. He possesses skills of C, C++, Python, SQL, JavaScript, Dart, HTML/CSS, GraphQL languages along with expertise in React JS, React native, Node JS, Express JS, Flutter, Redux frameworks. He is using developer tools like Git, Docker, Bash, Firebase etc. His journey in technology has been a dynamic blend of learning, innovation and impactful projects. He has successfully completed various projects assigned to him individually and in group. He published three research papers in reputed Journals. He got 'Technology Innovation Award-2022' at 22<sup>nd</sup> Global Leadership Summit-2022 at Goa (India) by Global Leaders Foundation, New Delhi.

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