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# Leveraging Internal Audit and Blockchain to Mitigate Academic Fraud and Enhance Institutional Sustainability: A General Strain Theory Perspective

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**ABSTRACT**

**Purpose:** With application of general strain theory, this study investigates how internal audit function and blockchain technology can be leveraged to ensure the sustainability of higher education institutions (HEIs) by combating faculty credential fraud. Faculty members with fake credentials pose a significant threat, jeopardizing the quality of education, eroding public trust, and hindering the institution's ability to attract qualified students and faculty.

**Methodology:** A comprehensive review of existing literature and reports related to faculty credential fraud, internal audit practices, and blockchain technology is conducted. The study considers the effectiveness of internal audit and blockchain solutions in addressing faculty credential fraud within the context of HEI sustainability. Study also provides practical solutions for the development and implementation of blockchain specifically related to HEIs and defines specific measures to be taken by internal audit function towards preventing such frauds.

**Findings:** The study reveals that faculty credential fraud poses a significant threat to the sustainability of HEIs. When faculty lack the qualifications they claim, it undermines the quality of education students receive. This can lead to a decline in student enrollment, reputational damage, and difficulty attracting qualified students and faculty, ultimately jeopardizing the institution's long-term viability. Internal audit plays a crucial role in identifying and preventing fraudulent credential use. Blockchain technology, on the other hand, offers a secure and transparent platform for verifying faculty credentials, combating document forgery, and ensuring the qualifications of teaching and research staff.

**Novelty:** This study offers a unique perspective by integrating internal audit and blockchain technology as a comprehensive solution to address faculty credential fraud. By implementing these tools, HEIs can significantly enhance faculty credential verification processes, improve data security, and uphold the trust and credibility of their academic staff.

**Practical Implications:** This research suggests practical measures for HEIs. These include adopting proactive measures like enhanced credential verification procedures, data analytics for identifying inconsistencies, employee education on ethical practices, and implementing blockchain-based credential verification systems. These measures collectively contribute to a more sustainable educational environment with qualified faculty delivering quality education.

**KEYWORDS:** faculty credential fraud, academic integrity, blockchain technology, internal audit, general strain theory, higher education sustainability

## 1. INTRODUCTION

Higher Education Institutions (HEIs) are integral components of society (Findler, Schönherr, Lozano, Reider, & Martinuzzi, 2019), shaping the intellectual and professional landscape and contributing significantly to societal progress. The impact of HEIs is far-reaching, influencing economic development, cultural enrichment, and knowledge dissemination. HEIs play a pivotal role in nurturing future leaders, innovators, and professionals (Aithal & Aithal, 2023), thereby driving innovation, economic growth, and social advancement.

The credibility and trust associated with HEIs can be jeopardized by fraudulent activities, particularly concerning fake credentials held by faculty members (Kirya, 2019). The repercussions of such fraud extend beyond mere financial losses. They can lead to the erosion of institutional reputation, damage the trust and confidence of stakeholders in the educational system. This erosion of trust not only affects the institution directly but also has broader implications for the quality of education and the societal perception of educational outcomes (Awalluddin, Nooriani, & Maznorbalia, 2022).

## Leveraging Internal Audit and Blockchain to Mitigate Academic Fraud and Enhance Institutional Sustainability: A General Strain Theory Perspective

Fraud is a breach of trust which is conducted by the individual to obtain personal benefits (Cross & Gillett, 2020). Fraud can further be defined as a deliberate deception conducted to secure an unfair or unlawful gain which poses a significant threat to all organizational sectors including the educational industry. This deceptive practice can occur in various forms, such as credential fraud, financial misappropriation, or research misconduct (Karpoff, 2021; Christensen Hughes & Eaton, Academic misconduct in higher education: Beyond student cheating, 2022; Reisig, Holtfreter, & Berzofsky, 2020). Motivated by financial gain, career advancement, or reputation enhancement, fraud can exploit vulnerabilities in governance, controls, and oversight mechanisms within educational institutions (Christensen Hughes & Eaton, Academic misconduct in higher education: Beyond student cheating, 2022). One of the most concerning aspects of credential fraud is its potential to erode trust and integrity within educational institutions. When individuals misrepresent their qualifications, it not only undermines the credibility of their achievements but also raises questions about the effectiveness of credential verification processes. This poses a significant risk to educational institutions, employers, and society at large, as it can lead to the placement of unqualified individuals in positions that require specific expertise and credentials (Børresen, Meier, & Skjerven, 2020; Eaton & Carmichael, 2023).

In today's world, external auditors play a crucial role in ensuring transparency and trust in financial reporting. Their independence and oversight are essential to maintaining investor confidence and regulatory compliance. Recently, the US Public Company Accounting Oversight Board (PCAOB) fined KPMG Netherlands (Big 4 accounting firm) a record $25 million for widespread cheating on internal exams by staff, including senior leadership. This scandal exposes a systemic issue within the external audit firms, raising concerns about independence and ethical conduct (Foley & Foy, 2024). With external oversight compromised, organizations may be left with limited options, potentially increasing reliance on internal audit functions. While internal audit lacks the external perspective, it offers the benefit of operating within the organization and may hold more direct influence over management, potentially fostering a stronger internal control environment (Rehman A. , Organizational Corruption Prevention, Internal Audit, and Sustainable Corporate Governance: Evidence from Omani Public Listed Companies, 2020).

Internal Audit (IA) functions as an independent and objective assurance and consulting activity designed to add value and improve an organization's operations (Rehman A. , Organizational Corruption Prevention, Internal Audit, and Sustainable Corporate Governance: Evidence from Omani Public Listed Companies, 2020). For Higher Education Institutions (HEIs), IA plays a pivotal role in ensuring compliance with regulations, assessing risks, evaluating internal controls, and enhancing governance processes (Fonseca, Jorge, & Nascimento, 2020; Sofyani, Abu Hasan, & Saleh, 2022). With the ever-evolving landscape of educational delivery and the growing importance of maintaining trust and integrity, IA has become indispensable in providing assurance to stakeholders and safeguarding institutional reputation. However, in the current business era, IA requires technological advancements to efficiently achieve its goals and objectives, particularly in preventing and detecting fraud. In this context, emerging technologies such as blockchain can play a major role in augmenting the capabilities of IA within HEIs.

Blockchain technology is gaining momentum as an effective solution to improve transparency, security, and efficiency across various sectors, including education (Dash, Panda, Kumar, & Luthra, 2022). Its decentralized and unchangeable nature makes blockchain especially relevant for managing academic credentials and maintaining accurate records. Through the utilization of blockchain, HEIs can streamline the process of verifying credentials (Castro & Au-Yong-Oliveira, 2021), mitigate the risks associated with fraudulent activities like degree mills or counterfeit certificates, and empower individuals with better control over their educational accomplishments.

IA can leverage blockchain technology to enhance the prevention and detection of credential fraud within HEIs. By integrating blockchain into auditing procedures, IA can establish tamper-proof audit trails for academic credentials, ensuring their validity and reliability. The distributed ledger technology of blockchain improves the transparency and traceability of credential verification, making it more resistant to tampering or unauthorized modifications. This proactive approach by IA significantly contributes to reinforcing the overall security and trustworthiness of academic credentials, thereby enhancing trust within the education sector.

Sustainability in education extends beyond environmental concerns to include the integrity and reliability of academic processes and outcomes (Kioupi & Voulvoulis, 2019). Credential fraud weakens this sustainability by eroding trust, damaging reputations, and compromising the quality of education. When fraudulent activities occur, they threaten the sustainability of educational institutions (Caramihai & Severin, 2023) by weakening governance structures and diminishing stakeholder confidence.

Internal Audit, along with blockchain technology, can play a crucial role in restoring and maintaining sustainability within HEIs (Abdullah, Saleh, & Manuel, 2024). By ensuring that academic credentials are authentic and verifiable, these measures help uphold the integrity of educational qualifications. Blockchain's immutable records provide a secure and transparent method for verifying credentials, reducing the risk of fraudulent activities (Al Hemairy, Abu Talib, Khalil, Zulfiqar, & Mohamed, 2024). This not only protects the institution's reputation but also ensures that students and faculty are held to high standards of accountability and integrity. By leveraging IA's expertise and the robust capabilities of blockchain technology, HEIs can create a sustainable educational environment where academic fraud is minimized, trust is restored, and the quality of education is preserved (Brender, Gauthier, Morin, & Salihi, 2024).

General Strain Theory (GST) identifies that individuals engage in unusual behaviors when they experience strain or stress, particularly when they are unable to achieve culturally valued goals through legitimate means (Agnew & Brezina, 2019). In the context of credential fraud within HEIs, GST can be applied to understand the motivations behind such fraudulent activities. The pressures to achieve academic success, secure prestigious positions, or gain financial rewards can lead individuals to resort to deceitful practices when legitimate avenues seem unattainable. IA and blockchain technology can play an important role in mitigating these strains by enhancing the integrity and transparency of credential verification processes. IA's rigorous oversight and blockchain's immutable records can deter fraudulent attempts by ensuring that credentials are authentic and verifiable. This dual approach not only addresses the root causes of strain by fostering a fair and transparent system but also strengthens the governance framework within HEIs, thereby reducing the opportunities for credential fraud and promoting a culture of accountability and integrity.

This study highlights the critical need for innovative approaches in combating credential fraud within HEIs by integrating IA's expertise with blockchain technology thus getting one step closer of achieving sustainability. By leveraging IA's auditing capabilities and blockchain's decentralized and tamper-proof nature, this research advocates for a proactive and robust framework to address credential fraud challenges and safeguard the integrity of educational credentials. This collaboration not only strengthens internal controls but also fosters a culture of sustainability, accountability and integrity within HEIs. The use of blockchain can streamline and automate verification processes, reducing the risk of fraudulent activities such as degree mills or counterfeit certificates.

The immutability and transparency inherent in blockchain transactions enhance the reliability and authenticity of academic records, benefiting HEIs, prospective employers, regulatory bodies, and the broader society. Furthermore, the strategic collaboration between IA and blockchain technology mitigates risks and contributes to enhanced governance frameworks and regulatory compliance. HEIs, ministries of education, and other regulating bodies stand to gain substantial benefits from adopting such innovative solutions. The increased efficiency, accuracy, and security in credential verification offered by blockchain, coupled with IA's oversight and assurance mechanisms, can lead to improved educational outcomes, reduced fraud instances, and elevated trust in academic qualifications. This study serves as a catalyst for embracing technological advancements and fostering a culture of transparency and accountability in higher education, advocating for proactive measures to combat fraud, protect stakeholders' interests, and uphold the credibility and value of academic credentials in the digital age.

## 2. LITERATURE REVIEW

This section dwells into details of fraud, internal audit, blockchain, development and audit of blockchain and utilization of blockchain in internal audit function. This section will also inform about how internal audit can leverage blockchain technology and how internal audit can perform audit services that caters the needs for universities and its related stakeholders.

### 2.1 Fraud

Fraud is understood as the breach of trust and intentional act conducted to obtain material gains (Kagias, Cheliatsidou, Garefalakis, & Sariannidis, 2022). Faculty members possessing fake degrees represent a profound betrayal of the trust placed in academia (Tariq, Haq, & Ali, 2022; Castro & Au-Yong-Oliveira, 2021). Beyond the ethical dimensions, the fabrication of academic credentials should unequivocally be considered an act of fraud (Carmichael & Eaton, 2023). At its core, this deception is executed with the explicit intent of obtaining material benefits (Pradesyah, Yuslem, & Batubara, 2021), such as salaries and other perks associated with academic positions. Such deceit not only compromises the integrity of the academic institution but also erodes the foundation upon which education is built i.e. knowledge, credibility, and trust (Rustiarini, Sutrisno, Nurkholis, & Andayani, 2019). When individuals within the Ivory Tower wield counterfeit degrees, the consequences ripple through the educational landscape. The repercussions extend beyond the immediate impact on the individuals involved. Students, the primary stakeholders in the academic environment, bear the brunt of this deception (Crossman, 2022).

Faculty members with fraudulent credentials may lack the genuine expertise required to impart knowledge effectively, resulting in a subpar learning experience (Chakraverty, 2022). The academic journey of students becomes marred by compromised quality, hindering their intellectual growth and potential. Moreover, the Universities themselves face the risk of reputational damage (Wilson, 2020). A tainted reputation not only undermines the trust of current students and faculty but also discourages prospective students from seeking education in an environment plagued by fraudulent practices (Joseph, Omar, Janang, Rahmat, & Madi, 2021). The ramifications of faculty members using fake degrees extend far beyond personal gain, corrupting the very fabric of education and jeopardizing the credibility of the entire academic institution (Joseph, et al., 2021). While it is difficult to accurately measure the full extent of the issue, it is estimated that there are approximately 3,300 unaccredited universities globally. Many of these institutions are willing to sell degrees at various academic levels. It is also suggested that over 50,000 PhDs degrees are purchased from diploma mills each year (Børresen, Meier, & Skjerven, Detecting Fake University Degrees in a Digital World, 2020).

#### 2.1.1 Types of Fraudulent/ Fake degrees

This section will inform about the fraudulent/ fake degrees. There are three types of fake degrees:

1. Issued by non-existent/ non-registered Universities.
2. Issued by non-accredited Universities.
3. Degree is fabricated/ created for actual existent/ registered Universities.

**2.1.1.1 Issued by Non-Existent/ Non-Registered Universities.**

One of the prominent fake degree cases was with the Pakistan based company name "Axact" which was implicated in an extensive fake degree scandal that was exposed in 2015 (Ezell, 2023). The New York Times conducted an investigative report, unveiling Axact's engagement in a widespread operation where they operated numerous websites selling fake diplomas and credentials from fictitious universities (Rustam, Ali, & Imran, 2019). The impact of this fraudulent scheme extended globally, with a notable influence on individuals, especially in the Gulf Cooperation Countries (Matarneh, 2018).

In the aftermath of the revelation, Axact confronted legal consequences. The company's CEO and several employees were found guilty and received prison sentences. Additionally, authorities took action by shutting down multiple fake websites linked to Axact, aiming to curb the perpetuation of the fraudulent activities (Hashmi, 2023).

The Axact company and other companies of similar intent, created universities exclusively on websites, offering students a complete set of degrees and transcripts, along with attested/apostille copies. These companies issue bachelor's, master's, or PhD degrees based solely on an individual's claimed experience. There was no verification or authentication of the claimed experience, resulting in the issuance of fake credentials that cannot be considered as coming from accredited universities.

Few of the universities which come under the umbrella of non-existent/ non-registered Universities are Rochville University, Ashley University, American Mideast University, Newport University, Walesbridge University, Panworld University, Barrington University, Gibson University, Adam Smith University, Washington International University, the American University of Professional Studies and Riverwood University (Service, 2020). It is worth mentioning that still there are many professionals who are demonstrating their educational background on LinkedIn from these universities.

In April 2019, four Lebanese universities were investigated for selling fake degrees, leading to the arrest of several high-level government officials. This investigation revealed that hundreds of fraudulent degrees were sold, primarily to Iraqis, including members of parliament. The universities involved included the American University of Culture and Education, the Lebanese French University, Saida University College, and the Arts, Sciences and Technology University in Lebanon. These degrees were sold for significant sums, with a master's degree costing around $5,000 and a PhD costing up to $10,000. This scandal not only involved civilian transactions but also implicated military personnel, reflecting a widespread issue of credential fraud in the region (Jr, Karkouti, & Douglas, 2020; Reayat, Jabeen, & Qasim, 2021; National, 2019; Stacey, 2019; Børresen, Meier, & Skjerven, 2020). Furthermore, in the United States, a candidate for the 2018 Florida State House, Melissa Howard, admitted to lying about graduating from Miami University of Ohio. She posed with a fake diploma, which ultimately led to her withdrawal from the race. This incident highlighted the prevalence of fraudulent academic claims even in political circles (AFP, 2021; Stacey, Lebanese gov't cracks down on "fake degrees", 2019). It is worth mentioning that fake degrees not only attracted faculty members but also politicians and military personals who can be considered as the backbone of any nation.

**2.1.1.2 Issued by Non-Accredited Universities.**

Countries all over the world have their academic accreditation authorities such as Ministry of Higher Education, The U.S. Department of Education and the Council for Higher Education Accreditation (CHEA), Tertiary Education Quality and Standards Agency in Australia etc. There are several standards and criteria which are in place for the Universities to get accredited (Gaston, 2023). Government accreditation ensures that universities meet certain minimum standards for education quality (Noaman, Ragab, Madbouly, Khedra, & Fayoumi, 2017). This includes factors like faculty qualifications, curriculum content, student support services, and infrastructure. Accreditation agencies regularly evaluate universities to ensure they are upholding these standards, which gives students, parents, and employers confidence in the value of a university degree (de Souza-Daw & Ross, 2023).

There are several universities which exist, but they are not accredited by their local and or international authorities (Mattar, 2022). These universities includes Al Khawarizmi International College, Al Dar University College, Al Falah University, Al Hosn University, Boston University Institute For Dental Research & Education, American Business Management and Technology College, Bridgewater State University, California Institute of Advanced Management and many others (Accreditation, 2024).

These institutions may issue degrees and diplomas, but their legitimacy and value can be highly questionable and create risks such as reputational damage, legal issues and academic integrity.

**2.1.1.3 Degree is Fabricated/ Created for Actual Existent and Registered Universities.**

The third type credential fraud is the fabrication of degree and pretend it to be issued from the actual and registered universities (Baloch, 2024; Rahman, 2013; Jimu, 2018). There are several websites which provide these services. The combined impact of these fabrication techniques results in a market capable of producing counterfeit degrees and credentials that appear authentic at first glance.

The operation of websites that specialize in fabricating degrees and credentials involves a range of deceptive methods, each designed to create an illusion of authenticity. Few of the well-known degree frauds in last ten years are presented in Table 1:

**Table 1: Degree Frauds in Last Ten Years**

| Name of Faculty Member | Affiliated University | Fraudulent Degree | Source |
|---|---|---|---|
| Marilee Jones | Massachusetts Institute of Technology | PhD | (Mourassilo, 2023) |
| James Tate | Hustler University | PhD | (Mourassilo, 2023) |
| Dubravko Zgrablic | Seneca College | MSc | (Szeto & Vellani, 2017) |
| Wen Xia | National University of Singapore | MSc | (Star, 2004) |
| Anoop Shanker | West Virginia University | PhD | (Us, 2016) |

The cases listed in Table 1 represent only a small fraction of the actual instances. The list could be extensive, as many universities have detected such cases but chose not to disclose the names of the involved faculty to protect their reputations (Junaidi, 2012; Eaton & Carmichael, 2023).

One common tactic utilized for fake degrees is the forging of official documents, where these websites accurately replicate the design and format of legitimate diplomas and transcripts (Freeman Jr, Karkouti, & Douglas, 2020). This process often includes mimicking the distinctive elements such as seals, signatures, and paper quality to make the fabricated documents appear genuine at first glance (Roe & Perkins, 2023). Moreover, these illegitimate services exploit loopholes in university record systems, gaining access to information that facilitates the creation of counterfeit documents. This may involve acquiring templates, logos, and other proprietary details that lend credibility to the forged credentials. In some cases, individuals within educational institutions may be complicit, providing insider information for a fee (Khushik, 2017).

The sophistication of fabrication methods has increased over time, incorporating advanced printing techniques to produce documents that are visually indistinguishable from authentic ones. High-quality printers, specialized inks, and paper materials are employed to achieve a level of detail that can deceive even seasoned professionals. Watermark cloning is another technique where counterfeiters reproduce the intricate watermarks found on official documents, adding an additional layer of realism to their forgeries (Suwito, Ueshige, & Sakurai, 2018).

### 2.1.2 Potential Reasons for Conducting Academic Fraud.

Faculty members who present fake or fabricated degrees and credentials often do so for a variety of reasons, with motivations rooted in personal circumstances. One common motivation is the pursuit of career advancement, as individuals may feel compelled to enhance their resumes/ CVs in order to compete for better job opportunities, promotions, or salary increases (Carmichael J. , 2023). The belief that certain qualifications are essential for career progression can drive individuals to take dishonest measures to meet perceived expectations (Denisova-Schmidt, 2018). In some cases, personal insecurities about abilities or qualifications may prompt individuals to fabricate credentials in an effort to appear more competent or accomplished than they actually are (Posselt, 2016).

There could be other reasons such as social pressures and financial constraints. Social pressure includes societal expectations or familial pressure to succeed academically or professionally. Financial constraints can include desperation, financial difficulties, or unemployment which may lead some faculty members to resort to presenting fake credentials as a means of securing a job or income. Furthermore, the desire to impress others, a lack of ethical values, and a fear of failure are further factors that can motivate individuals to engage in such dishonest practices.

## 2.2 How Internal Auditors Detect Such Fraud.

As fraud and its related fraudulent technology continues to evolve, the battle against credential fraud requires constant vigilance and the implementation of advanced verification measures to maintain the integrity of educational and professional systems.

As guardians of institutional integrity and financial responsibility, internal auditors in universities play a crucial role in unearthing and preventing academic fraud (Sudirman, Sasmita, Krisnanto, & Muchsidin, Effectiveness of Internal Audit in Supporting Internal Control and Prevention of Fraud, 2021), particularly concerning fake degrees. The identification of faculty members with fraudulent credentials falls squarely within the purview of internal audit functions, serving as a safeguard against the erosion of the academic foundation. Internal auditors act as the frontline defenders of the institution's reputation and internal auditors are equipped to uncover the financial implications of academic fraud (Rahayu, Yudi, & Rahayu, 2020). Moreover, the role of internal auditors extends to the maintenance of academic quality (Nisak & Rochayatun, 2023). Internal auditors can adopt the following guidelines to detect and prevent the credentials fraud:

### 2.2.1 Risk Assessment

Risk can be defined as an event that can impact the achievement of organizational objectives and can negatively impact organizational reputation (Sadeghi, Mahmoudi, & Deng, 2023). Effective management of educational credential verification involves a comprehensive risk approach (Daradkeh, 2023), covering various key elements. The main step is a thorough risk assessment to identify positions where the repercussions of a fraudulent degree could be severe such as substandard education and low educational quality. Evaluating existing hiring and promotion policies and scrutinizing past incidents within the university

provides valuable insights into potential vulnerabilities (White-Lewis, 2020). Identify potential red flags which are related to the faculty feedback, faculty quality assessment and faculty engagement (Kogan, Conforti, Bernabeo, Iobst, & Holmboe, 2015).

**2.2.2Verification Procedures**

Verification procedures play a pivotal role in ensuring the legitimacy of educational credentials (Tariq, Haq, & Ali, 2022). This involves establishing direct communication with educational institutions, employing reputable third-party verification services, and incorporating educational background checks into standard pre-employment screening processes (Rustemi, Dalipi, Atanasovski, & Risteski, A systematic literature review on blockchain-based systems for academic certificate verification, 2023; Siddiqui, Ahmad, Khamruddin, Gupta, & Singha, 2022). At the time of hiring a faculty member, it is recommended that potential faculty member should sign a declaration allowing the university to check/ verify the credentials of faculty members.

**2.2.3 Data Analytics**

Data analytics can be leveraged to detect inconsistencies or atypical patterns in employee data (Arrighetti, Bartoloni, Landini, & Pollio, 2022). Using analytical tools helps flag discrepancies, such as degrees from institutions that are closed or do not offer the claimed program. Identifying unusual patterns, such as multiple employees with degrees from obscure institutions or obtaining degrees in a short timeframe, is crucial in maintaining the integrity of the verification process (Mattar, 2022). Fake universities are not able to obtain the website domain of “edu” or “ac”. These universities operate under the “.com” domains. Furthermore, internal auditors must verify that individuals, such as the Chancellor, Vice-Chancellor, registrar, or Chairman of the Board of Trustees, who sign credentials are/ were currently/ previously employed in the corresponding roles at the university on the date the credentials were issued.

**2.2.4 Employee Education and Awareness**

Employee education and awareness initiatives are essential components of a robust verification system (McIlwraith, 2021). Providing training to HR staff and hiring managers on recognizing red flags and implementing reporting mechanisms for employees to confidentially report suspicions fosters a proactive approach. Clearly communicating potential disciplinary actions for providing false credentials reinforces the importance of authenticity (Christensen Hughes & Eaton, 2022).

**2.2.5 Proactive Audits**

Proactive audits form a preventive layer in the verification process (Rodríguez-Quintero, et al., 2021). Conducting random sampling, targeted audits on high-risk positions, and engaging expert auditors with expertise in credential verification contribute to a comprehensive review. Typically, Universities impose fees for credential verification, and the verification reports from universities usually take three to four months on average (Lee, Dell, González Canché, Monday, & Klafehn, 2021). It is advisable for internal auditors to conduct proactive audits (Calvin, 2021) to detect warning signs and promptly alert management to potential risks posed by employees.

Staying informed about evolving verification techniques, collaborating with industry groups to share best practices, and exploring innovative solutions like blockchain-based digital credentials enhance the overall security of the verification process (Kabir, A Sobhani, Mohamed, & Ashrafi, Impact of integrity and internal audit transparency on audit quality: the moderating role of blockchain, 2022).

**2.3 Blockchain Technology**

The emergence of blockchain technology offers a promising solution to combat credential fraud in academia (Al Hemairy, Abu Talib, Khalil, Zulfiqar, & Mohamed, 2024). Blockchain is a decentralized digital ledger that records transactions across multiple computers in a secure and transparent manner (Tyagi, Decentralized everything: Practical use of blockchain technology in future applications. , 2023). Each transaction, or in this case, academic credential, is stored as a block that is linked to the previous one, forming a chain of blocks (hence the name blockchain).

Blockchain technology was introduced to address the need for a secure, transparent, and decentralized system for recording and verifying transactions (Sonkamble, Bongale, Phansalkar, Sharma, & Rajput, 2023). It was conceptualized by an anonymous person or group known as Satoshi Nakamoto (Sert, 2021), who introduced it in a 2008 white paper titled "Bitcoin: A Peer-to-Peer Electronic Cash System." The primary motivation behind blockchain was to create a system that could operate without the need for a central authority, such as a bank, to mediate transactions, thus reducing the risk of fraud and the costs associated with traditional financial systems (Mishra & Kaushik, 2023). By utilizing a decentralized ledger that is immutable and transparent, blockchain technology promised to revolutionize various industries by enhancing security, efficiency, and trust in digital transactions (Bazel, Ahmad, & Mohammed, 2023). Table 2 defines utilization of this technology in different sectors and its associated benefits.

**Table 2: Utilization of Blockchain Technology Across Sectors**

| Sector | Applications | Benefits |
|---|---|---|
| Finance and Banking | Cross-Border Payments and Smart Contracts | - Reduced Transaction Costs<br>- Increased Transparency and Security |

| | | |
|---|---|---|
| Supply Chain | Tracking and Traceability and Verification of Authenticity | - Enhanced Transparency<br>- Improved Efficiency |
| Healthcare | Medical Records Management and Drug Traceability | - Data Security<br>- Interoperability |
| Real Estate | Property Transactions and Title Management | - Reduced Transaction Time<br>- Increased Transparency |
| Voting and Governance | E-Voting Systems and Identity Verification | - Enhanced Security<br>- Transparency and Trust |
| Energy Sector | Energy Trading and Grid Management | - Efficiency<br>- Transparency |
| Entertainment and Media | Content Distribution and Digital Rights Management | - Fair Compensation<br>- Piracy Reduction |
| Government and Public Services | Land Registry and Identity Management | - Corruption Reduction<br>- Efficiency |
| Insurance | Claims Processing and Fraud Detection | - Speed<br>- Reduced Fraud |
| Retail | Loyalty Programs and Supply Chain Transparency | - Customer Engagement<br>- Trust |

**Source:** (Patel & Shrimali, 2023; Dewangan, Verma, Parganiha, & Dewangan, 2023)

It is obvious from Table 2 that benefits associated with the blockchain are enhancing effectiveness and process efficiency, developing trust and eliminating fraud and or corruption. Although blockchain is emerging technology, and it will enhance and will provide meaningful benefits to society as whole (Tyagi, Dananjayan, Agarwal, & Thariq Ahmed, 2023).

**2.3.1 Importance of Blockchain in the Education Sector**

By utilizing blockchain for credential verification, universities can create a transparent and immutable record of academic achievements. When a student earns a degree or certificate, the corresponding credential is encrypted and added to the blockchain. This creates a digital fingerprint that cannot be altered or falsified without consensus from the entire network, making it virtually impossible to create fake credentials or manipulate existing ones (Zaurbek, 2023; El Koshiry, Eliwa, Abd El-Hafeez, & Shams, Unlocking the power of blockchain in education: An overview of innovations and outcomes., 2023).

For faculty members, their academic qualifications and certifications can also be securely stored on the blockchain (Rustemi, Dalipi, Atanasovski, & Risteski, 2023). Employers or institutions seeking to verify credentials can access the blockchain network to instantly validate the authenticity of degrees and certifications without relying on potentially falsifiable documents (Alsobhi, Alakhtar, Ubaid, Hussain, & Hussain, 2023).

Throughout these processes, it is crucial to uphold confidentiality to protect employee privacy, ensure fair and impartial treatment for those suspected of presenting fake credentials, and seek legal counsel when necessary to address potential legal ramifications. This multifaceted approach establishes a robust framework for educational credential verification, safeguarding organizations from the risks associated with fraudulent degrees (Moya, 2023).

**2.3.1.1 Enhancing Transparency in Higher Education**

Blockchain technology plays a significant role in enhancing transparency in higher education (Alsobhi, Alakhtar, Ubaid, Hussain, & Hussain, 2023). By creating a decentralized and immutable ledger, blockchain allows educational institutions to maintain transparent records of academic achievements, credentials, and other key data. Every transaction or entry made on the blockchain is visible to all participants, ensuring that all actions are transparent and verifiable (Castro & Au-Yong-Oliveira, 2021). This openness helps build trust among students, educators, and employers, as they can independently verify the authenticity of academic records without relying on a central authority. For example, a student's degree or certificate recorded on the blockchain can be easily and securely accessed by potential employers, reducing the need for intermediaries and expediting the verification process. In the current working environment, several credential verification organizations exist, affiliated with many universities and countries, such as World Education Services (WES) and the International Credential Evaluation Service (ICES) (Mühle, Assaf, Köhler, & Meinel, 2023). Both WES and ICES are recognized by several immigration and educational institutions for assessing and verifying foreign academic credentials (Gray, 2023). With the proper implementation of blockchain technology, many such intermediaries can be eliminated to enhance efficiency and effectiveness.

**2.3.1.2 Reducing Fraud and Increasing Data Security**

Blockchain significantly reduces the risk of fraud in the education sector (Dahal, 2023; El Koshiry, Eliwa, Abd El-Hafeez, & Shams, 2023). Traditional methods of storing and sharing academic records are vulnerable to tampering and forgery. Blockchain, with its cryptographic security features, ensures that once a record is entered into the blockchain, it cannot be altered or deleted (Aliane &

Salim, 2023). This immutability guarantees the integrity of academic records, making it nearly impossible for individuals to falsify their credentials. Additionally, blockchain's decentralized nature means that data is not stored in a single location, reducing the risk of data breaches and unauthorized access. Institutions can securely store and share sensitive information such as transcripts, diplomas, and student records, knowing that the data is protected by the highest levels of security.

#### 2.3.1.3 Streamlining Administrative Processes

Blockchain can streamline various administrative processes in higher education (Aliane & Salim, 2023), making them more efficient and less prone to errors. The enrollment process, which often involves verifying a student's previous academic records, can be expedited using blockchain technology. Smart contracts can automate many routine administrative tasks (Parycek, Schmid, & Novak, 2023), such as course registration, fee payments, and record keeping. These automated processes reduce the workload on administrative staff, lower the chances of human error, and ensure that processes are completed swiftly and accurately. This efficiency not only saves time but also reduces administrative costs, allowing institutions to allocate resources more effectively.

#### 2.3.1.4 Facilitating Lifelong Learning and Credentialing

Blockchain supports the concept of lifelong learning by providing a permanent, verifiable record of an individual's educational achievements. As people increasingly engage in continuous education and acquire skills from various institutions and online platforms, maintaining a comprehensive and trustworthy record of all these achievements becomes crucial. Blockchain enables learners to accumulate and showcase their credentials from different sources in a single, unified ledger (Kaufman & Soltanifar, 2023 ). This holistic view of an individual's educational and professional development is beneficial for both learners and employers, facilitating better matching of skills with job opportunities. Moreover, it empowers learners by giving them greater control over their own educational records.

#### 2.3.1.5 Promoting Inter-Institutional Collaboration

Blockchain can foster collaboration among educational institutions (Bjelobaba, Savić, Tošić, Stefanović, & Kocić, 2023) by creating a shared, interoperable platform for exchanging information. This is particularly useful for credit transfer and student mobility programs. When students transfer between institutions or participate in exchange programs, their academic records can be seamlessly verified and transferred via the blockchain. This interoperability ensures that students' achievements are recognized and honored across different institutions, promoting a more flexible and integrated educational ecosystem. Moreover, blockchain can support collaborative research projects by providing a transparent and secure way to manage and share research data and intellectual property (Bonnet & Teuteberg, 2023; Bonnet & Teuteberg, 2023).

By leveraging the security, immutability, and decentralization features of blockchain, educational institutions can build more trust with stakeholders, ensure the integrity of academic records, and create a more efficient and flexible educational environment. As the education sector continues to evolve, blockchain stands out as a transformative technology that addresses many of the challenges faced by higher education institutions.

### 2.4 Building Blockchain for the Education Sector

Universities can opt for the already existing tools for development of blockchain or they can develop one of their own and link it with the pre-existing platforms. In either case, following steps are necessary:

#### 2.4.1 Define Requirements

Like any other technological tool, before developing a blockchain, it is crucial to define the specific goals and requirements. This includes identifying the key stakeholders, such as students, educators, and institutions, and determining the primary objectives, such as credential verification, student record management, or intellectual property protection. Establishing these parameters will guide the design and implementation phases, ensuring the blockchain meets the educational sector's unique needs. This can be developed with the notion of eliminating educational fraud and enhancing the overall process efficiency (Udokwu, et al., 2023; Kölbel, Zekri, & Weinhardt, 2023).

#### 2.4.2 Choose the Right Technology

Selecting the appropriate blockchain platform is fundamental to the development success. Options like Ethereum, Hyperledger Fabric, and Corda each offer unique features suitable for different use cases. Ethereum provides robust smart contract functionality, Hyperledger Fabric supports private, permissioned networks ideal for institutional use, and Corda emphasizes privacy and scalability for enterprise solutions. The choice should align with the goals and technical requirements (Suryawijaya & Wibowo, 2023; Quamara & Singh, 2023; Gayialis, Kechagias, & Papadopoulos, 2023; Khan, et al., 2023).

#### 2.4.3 Design and Develop Blockchain

This phase involves outlining the blockchain’s architecture, developing smart contracts, and implementing security measures. The architecture should detail the network's nodes, consensus mechanisms, and data storage solutions. Smart contracts automate key processes such as credential issuance and verification. Security measures, including encryption and access controls, must be rigorously applied to protect sensitive educational data (Alzhrani, Saeedi, & Zhao, 2023; Han, Seo, Lee, Kim, & Son, 2023).

#### 2.4.4 Obtain Necessary Licenses

Compliance with legal and regulatory frameworks is essential. This involves adhering to data protection laws like General Data Protection Regulation (GDPR) or The Family Educational Rights and Privacy Act (FERPA), ensuring open-source licenses are respected if applicable, and securing any necessary patents for proprietary technology. Legal consultation is recommended to navigate these requirements effectively (Karisma & Tehrani, 2023).

#### 2.4.5 Link with Existing Blockchains

Interoperability with existing blockchain networks can enhance functionality and acceptance. Utilizing technologies like Polkadot, Cosmos, or Wanchain can facilitate seamless integration. APIs and oracles can bridge the blockchain with external systems, ensuring data can be fetched and verified efficiently. Forming consortiums with other educational entities can further promote collaboration and standardization (Scott, de Castro Neto, & Pinheiro, 2023; Essaid, Kim, & Ju, 2023; Wang & He, 2021).

#### 2.4.6 Testing and Deployment

Thorough testing in controlled environments is crucial before full deployment. Test networks like Ropsten for Ethereum allow for debugging and performance evaluation. Once testing is complete, deploy the blockchain on the main net and monitor its performance to ensure stability and reliability. Adjustments and optimizations may be necessary based on real-world usage (Ismail, Toohey, Lee, Dong, & Zomaya, 2022; Abdullah, Saleh, & Manuel, 2024).

#### 2.4.7 Maintenance and Updates

Ongoing maintenance is vital to address any bugs, enhance features, and improve security. The update and maintenance of blockchain networks can be significantly enhanced using IoT devices. IoT devices can monitor the health and performance of blockchain nodes in real-time, ensuring that any issues are promptly identified and addressed. They can automate the distribution of updates and patches across the network, ensuring all nodes are consistently updated with the latest software. Additionally, IoT devices can help in validating and testing new updates before they are fully deployed, providing a more efficient and reliable maintenance mechanism for blockchain systems (Boudguiga, et al., 2017).

### 2.5 Internal Audit and Blockchain Integration

Internal audit is objective assurance and independent function available within organization (Lenz & Hoos, 2023). IA can help Universities to ensure that their governance structure is operating in a way that enables the achievement of its mission and vision (Rehman, Khan, & Hashim, 2023). IA can perform following tasks to provide assurance on the implementation of blockchain by universities.

#### 2.5.1 Risk Assessment

Risk based audit approach is always recommended for any IA function operating in any industry including educational sector (Rehman, Ganesan, & Al-Maskari, Influence of Internal Audit on Implementation of Environmental, Social, and Governance Factor. Case of Public Listed Companies in Oman, 2024). Risk management audits are critical for identifying potential risks within an organization and developing strategies to mitigate them (Rehman A. , 2023). These audits involve a systematic review of the organization's risk management processes, including risk assessments, the development and review of risk management plans, and the implementation of appropriate control measures. Effective risk management is essential for reducing the likelihood of operational failures, data breaches, and other adverse events (Rehman A, 2021).

Key components of risk management audits include conducting comprehensive risk assessments to identify potential risks across various operational areas, evaluating the likelihood and impact of these risks, and prioritizing them based on their potential severity and probability (Landoll, 2021). Developing risk management plans is another crucial aspect, involving the creation of strategies to address identified risks (Willumsen, Oehmen, Stingl, & Geraldi, 2019), assigning responsibilities for risk management activities, and creating contingency plans for high-impact risks. Implementing control measures, such as policies and procedures to mitigate risks, and regularly reviewing and updating these measures are also fundamental to effective risk management (Hubbard, 2020). Continuous monitoring and reporting on risk indicators and the effectiveness of control measures ensure that adjustments can be made based on audit findings (Cheng, Goh, & Kim, 2018).

Specialized frameworks are essential for managing risks associated with emerging technologies like blockchain (Drljevic, Aranda, & Stantchev, 2020). For blockchain, the risk framework includes addressing security risks to prevent hacking and unauthorized access, operational risks related to scalability and reliability, regulatory risks ensuring compliance with legal requirements, and smart contract risks to mitigate coding errors and vulnerabilities (Taherdoost, 2022). Moreover, the framework focuses on data privacy risks to protect sensitive data, algorithmic bias risks to ensure fairness and accuracy, operational risks to ensure system reliability, and ethical risks to address concerns related to transparency and accountability.

Several established frameworks and standards guides are available in organizations in managing these risks. The NIST Framework for Blockchain Technology, developed by the National Institute of Standards and Technology, provides guidelines for the security and resilience of blockchain implementations (Aderibole, et al., 2020). The ISO/IEC 27001 standard for information security management systems includes guidelines relevant to managing risks in blockchain applications (Alamri, Crowley, & Richard, 2022). COBIT (Control Objectives for Information and Related Technologies) is a framework for developing,

implementing, monitoring, and improving IT governance and management practices (Sihotang, Panjaitan, & Yunis, 2020) which can also be adaptable for blockchain.

### 2.5.2 Objectives, Scope, and Planning of Internal Audit

Internal audit plays a pivotal role in ensuring that blockchain projects comply with regulations, operate securely, and manage risks effectively (Kabir, A Sobhani, Mohamed, & Ashrafi, 2022). The audit's objectives should encompass compliance, security, operational efficiency, risk management, and governance. This comprehensive scope ensures all critical aspects are scrutinized and optimized.

During the planning phase, auditors define the audit scope, objectives, and methodology (Abuazza, Labib, & Savage, 2020). This involves reviewing project documentation, relevant regulations, and conducting preliminary stakeholder meetings to understand the blockchain's goals and operational environment. Developing a detailed audit plan and schedule ensures a structured and systematic approach to the audit process (Carcary, 2020; Mkoba & Marnewick, 2020).

### 2.5.3 Compliance, Security, Operational and Governance Audit

The compliance audit verifies adherence to relevant laws and regulations, such as data protection laws and open-source licenses. Auditors assess whether the blockchain system meets legal requirements (Kabir, A Sobhani, Mohamed, & Ashrafi, 2022), helping to avoid potential legal issues and ensuring ethical standards are maintained.

Security audits involve evaluating the measures in place to protect the blockchain from vulnerabilities (Stodt, et al., 2021). This includes penetration testing, reviewing encryption protocols, and assessing access controls. Identifying and addressing security risks is crucial to maintaining the integrity and trustworthiness of the blockchain.

Auditors evaluate the design and implementation of blockchain processes to ensure they are efficient and effective (Turker & Bicer, 2020). This involves assessing the blockchain's architecture, transaction processing capabilities, and integration with existing systems. Recommendations from this audit can enhance the overall performance and scalability of the blockchain.

The governance audit ensures robust governance structures and processes are in place (Turker & Bicer, 2020). This includes reviewing decision-making frameworks, stakeholder roles and responsibilities, and the management of smart contracts. Proper governance ensures accountability and transparency, fostering trust among users.

### 2.5.4 Reporting and Follow-Up

After completing the audit, findings are compiled into a comprehensive report, highlighting strengths, weaknesses, and actionable recommendations. Regular follow-up audits and monitoring the implementation of recommendations ensure continuous improvement and adherence to best practices. This ongoing process helps maintain the blockchain's integrity, security, and efficiency (Brender, Gauthier, Morin, & Salihi, 2024).

## 2.6 Sustainability in Education Sector

Sustainability in the education sector encompasses a holistic approach that integrates economic, social, and environmental dimensions to ensure long-term viability and integrity of educational institutions (Žalėnienė & Pereira, 2021). It involves implementing practices that promote not only environmental stewardship but also social responsibility, financial stability, and institutional integrity. Sustainable education aims to provide quality education while minimizing negative impacts on society and the environment (Al-Nuaimi & Al-Ghamdi, 2022), fostering a culture of continuous improvement and ethical standards.

### 2.6.1 What is Considered as Sustainability in Education Sector

Sustainability in the education sector is a multifaceted concept that includes ensuring the long-term operational efficiency and resilience of educational institutions (Eishwar & Mahadev, 2024). It involves managing resources efficiently, maintaining financial health, promoting social equity, and enhancing environmental stewardship. Educational institutions must adopt sustainable practices such as reducing waste, conserving energy, and integrating sustainability into the curriculum to educate students about their role in fostering a sustainable future (Altassan, 2023). Furthermore, sustainability in education emphasizes the importance of ethical governance, transparency, and accountability to build trust among stakeholders and ensure the institution's enduring impact on society.

### 2.6.2 How Fraud Can Distort Sustainability in Education Sector

Fraud can significantly distort sustainability in the education sector by undermining trust, depleting financial resources, and damaging the reputation of educational institutions (Burke & Sanney, 2018; Heyneman, Anderson, & Nuraliyeva, 2008; Chapman & Lindner, 2016). When fraud occurs, whether through misrepresentation of credentials, financial misappropriation, or academic dishonesty, it erodes the foundation of trust that educational institutions rely on. This erosion of trust can lead to a decline in student enrollment, loss of funding, and decreased support from stakeholders. Financial losses due to fraud can strain an institution's budget, diverting resources away from essential programs and initiatives that support sustainable practices. Additionally, fraud can compromise the quality of education, resulting in graduates who are unqualified or underprepared, which in turn diminishes the institution's credibility and long-term sustainability.

### 2.6.3 Internal Audit, Blockchain, and Sustainability in Education Sector

Internal audit and blockchain technology can play a crucial role in enhancing sustainability in the education sector by strengthening governance, improving transparency, and ensuring the integrity of academic and financial processes. Internal audit functions provide independent and objective assessments of an institution's operations, identifying risks and recommending improvements to enhance efficiency and effectiveness (Sudirman, Sasmita, Krisnanto, & Muchsidin, 2021). By focusing on areas such as compliance, risk management, and internal controls, internal audit helps educational institutions uphold high standards of accountability and transparency, which are essential for sustainable operations (Tumwebaze, Bananuka, Kaawaase, Bonareri, & Mutesasira, 2022).

Blockchain technology offers a decentralized and immutable ledger system that can significantly enhance the security and verifiability of academic credentials and financial transactions (Drljevic, Aranda, & Stantchev, 2020). By recording academic achievements and transactions on a blockchain, educational institutions can create tamper-proof records that are easily verifiable by employers, regulatory bodies, and other stakeholders. This level of transparency and security helps prevent fraudulent activities and ensures that the qualifications and financial dealings of the institution are authentic and reliable.

The integration of internal audit functions with blockchain technology creates a robust framework for combating fraud and promoting sustainability. Internal auditors can leverage blockchain to conduct more efficient and effective audits, as the technology provides a clear and unalterable audit trail (Brender, Gauthier, Morin, & Salihi, 2024). This combination not only helps in detecting and preventing fraud but also supports the institution's commitment to sustainable practices by fostering a culture of integrity and accountability (Zhang & Shah, 2023). By ensuring that resources are used efficiently and ethically, internal audit and blockchain technology together contribute to the long-term sustainability and success of educational institutions.

## 3. GENERAL STRAIN THEORY

General Strain Theory (GST), developed by Robert Agnew, explains deviant behavior as a response to stress or strain experienced by individuals. According to GST, strains are conditions or events that are perceived as negative and create pressure on individuals to engage in deviant behavior (Agnew & Brezina, 2019). This can occur when individuals are unable to achieve culturally valued goals through legitimate means, leading to frustration and resorting to unlawful actions as a coping mechanism. Strains can be experienced in various forms, such as failure to achieve academic success, inability to secure prestigious positions, or lack of financial rewards, all of which can drive individuals towards fraudulent activities to fulfill their aspirations.

### 3.1 Internal Audit and General Strain Theory

Internal Audit (IA) can play a critical role in addressing the strains that lead to credential fraud within Higher Education Institutions (HEIs). By implementing robust auditing processes and maintaining rigorous oversight, IA can help mitigate the pressures experienced by individuals to engage in fraudulent activities. IA functions as an independent and objective assurance activity that evaluates and improves the effectiveness of risk management, control, and governance processes (Gottschalk, 2020). By ensuring compliance with regulations and verifying the authenticity of academic credentials, IA can alleviate the strain experienced by individuals who might otherwise feel compelled to engage in fraud. This proactive approach not only reduces the opportunities for fraudulent behavior but also promotes a culture of accountability and integrity within HEIs, aligning with the principles of GST (Al-Badayneh, Shahin, & Brik, 2024).

### 3.2 Blockchain and General Strain Theory

Blockchain technology can further enhance the efforts to mitigate strains that lead to credential fraud, in line with General Strain Theory (Braaten & Vaughn, 2021). Blockchain's decentralized and immutable nature provides a secure and transparent method for managing and verifying academic credentials. By creating tamper-proof records and audit trails, blockchain technology reduces the likelihood of fraudulent activities, such as degree mills or counterfeit certificates. This technological advancement addresses the strains individuals might experience by ensuring that credentials are easily verifiable and authentic, thus reducing the perceived need to engage in fraudulent behavior. Integrating blockchain with IA creates a robust framework that not only enhances the reliability and integrity of academic credentials but also supports a transparent and fair educational environment, aligning with the objectives of GST to reduce deviant behaviors through effective strain mitigation.

## 4. CONCLUSION

This study highlights the critical role of integrating internal audit practices with blockchain technology to combat academic fraud in higher education institutions. These innovative solutions significantly enhance the verification processes for academic credentials, ensuring authenticity and maintaining the integrity of educational programs. By strengthening governance, improving transparency, and ensuring the integrity of academic and financial processes, the integration of internal audit and blockchain technology promotes sustainability within educational institutions. Credential fraud weakens sustainability by eroding trust, depleting resources, and damaging institutional reputations. By addressing these issues through robust verification measures, educational institutions can restore trust, safeguard resources, and ensure long-term sustainability.

## Leveraging Internal Audit and Blockchain to Mitigate Academic Fraud and Enhance Institutional Sustainability: A General Strain Theory Perspective

General Strain Theory (GST) explains the motivations behind credential fraud, identifying the pressures that drive individuals toward such deviant behaviors. GST explains how the inability to achieve culturally valued goals through legitimate means can lead to frustration and fraudulent actions. Internal audit and blockchain technology can mitigate these strains by providing transparent and secure methods for credential verification, thus reducing the perceived need for fraud. The integration of these technologies addresses the root causes of strain by creating a secure, transparent, and reliable system that reduces opportunities for fraudulent behavior, thereby fostering a culture of accountability and integrity within higher education institutions.

The adoption of internal audit and blockchain technology offers a proactive and robust framework to address credential fraud, fostering a sustainable educational environment. This collaboration not only strengthens internal controls but also ensures that academic credentials are authentic and verifiable. By leveraging these technological advancements, higher education institutions can enhance the reliability and authenticity of academic records, mitigate risks, and contribute to enhanced governance frameworks and regulatory compliance. Such measures protect stakeholders' interests and uphold the credibility and value of academic credentials in the digital age, ensuring that educational institutions remain trustworthy and sustainable.

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