

The Evolution of Technological-Enabled Governance Practices in Indian Educational Institutions: A Review Study

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ABSTRACT

Institutions have their specific norms, values and practices that clearly visible in the behavior of institutional actors including administrators, faculty, staff, students, and all related stakeholders. The governance structure of the institution depends on its nature and essential in shaping the culture of institution. The conventional methods of institutional governance are often time consuming, offer limited accessibility to academic resources and lack of transparency in administrative processes, and to address these challenges, technology and AI driven practices are being implemented to transform Institutional governance. For this study, the researcher conducted meta-analysis review method and used purposive sampling technique to identify the relevant document. A total 20 documents are included for this study as 18 research papers from reliable international database such as Scopus as well as some Indian refereed journal publications and 2 policy documents. The study encompassed recommendations on technology integration in education and digital initiatives aimed at improving the accessibility and affordability of the educational resources. It also shed a light on the role of technology implementation in the governance of Indian higher education and concludes that technology and AI driven practices enhance accessible, affordable, and foster a more personalized and interactive learning environment. These practices also improve accountability in administrative task, and enable predictive analytics using large volume of student data. There are several government and institutional initiative have been launched to strengthen governance of institution in resource access at national level as, certificate courses, administration of higher education institution, providing assignment and taking assessments and more. This study explored Samarth e-Gov portal services for higher education institutions, that facilitate students' academic support, employee support and human resource management, financial services, and administrative decisions.

Keywords: Educational technology, E-governance, Predictive analysis, Samarth e-Gov

INTRODUCTION

An institution establishes as an organization in which all the individuals work together to enhance its progress. The institutional environment can be positive or negative on the basis of their factors that influence the facilities and services of the institution. Institutions are shaped by multiple institutional factors, such as information and Communication accessibility, employee and student engagement and support, resources availability, and peer interaction and collaboration. All these facilities are implicitly or explicitly related with the governance structure of the institution (Figure 1)(Luo, et al., 3). When these factors work in support of each other, they create an opportunity to establish a more constructive environment for

stakeholder growth and development. Governance of educational institution is the set of formal and informal arrangements, institutions rules and practices through which public and private actors define education policy, allocate resources, set accountability mechanisms, and manage education systems to raise performance and equity (Kamala and Kamalakar, 162). A supportive institutional environment enhances job satisfaction and cultivates a positive research culture, that attract new talent, lowering operational costs, and improves student enrolment. A negative institutional environment decreases the work motivation and overall job satisfaction, which affects the quality of academic and non-academic workforce, early career researchers and students. Governance of an institution encompasses the decision-making process for teaching and learning as well as administrative works, it enhances institutional performance through effective decisions, along with transparency and accountability measures within the institution (Kamala & Kamalakar, 160; Arora & Kaur, 186). National Education Policy (NEP) 2020 recommends the establishment of Board of Governance (BoG) in appropriate grade received higher education institutions to providing autonomy to make all decision about governance by 2035 (NEP-2020, 49).



Fig 1: Core Operational Factors of Governance

The technology consistently evolving, and no field has remained untouched by this; therefore, educational technology is also being used in the field of educational governance. In India, various technologies like radio, television, and computer technology have been used at various levels of education from a long time. In wake of this progress, Indian educational institutions have also used this technology with the objective of providing education to all in meaningful, accessible, equitable, and affordable for all. Technology driven practices are also used in educational governance, which is more transparent, accountable, effective, and inclusive in nature (Chhangani & Hussain, 392; Ajuwon, et al., 117). The technology integration in institutional governance has been recommended by all major education policies including the Kothari Commission (1964-66) emphasized educational planning, and centralized coordination, advocate institutional management through scientific approaches like quantitative data collection and evaluation, that later become the seeds of digital governance. The National policy on Education (NPE)-1986 recommended for initiative of digitalisation in form of computer education and ICT use in learning and management. The National Education Policy (NEP) 2020 also recommends the establishment of National

Education Technology Forum (NETF) for data driven decision making, such as development of digital infrastructure and digital content creation, online and blended learning, analytics for educational planning and governance, and nourish School Management Information Systems (SMIS) for transparency and accountability of the institution (NEP-2020). Educational e-governance comprises the technical platforms and digital procedures through which policymakers and institutional actors implement, monitor, and hold education systems accountable (Kumar, 107).

RATIONALE OF THE STUDY

India has one of the largest populations in the world, and a huge number no of population, approximately 65% of the citizens are lived in rural and remote areas of the country. Education is imperative for national growth and development and is a fundamental right of all citizens to get education, therefore, it is very essential to ensure the accessibility of education to all (Bharaty& Kumar, 51). The Gross Enrolment Ratio in Indian higher education is only 28.4% (AISHE, 2021–22), with a goal to reach 50% by 2035. Consequently, it is necessary to extend educational access to all regions of the country, including rural and underserved populations. Integrating technology into institutional governance is a necessary means to facilitate education at national level. Therefore, it is imperative to provide higher education facilities and services in digital or electronic mode to integrate students from remote areas. E-governance services in higher education facilitate the learners at all stages including admissions, the learning process, assessment, degree allotment, appointments, feedback and more (Aggarwal, 65). This paper sheds light on the integration of technology in e-governance and its impact on fostering educational facilities, and explores the initiative portals and websites that promote accessibility, transparency, and accountability in education. The paper examines the Samarth portal initiative for facilitating the institutional administration and services at one door step, and give future direction for additional improvement to reshaping the e-governance of higher education institutions.

RESEARCH QUESTIONS

- **RQ1:** How AI technology driven practices transform institutional governance?
- **RQ2:** What kind services provided by Samarth e-Gov portal in Indian higher education institutions?

RESEARCH OBJECTIVES

- **RO1:** To examine how AI technological implementation transforms institutional governance.
- **RO2:** To explore the e-Samarth portal platform services in Indian higher education institutions.

RESEARCH METHODOLOGY

Research Design and Sample

Qualitative approach was adapted by the researcher, meta-analysis review method has employed for the study, non-probability sampling technique was used for document selection. Only from year 2015 to 2025 published documents are included for the study through purposive sampling method.

Search Strategy

Search the articles from authentic international databases such as Scopus and for Indian context research some Indian publishers' articles, and policy documents are included for the study by search title as; Educational e-governance, ICT integrations in higher education institutions. These terms are relevant to this study and researcher include these pre-existing documents to give an insight for this study.

Documents Included for study

A total 345 documents were identified in Scopus database; a number of 265 documents were screened between year 2015 to 2025. The inclusion and exclusion criteria have mentioned in Table 1, as this study includes only English language open access article, conference papers, and book chapters type 81 documents through automated inclusion and exclusion criteria. After the automated inclusion and exclusion documents under go for manual exclusion process through careful reading of all the documents titles and abstracts. After rigorous reading only those documents relevant to educational e-governance were retrieve for the study while those not related to these were excluded. Thus, 10 studies were obtained from the Scopus database for this study. The policy documents and other publications of interest to this study were also included based on a process of manual inclusion and exclusion according to the research objectives. For final study, a total of 20 documents were included, comprising Scopus database indexed documents, non-indexed published document and policy documents.

Table 1: Inclusion and Exclusion Criteria

Inclusion Criteria	Exclusion Criteria
From 2015-2025	Before 2015
Only English language Articles, Book chapters, conference proceedings	Other than English language documents
Only open access documents	Other than open access documents
Educational e-governance, ICT integrations in higher education institutions terms having in title, abstract, and keywords	Other than these terms in title, abstract, and keywords

FINDINGS

There are 20 documents that was reviewed for this study, that very much emphasises on the integration of various technologies in institutional governance for ease of teaching, learning and administrative work of the institutions. The student and faculty ratio in Indian institutions are high; technologies play a significant role in dissolving this difference and enhancing educators' satisfaction and reduce administrative burnout. The summery of the reviewed studies are comprises in Table 2.

Table 2: Summary of Reviewed Articles

S.N.	Citations	Title of the Research	Summary of the Study
1	Chadha, 2024	Transforming Higher Education for the digital age: Examining Emerging Technologies and Pedagogical Innovations	This study relied on Knewton and Stanford's AI program on investigating how AI, AR, VR, and blockchain can revolutionize higher education based on a critical examination of case study.
2	Joshuakumar and Anburaj, 2024	A Comparison between Conventional and Digital Education	The study analyses the imbalance in digital resources availability and its impact on educational inclusivity and efficiency in underprivileged regions.
3	Lavanya, 2024	Governance Models in Higher Education: Comparative Analysis Under the New Education Policy in India	A comparative analysis of traditional and contemporary governance structure as centralize, decentralized, network, and corporate, and their alignment with the objectives of India's New Education Policy (NEP) 2020
4	Ajuwon et al., 2024	Integrating AI and technology in educational administration: Improving efficiency and educational quality	This research explores how AI takes care of routine tasks such as grading, attendance tracking, and managing student records, giving educators more time to focus on strategic work that makes a real difference.
5	Banu, 2023	The Impact of Technology Integration in Educational Management and Administration	This study explored how digital tools transform traditional administrative practices into efficient models for the 21 st century. It also shed light on the challenges including infrastructure limitations, high training needs for staff, and significant data security concerns.
6	Kumar, 2023	Role of Electronic Governance in Educational System: A Study	This study explores transformation of teaching, learning and assessment through ICT integration and It highlights the shift toward digital educational governance and evaluates the impact of specific initiatives, such as smart classes and broadcast tools like Gyan Darshan and Shiksha Vani on improving student confidence and learning outcomes.

7	Bharaty and Kumar, 2023	E-Governance in Education: Development, Challenges and future directions	This study delves into the evolutionary process of e-governance in education both at national and international levels. It particularly looks at socio-economic constraints like the digital gap, digital literacy, and unavailability of teaching infrastructures and come up with future trends of ensuring more accessibility and citizen-based approaches in administrative of educational services.
8	Chhangani and Hussain, 2023	Digital Transformation pf Higher Education: Leveraging e-Governance in India	This paper discusses the e-governance revolution to the higher education of India, which has overcome the inefficiencies arising in current services that are characterized by bureaucracies and manual procedures associated with higher education management by making the admissions, records, and digitalization of education.
9	Dutta, 2023	Open Educational Resource (OER) for Lifelong Learning: Digital Initiatives of India	The study targets the area of digital projects aimed at making Open Educational Resources (OER) popular in India during the past decades. It provides information about how web-based platforms such as SWAYAM, NPTEL, and virtual labs enable moderate and non-premier universities to bridge the knowledge gap between the top and the lower ranked universities; it provides free and high-quality content to student and educators in the field of science, technology and humanities.
10	Lai, 2022	How does technology embed and empower education governance? Analysis based on governance long period theory	This study analyses uses the long period theory of governance and SCP model to track how technology transforms educational governance from the agricultural age to the current age of intelligence.
11	Aggarwal, 2022	A Study of the Concept of E-Governance and its Impact on the Higher Education System in India	The paper addresses the prevalent situation and extent of e-governance in higher education in India and the constraints of the study and ways that e-governance could be better adopted by use of information and communication technology to promote transparency and efficiency.
12	Singh, 2022	Effective E-Governance and its' Impact in Higher Education Sector	This paper involves providing a roadmap on how to execute e-governance in enhancing the quality of educations and cantered on integrated solutions in handling huge amounts of data such as registration, library management, and examinations.
13	Padhi and Yadav, 2021	Information and Communication Technology in Higher Education in India: An Overview	This study highlights the historical interventions and the role of ICT as a paradigm shift in strengthening education extension and bridging accessibility gaps, particularly highlighted during the COVID-19 crisis.
14	Som, 2021	ICT In Education: Opportunities and Challenges	It reviews such government efforts as SWAYAM, MOOC, e-Pathshala and finds substantial difficulties in implementation, such as poor teacher awareness and institutional infrastructure.

15	Sharma et al., 2020	Artificial Intelligence and Effective Governance: A Review, Critique and Research Agenda	The study reviewed 74 papers from worldwide databases to see how AI being used across different sectors like healthcare, Transportation, and policymaking.
16	Chopra, 2020	E-governance in Higher Education Institutions in India: Status and Prospects	This paper compare the ICT use in the private and public universities and examines the challenges they are experiencing in their attempt to adopt the technology.
17	Javid and Chinnathurai, 2018	Role of E-Governance in Transforming Education System in India	This study discusses the use of ICT for government to citizen services and the necessity of real time monitoring to maintain quality. It highlighted that many systems are not yet updated or effective enough to face the challenges of a globally competitive environment or electronic governance.
18	Arora and Kaur	E-Governance in Higher Education	This paper addresses the concept and practice of e-governance in the field of higher education in India with special focus on how it has facilitated transparency, efficiency of administrative system and real time decision making. It describes several implementation models such as the public-private partnership and mentions such advantages as central information access and decrease paperwork.

DISCUSSION

After careful review of included documents, the findings of the study compresence the benefits and utility of various digital technologies that facilitated the administration and management of educational institutions. These technologies align globally and create opportunity to accelerate effective teaching and learning processes and make accessible and affordable education inclusively. The integration of various technologies in educational governance has transform and ushered the traditional approaches into more interactive, adaptive, learner cantered, and data powered system.

Role of Technologies in Streamlining Educational E-Governance

Through the integration of advanced technology and artificial intelligence, institutions have produced cooperative learning experiences, facilitate data-driven decision-making, collaboration of institutions, effective learning outcome, grading, administrative work, student record management, predictive analytics, and more (Chhangani& Hussain, 392; Ajuwon, et al., 118). Most of the studies are advocating the use of AI, Augmented Reality (AR), Virtual Reality (VR), blockchain, and information and communication technology have fundamentally reoriented the trajectory of higher education governance, pedagogy, and administration. As technology provides an adaptive learning environment that facilitates personalized learning at the pace of individual learners, and enhance effective collaboration for better understanding of the concept. Artificial Intelligence technique like machine

learning is applied to develop effective strategies for collaborative problem-solving; their algorithms can detect when learners struggle to understand a particular concept and provide support at right time and in appropriate manner (Luckin, et al., 14). Using technology in education can be defined through the Learning Management System (LMS) in form of learning delivery platform, where administrators design, manage, and deliver courses with varied materials, assignments, assessments, and grades, while also coordinating and providing online education as well as distance education (Banu, 3). The implementation of e-governance technologies in institutions of higher learning in India has transformed the institutional data management and student success capacity of the institutions. The sophisticated systems allow universities to utilize massive data repositories and use predictive analytics for critical functions including enrollment management, student retention, prospective outcome forecasting, and strategic resource adjustment. A number of prominent Indian universities have become early proponents of these transformative technologies that demonstrating their practical applications and benefits. Rajiv Gandhi Proudyogika Vishvidyalaya (RGPV) is an impressive case of a successful implementation as the organization has installed Salesforce-based predictive analytics infrastructure to improve student performance. The system used in the university consists of advanced algorithms to recognize students at risk by analysing data streams, such as attendance patterns, academic performance markers, and learning management system activity indicators (Raghuvanshi, 3048). This proactive approach enables timely interventions through personalized learning recommendations tailored to individual student needs and learning trajectories. The comprehensive monitoring system helps to follow the student development across various dimensions, which forms a holistic view of academic activities and achievements (Oppong, 129). In addition to RGPV, there are other high-end institutions such as the Indian Institutes of Technology (through pilot initiatives) and Amity University, Manipal Academy of Higher Education, and SRM Institute of Science and Technology who have adopted predictive analytics too. These applications are a part of a larger trend in Indian higher education to become data-driven and student-focused in their decision-making and support models. The adoption of such technologies solves numerous problems of higher education system in Indian, including, high dropout rates, insufficient personalized attention, and resource utilization in constantly growing student audiences (Raghuvanshi, 3047). These e-governance system show more performance in institutional planning and policy formulation other than individual student support. Universities can now forecast enrolment trends with greater accuracy, identify patterns in student retention, and allocate resources more efficiently based on predictive insights rather than historical precedent alone (Gopalakrishnan, 13). This is a radical change in the concept of Indian higher education students' success and institutional sustainability.

Integration of ICT in Teaching and Learning Processes

The National Mission on Education through ICT is an initiative taken by the central government of India under Ministry of Human Resource Development and approved by Cabinet Committee on Economic Affairs (CCEA), it encompasses a variety of initiative to create and standardise Indian Higher Education e-contents with envisions of addressing 500

million learners' requirements at national level (Kumar, 107). The envisioned role of NMEICT initiative to transform the Indian higher education into digital empowered, and learner centered ecosystem that able to give academic facilities according to the learner needs. This umbrella initiative consisted some other initiatives including SWAYAM, SWAYAM PRABHA, NDL, e-PGPathshala, e-Samarth, e-Yantra, FOSSE, Spoken, Tutorials, and virtual Labs and more, developed for the actors of educational institutions. These initiatives are focuses on three major key factors as access, equity, and quality, of education and facilitate the actors of the institutions (Bharaty and Kumar, 51). Government started radio and TV channel in form of Gyan Darshan and Shiksha Vani to extend the accessibility of the education to the remote and unserved population. Singh (2022), stressed on this initiative and found that the reach of these initiatives is very impressive that started with a single channel 1962 extended in 2005 with 120 channels that currently telecast 200 educational channels under eVidhya initiative for school education through DD free Dish and SWAYAM Prabha DTH channel for higher education. Som (2021) found that the lack of awareness and inadequate infrastructure is major challenge in the path of accessibility of government OER initiatives like SWAYAM, MOOCs, and E-PGPathshala and more. These challenges relate with Selwyn's (2017), general findings that the need of teachers, implying the technology in their pedagogy for this the readiness and the motivation of the teachers toward integration of technology if imperative, only infrastructural investment is not alone sufficient without professional development of the faculty and the cultural change of the institutions.

Transformation of Governance Models through Technology adaptation

Lavanya (2024), found that the traditional centralised model of governance transformed into decentralisation and it is possible through the digital integration after NEP 2020 recommendations. These models are aligned with new education policy that ambitious for institutional autonomy, multidisciplinary, and technology enabled flexibility. Lai (2022), also added the development of this area through his application of the long-period theory of governance and the Structure-Conduct-Performance (SCP) model to map the evolution of educational governance through technological revolutions from the agricultural era to the present intelligence era. This longitudinal theoretical perspective reveals the current digital transformation is not a breakthrough but the latest phase in an ongoing evolution of educational governance, during which the institutional conduct and the institutional performance are progressively shaped by the technological endowments and the regulatory settings. This view avoids both the inclination towards current digital innovations as novel and the risk of underestimating institutional path dependencies in technology uptake.

Samarth e-Gov Portal Services for Educational Institutions

The Samarth is an initiative that pioneer change in the digitalization of higher education in India, as it is an e-governance model that has been developed by the Ministry of Education in 2019, under NMEICT-II, to modernize institutional activities of the universities and colleges in India. This is an integrated system that was initiated as part of the Digital India campaign because this system deals with the disjointed nature of educational administration by offering an integrated digital backbone that links students and faculty, administrators and regulatory bodies in one ecosystem (Ministry of Education, par. 6). The platform is a reflection of the

vision of providing technology-enhanced, efficient, and transparent education governance in accordance with the National Education Policy 2020 goals. The Samarth e-Gov portal is a University Information Management System project that created by the Institute of Information and Communication at University of Delhi with collaboration of Ministry of Education. It has nine packages including more than forty modules which are integrated to the entire student lifecycle and authentic institutional management (About Samarth, par. 5). Some of the core services are online admission management featuring automated seat assignment, full examination and assessment systems, digital generation of transcripts, and tracking student progress. The platform also enables academic planning via timetable management, course-registration, credit transfer and mechanisms that aid the transfer of students between institutions.

The faculty management modules allow them to manage recruitment processes, performance appraisal, distribution of workloads, and monitoring of professional development, whereas financial management components allow the management to collect fees, approval and disapproval of scholarships, handle grants, and make budgetary decisions. In addition to being efficient in its operations, e-Samarth focuses on stakeholder involvement and remedy of grievances. It has special channels that students can use to complain, give feedback and track the resolution status thus holding all involved accountable and responsive (Samarth e-Gov). The platform will have library management systems that allow sharing of resources among institutions, cataloguing of resources digitally, and also allow access to educational materials remotely. The analytics dashboard of the portal fully produces real-time data regarding the enrolment status, student performance, attendance, and use of resources, providing institutions with knowledge-based planning. Introduction of e-Samarth has brought a lot of benefits such as administrative costs have been cut, paperwork has been reduced, accuracy of data has been improved, and provision of better service delivery periods. The standard processes provide conformity to the regulation of University Grant Commissions and allow easy interaction with regulatory bodies (Chopra, 125). The interoperability capabilities of the platform allow the Academic Bank of Credits functionality with support of the multiple entry-exit mechanisms as envisaged by NEP 2020. Nevertheless, despite the digital literacy issues, infrastructural preparation, and the change management process, the involved institutions boast of significant quality enhancements in the operational transparency, stakeholder satisfaction, and the quality of institutional governance. The Samarth e-Gov portal is an example of how strategic application of e-governance can radically change the administration (Figure 2) of higher education in India. University of Delhi covers more than millions of students and employs through two separate portals including employee portal: du.samarth.ac.in and student portal: slc.uod.ac.in. Additionally, the Uttara Pradesh government also take an initiative to implement the Samarth e-Gov portal across all universities and colleges for more transparent administration process by 2025-26 academic session. More than 200+ universities and higher education institutions are already registered on this portal for facilitating robust, secure, open and automated institutional governance.

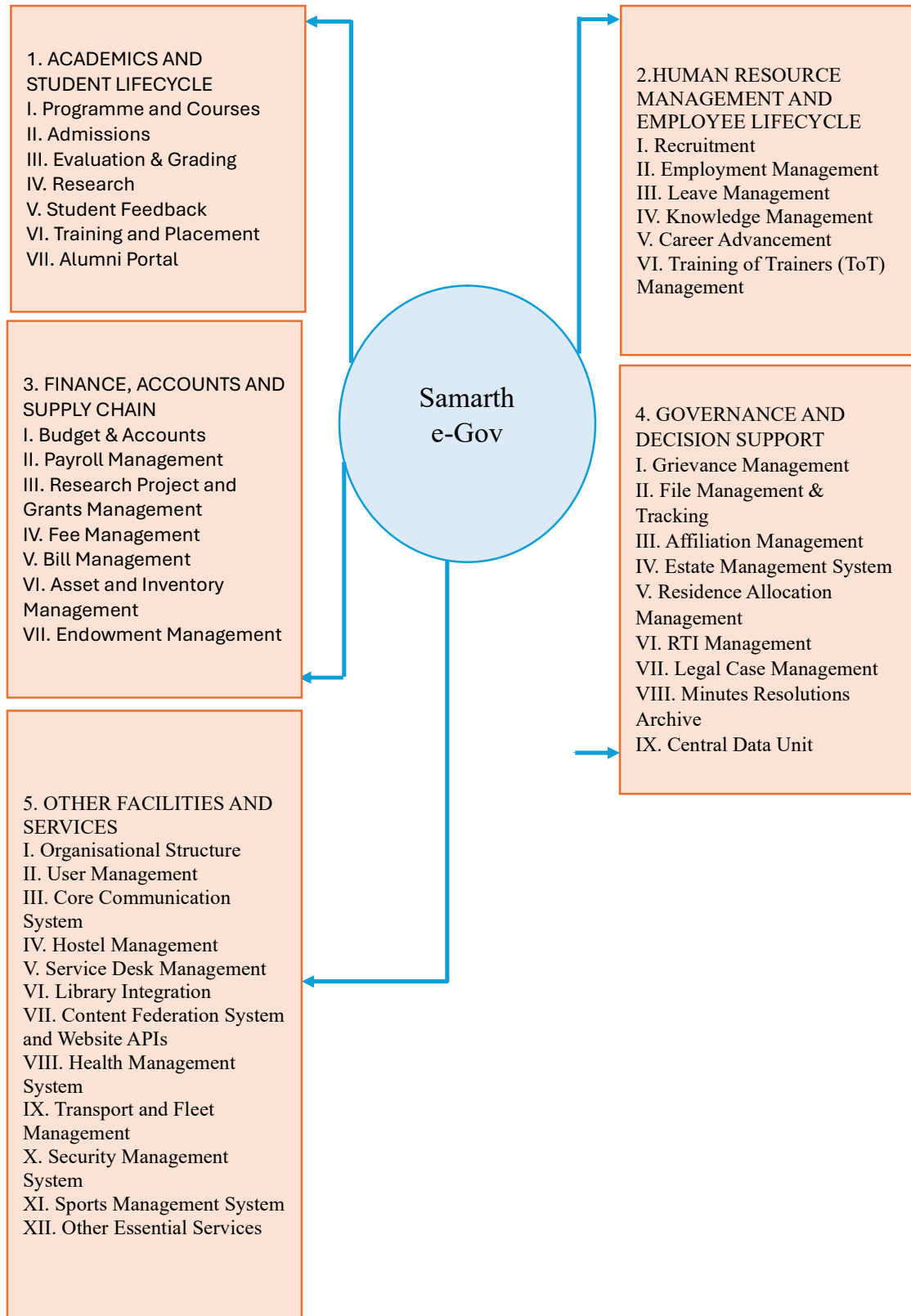


Fig 2: Samarth e-Gov services

EDUCATIONAL IMPLICATIONS

After review of the studies this study found, despite of profound transformation of higher education through digitalization, there is gap clearly visible across the country. The digital potential identified in the studies from the AI- automation and OERs, e-governance, transparency and smart classroom practices in both real and simulation. But this potential is systematically constrained by infrastructure inequity, digital literacy gap, institutional resistance and governance fragmentation that extremely affect public institutions. In the case of India, the NEP (2020), recommended a historically significant policy framework for aligning digital investment in terms of equity and quality in education (Lavanya, 2024; Ministry of Education, 2020). However, this study suggested that policy vision needs commensurate implementation mechanism including sustained funding, inter-institutional coordination, faculty training, and rigorous monitoring for effective meaningful educational outcomes. Future research should be conducted as longitudinal mixed-methods studies in focus of sustained impact of specific digital initiatives on divers' learners, for their impact on equity, inclusion, and the pedagogical dimensions of digital transformations.

CONCLUSION

Technology-Driven practices in institutional governance make administration more effective, transparent and accessible for all actors of an institution. To develop 21st century skills and knowledge in learners, it is imperative to connect them globally, as e-governance facilities and services enhance the student's efficiency and insight for catering real world problems. Various institutions that gross enhanced the predictive analytics tools to smooth oversight of academic achievements, student engagement, and outcome of the institutions. E-governance facilities were incorporated in the e-Samarth portal with the institutional actors. This comprehensive platform offers module for academics and students support, human resource management and employee support, finance, accounts and supply chain, governance and decision support, and much more. Despite these advancement, there are many areas in the field of e-governance require further explore and research such as awareness of various initiatives and digital literacy for effective utilization of these platforms, the availability and accessibility of e-portals and e-resources in remote areas where many challenges may limit the digital connectivity and access, and impact of various initiative on learners' enrolment and quality parameter in a higher education, and data security and privacy to safeguard sensitive information of students, faculty, and administrative works.

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