Tuijin Jishu/Journal of Propulsion Technology
ISSN: 1001-4055
Vol. 45 No. 1 (2024)

Discuss The Ethical Implications of Data Privacy, Surveillance, And the Use of Algorithms In E-Learning Platforms

Prof. Gaikwad Anil Pandurang[1]
Assistant Professor
MCA Department
JSPM'S Jayawantrao Sawant College of Engineering, Pune
anilgaikwad2@gmail.com

Prof. Kakpure Krutika Balram[2]
Assistant Professor
MCA Department
JSPM's Jayawantrao Sawant College of Engineering, Pune
krutika31.kakpure@gmail.com

Abstract

This study aims to gather information regarding the importance of data privacy, surveillance and the use of algorithms in e-learning platforms. The objectives have been set in this study according to the basis of the aim. E-learning platforms offer collaborative learning experiences through sessions of group discussion community engagement online and sharing ideas with each other. This helps in diversifying the viewpoints of learners and increases their ability to think critically which helps them in solving problems effectively. Implementing encryption models and regular auditing systems can help in protecting data that alliance with the data protection law. It can be seen that updated security protocols and regulatory frameworks can help in providing data safety to all the users of e-learning platforms effectively**.** The study has used primary quantitative methods for collecting information. In the process of conducting the survey questionnaires have been built where three demographic questions and 10 topic-oriented questions have been included. 60 participants have been chosen randomly for the survey purpose in this study. Through the use of a quantitative analysis system producing reliable outcomes through the interpretation of statistical data is possible. In order to present the relationship between the variables in this study the Analysis of data has been done by the use of IBM SPSS software in the form of ANOVA regression and correlation. A particular type of algorithm is employed in e-learning platforms to improve learning content and strength for a more effective learning environment. It is evident that protecting data privacy and using algorithms in learning platforms have very complicated ethical ramifications The use of ethical standards in the privacy maintenance and security system integration of the e-learning platform has been evaluated in this study. The use of quantitative analysis methods through SPSS tools has helped in providing statistical result that helps in forming the relation between the variables in this study.

Keywords: Ethical standards, e-learning, technology, surveillance, algorithm.

Introduction

Technology has evolved rapidly with its advanced tools and applications. This has helped in improving all fields of work including learning and teaching. Along with the growing technology e-learning methods also have been

improved which primarily refers to the learning process anywhere anytime with the help of the internet (A. Alshambri and Alassery, 2021). It can be seen that a cryptography algorithm is used for the users of e-learning platforms to authorise their existence on that platform. This helps in maintaining the privacy and sensitive information of each user. It can be seen that through the use of proper algorithms in e-learning platforms personalizing learning experiences can be improved (Alier et al. 2021).

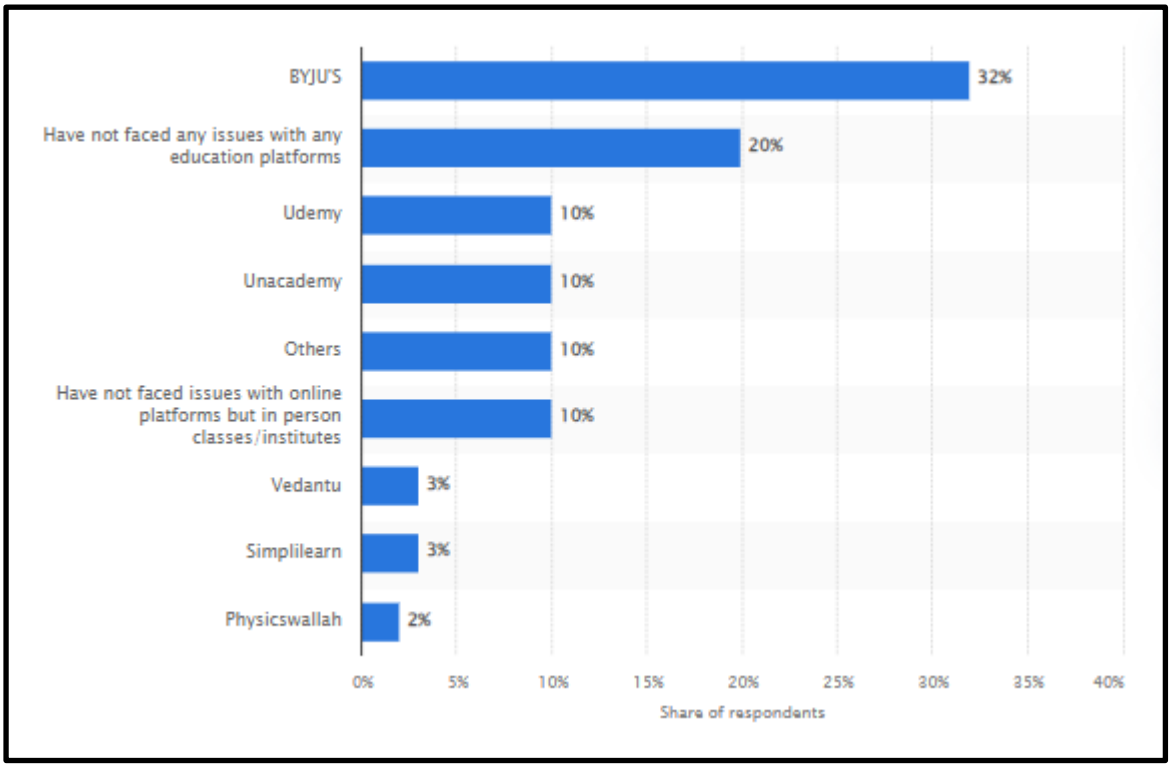

Figure 1: Users of online learning platforms are reporting issues in India by platform in 2023

(Source: Statista, 2023)

Figure 1 highlights the users of online learning platforms are reporting issues in India by platforms in 2023. 32% of respondents to a June 2023 survey of users of online learning platforms said they had problems with BYJU'S (Statista, 2023). On the other hand, 20% of respondents stated that they did not face any problems with online education platforms in the 24 months before the survey period (Statista, 2023).

Despite having the potential to provide support to the best learning experience to the learners, e-learning platforms have drawbacks of losing security to the threats. It can be seen that the use of personal information of the user can be collected and used wrongfully by cyber attackers due to the lack of surveillance protocols for the e-learning tools (Alshahrani, 2021). With the use of personal information for personalised earning experiences, users are basically exposing their sensitive information to hackers who can misuse it. In order to control the data theft and misuse of private information of e-learning platform users, the implementation of data security tools and surveillance software is highly important (Hegerius et al. 2020).

Aim

This study aims to gather information regarding the importance of data privacy, surveillance and the use of algorithms in e-learning platforms.

Objectives

RO1: To understand the basics of the e-learning platform and the way it improves learning experiences
RO2: To analyse the need for proper surveillance and algorithm of the e-learning platforms
RO3: To discover the way of implementing data privacy process in e-learning platforms in an ethical way to prevent mishaps
RO4: To recommend ways of improving the surveillance system of e-learning platforms through algorithmic use to increase safety in data privacy

Research Questions

RQ1: What is e-learning and how it can improve the learning experience of people?
RQ2: Why are using surveillance systems and algorithms in e-learning platforms highly important?
RQ3: How to implement the data privacy process in the e-learning platforms in an ethical way to prevent mishaps?
RQ4: What are the ways of improving the surveillance system of e-learning platforms through algorithmic use to increase safety in data privacy?

Literature review

E-learning education for a better and faster learning experience

E-learning platforms offer various advantages for better and foster learning experiences. The platforms of e-learning provide flexibility to all the users in accessing educational support and content from anywhere anytime as per their personal pace and convenience (Iman Cahyanto, 2023). This helps the learners to balance their work and family time with all commitments improving their learning skills with proper and sufficient educational resources through authentic e-learning platforms. The advantage of the e-Learning platform is their personalised learning contents which provide adaptive learning materials to individuals as per their preferences and needs (Kiennert et al. 2019). It can be seen that the platform of an electronic learning system offers multimedia elements for educational support such as interactive modules and videos for stimulating learning experience. This has helped users get more engaged with the learning platform and improve their weak areas in studies.

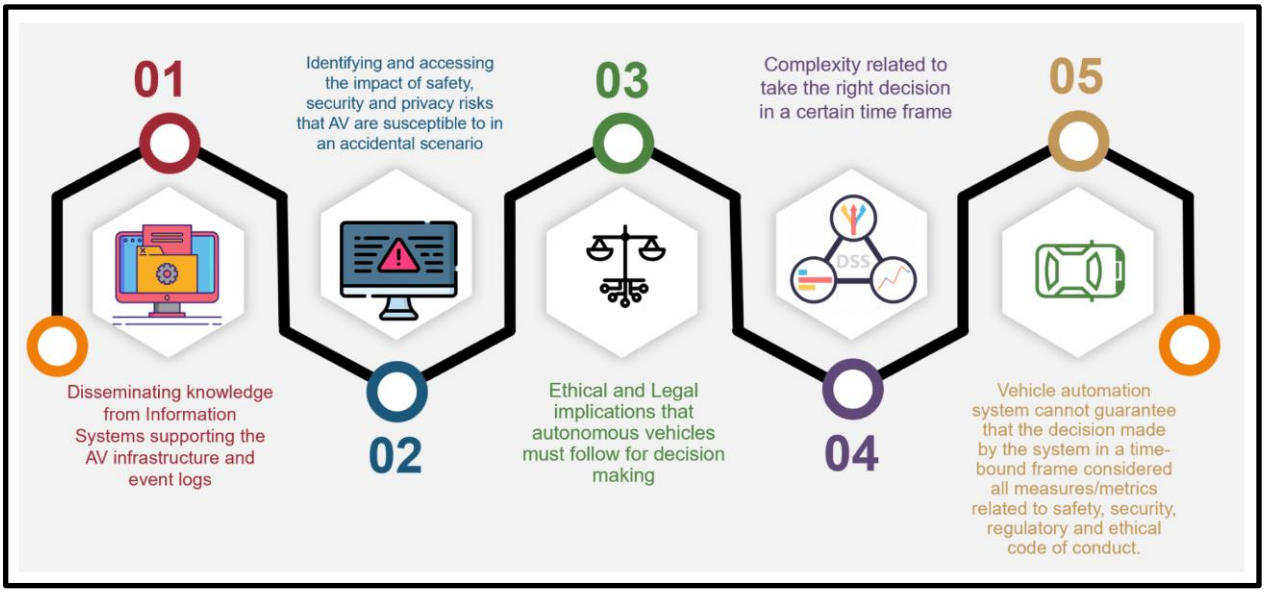

Figure 2: Ethical challenges in e-learning platforms

(Source: Influenced by Ungerer and Slade, 2022)

As per the comment of Kumar and Sharma (2021), it can be understood visual interactions are able to increase the understanding label of a learner which helps in getting knowledge regarding a particular topic more effectively and faster way as compared to the traditional method of learning. Additionally, e-learning platforms offer collaborative learning experiences through sessions of group discussion community engagement online and sharing ideas with each other. This helps in diversifying the viewpoints of learners and increases their ability to think critically which helps them in solving problems effectively (Ungerer and Slade, 2022). Besides that gamification process of e-learning platforms helps the users to engage better as well as motivate them to learn in an enjoyable way.

Role of Surveillance Tools and algorithm in E-learning Platforms

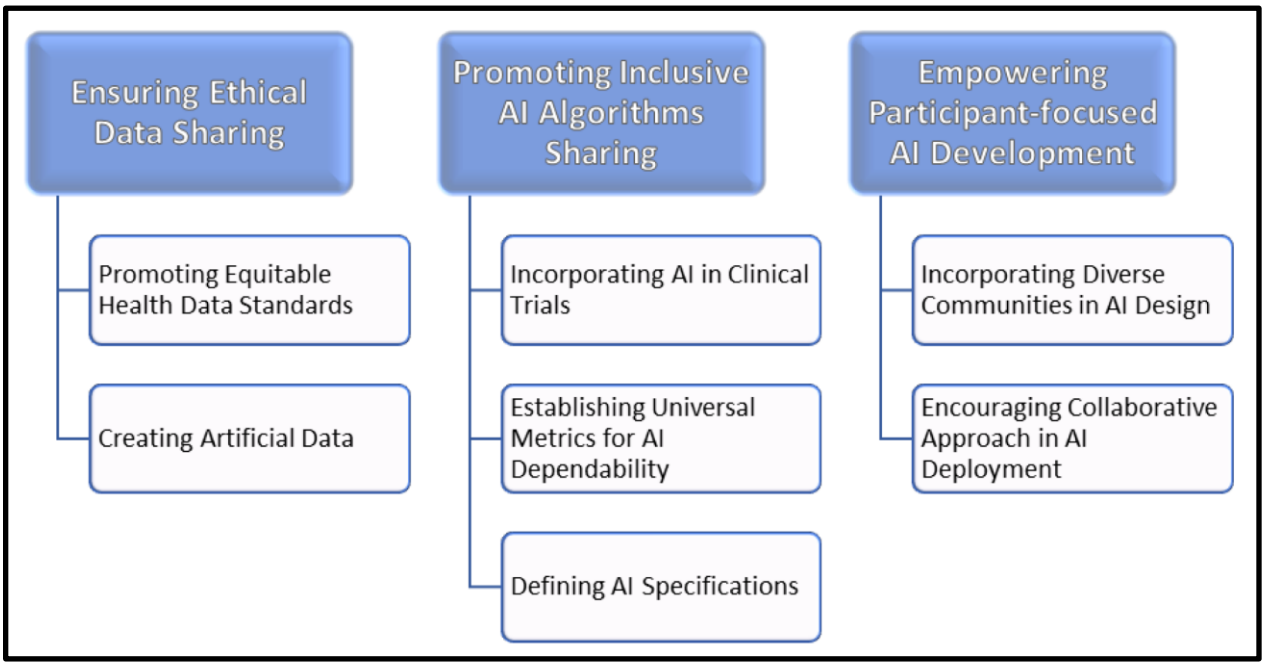

Figure 3: Implementation of an Algorithm e-learning platform for the betterment of study

(Source: Influenced by Paris et al. 2021)

In the platforms of e-learning, the tools of surveillance and algorithms play and important role in improving the educational experience of all the users. Tools of surveillance like tiger reserve detection and protection systems through remote control targets to keep the integrity of the academic process through the prevention of unfair activities like cheating during online exams and assessments (Paris et al. 2021). On the other hand, algorithms are able to analyse the behaviour of users record their performances and analyse their preferences to tailor a better experience of learning. This process is able to deliver the right and accurate content to each according to their style of learning and requirements. Learning analytics in e-learning platforms are primarily empowered by algorithms which help in identifying the performance patterns of learners. This helps to early detection of their wicker academic areas and strengths to provide additional support for their progress (Polydorou Eleni, 2023). Besides that survivals and algorithm processes in e-lanning platforms or able to generate feedback and grades for the learners based on their performances which help them understand their position in the academic field. It can be seen that algorithms in learning platforms are able to provide accurate resources and help users store the learning content for future uses which increases the flexible learning process effectively.

Evaluation of the ways of improving ethical standards of data safety for e-learning platforms

Safeguarding the sensitive information provided by the user in the learning platform needs to be protected for which establishing standards of ethics in data privacy is highly important. In the primary step, all the learning platforms need to clarify the privacy policy to all the users in a comprehensive way (Rakhimov et al. 2021). Additionally including a consent collection mechanism is able to help users get an option to choose how they like to share their information with the e-Learning platforms. Implementing encryption models and regular auditing systems can help in protecting data that alliance with the data protection law. It can be seen that updated security protocols and regulatory frameworks can help in providing data safety to all the users of e-learning platforms effectively (Sharma et al. 2021). In addition to this observing and monitoring surveillance and algorithms of e-Learning platforms to check whether these are imposing any threats or risks in academic resources for users. It can be seen that algorithms used in an e-learning platform can have potential biases and issues of fair treatment which is able to lower the academic experience of users. In order to prevent the situation regular evaluation and adjustment of e-Learning algorithms for minimising bias can help in increasing fairness assessment effectively.

Methodology

Data collection

The collection of data plays the most important role in conducting research. Through the collection of proper and relevant information for research answering the questions and building the objectives of a study can be easier (Jung et al. 2021). In order to understand the ethical implementation of data privacy and surveillance systems in e-Learning platforms the study has used primary quantitative methods for collecting information. Through the primary quantitative method, the study is able to collect real-time information where the views of participants have been collected (Kabukcu and Chabal, 2021). In the process of conducting the survey questioneries have been built where three demographic questions and 10 topic-oriented questions have been included. 60 participants have been chosen randomly for the survey purpose in this study.

Data analysis

In order to meet the aim of the study a quantitative analysis process has been considered. Through the use of a quantitative analysis system producing reliable outcomes through the interpretation of statistical data is possible. It can be seen the analysis through the quantitative process is able to deliver a well-structured perspective of the relationship between variables in this study. In order to present the relationship between the variables in this study the Analysis of data has been done by the use of IBM SPSS software in the form of ANOVA regression and correlation.

Findings and Analysis

Analysis of demographic profile

A detailed description of the demographic profile has been built in this part of the study. Demographic analysis is thought to be useful for looking at and analyzing relevant data related to specific demographic phenomena. The respondents' personal perspectives highlight the importance of "data protection systems in e-learning platforms" by taking into account various demographic factors, such as an individual's age, gender, and occupation, which help to elevate the authenticity.

Gender

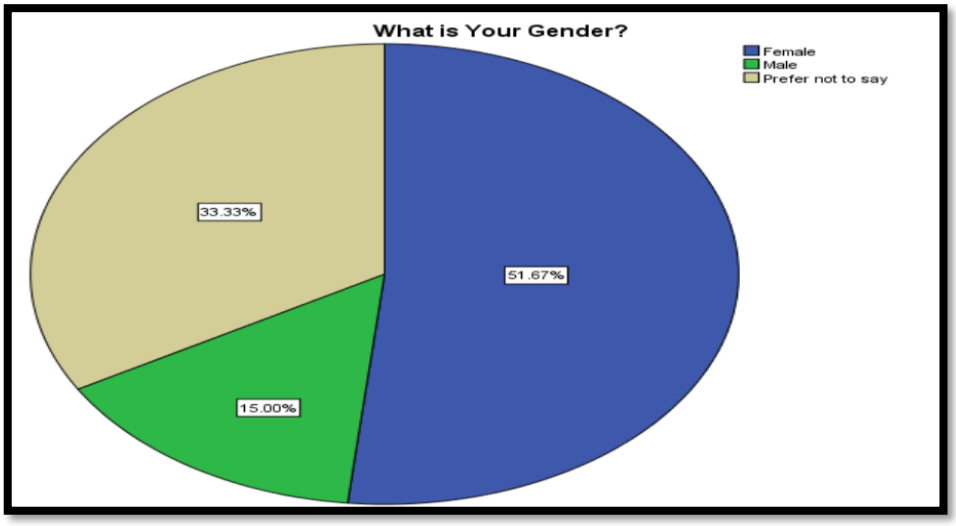

Figure 4: Analysis of the gender of participants

What is Your Gender?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	31	51.7	51.7	51.7
	Male	9	15.0	15.0	66.7
	Prefer not to say	20	33.3	33.3	100.0
	Total	60	100.0	100.0	

Table 1: Gender Analysis

Age

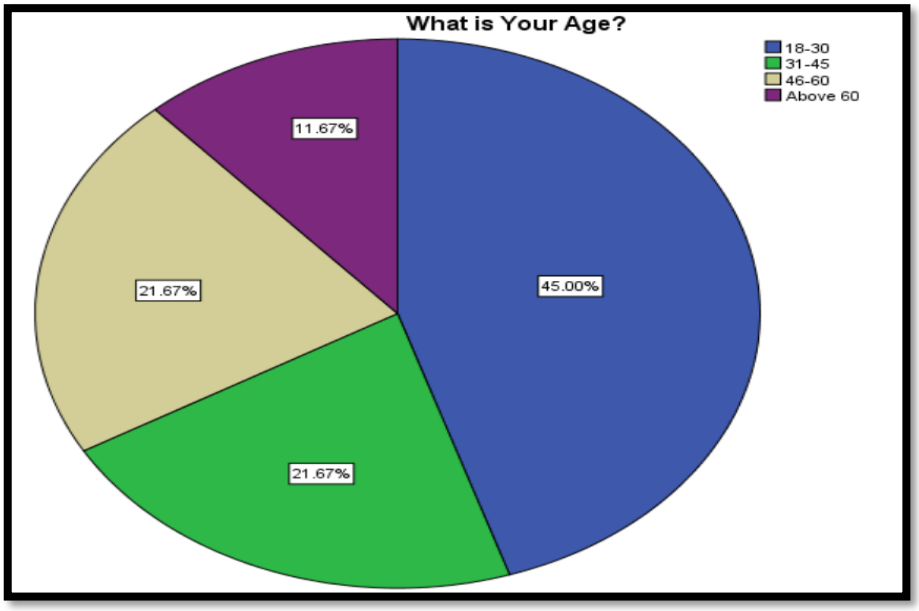

Figure 5: Analysis of the age of participants

What is Your Age?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18-30	27	45.0	45.0	45.0
	31-45	13	21.7	21.7	66.7
	46-60	13	21.7	21.7	88.3
	Above 60	7	11.7	11.7	100.0
	Total	60	100.0	100.0	

Table 2: Age Analysis

Profession

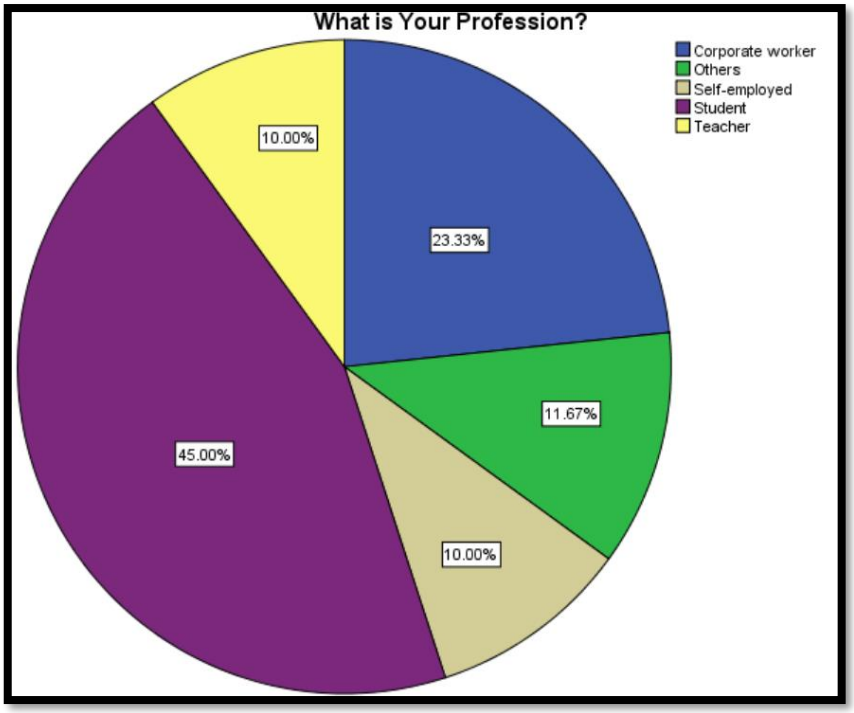

Figure 6: Analysis of the profession of participants

What is Your Profession?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Corporate worker	14	23.3	23.3	23.3
	Others	7	11.7	11.7	35.0
	Self-employed	6	10.0	10.0	45.0
	Student	27	45.0	45.0	90.0
	Teacher	6	10.0	10.0	100.0
	Total	60	100.0	100.0	

Table 3: Profession Analysis

The information above listed in figures and tables represents the gender, age and profession of participants who took part in the survey. In the survey, 60 participants were selected out of which 31 were female which 51.67% of the total participation was. 20 people who preferred not to disclose their identity are leading second position in the list which is 33.33% in the list. In the list of professionals, 27 were students which is 45% of the overall participation. In the list, corporate workers are in the second position which is 14, with 23.33% participation. In the case of the age of the participants, most of the participants with 45% participation belonged to the age group of 18 to 30. 21.67% of the participation belonged to the age group of both the 31 to 45 and 46 to 60.

Descriptive analysis

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Surveillance systems in the e-learning (DV)	60	1	5	3.85	1.505
The algorithms of the e-learning (IV 1)	60	1	5	3.57	1.358
The platforms of e-learning take permission (IV 2)	60	1	5	3.23	1.577
Algorithms in decision-making process (IV 3)	60	1	5	3.67	1.422
User rights are adequately protected (IV 4)	60	1	5	3.50	1.546
Valid N (listwise)	60				

Table 4: descriptive table presented by SPSS analyzing tool

Descriptive analysis needs to be done to scale the level of Central tendency of all the variables. in the study descriptive analysis has been done for scaling values such as mean median and standard deviation. as well as the skewness value. While the skewness value is more than +1, it reveals the data set is “right skewed” and in case of less than -1 the “left-skewed distribution” can be observed. in Table 4 the mean values range around 3 while the standard deviation is 1.3 to 15 which is considerably less than the former hence it can be said that the overall clustering of the responses lies near the mean value.

Multiple Regression

Hypothesis 1: Surveillance practices in learning platforms show a positive correlation with the better learning experience of users

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.798[a]	.636	.630	.916	.636	101.458	1	58	.000	1.904

a. Predictors: (Constant), User rights are adequately protected (IV 4)

b. Dependent Variable: Surveillance systems in the e-learning (DV)

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	85.037	1	85.037	101.458	.000[b]
	Residual	48.613	58	.838		
	Total	133.650	59			

a. Dependent Variable: Surveillance systems in the e-learning (DV)

b. Predictors: (Constant), User rights are adequately protected (IV 4)

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.132	.295		3.842	.000
	User rights are adequately protected (IV 4)	.777	.077	.798	10.073	.000

Table 5: analysis of regression for hypothesis 1

The R-value of Table 5 is .798, the R square value is .636 and the Adjusted R square is .630. The significance value of that analysis is .000. This information reveals that the R-value is near to 1 and the significance value is less than 0.05 which helps in supporting the claim of hypothesis 1.

Hypothesis 2: The use of ethical standards in the e-learning platforms forms a positive relationship with the improved learning experience of users

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.919[a]	.844	.841	.600	.844	313.068	1	58	.000	2.389

a. Predictors: (Constant), Algorithms in decision-making process (IV 3)

b. Dependent Variable: Surveillance systems in the e-learning (DV)

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	112.760	1	112.760	313.068	.000[b]
	Residual	20.890	58	.360		
	Total	133.650	59			

a. Dependent Variable: Surveillance systems in the e-learning (DV)

b. Predictors: (Constant), Algorithms in decision-making process (IV 3)

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.286	.216		1.324	.191
	Algorithms in decision-making process (IV 3)	.972	.055	.919	17.694	.000

Table 6: analysis of regression for Hypothesis 2

The R-value of Table 6 is .919, the R square value is .844 and the Adjusted R square is .841. The significance value of that analysis is .000. This information reveals that the R-value is near to 1 and the significance value is less than 0.05 which helps in supporting the claim of hypothesis 2.

Hypothesis 3: The use of algorithms in e-learning platforms forms a strong positive bond with better decision-making for building academic content

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.651[a]	.423	.413	1.153	.423	42.554	1	58	.000	1.772

a. Predictors: (Constant), The platforms of e-learning take permission (IV 2)

b. Dependent Variable: Surveillance systems in the e-learning (DV)

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	56.560	1	56.560	42.554	.000[b]
	Residual	77.090	58	1.329		
	Total	133.650	59			

a. Dependent Variable: Surveillance systems in the e-learning (DV)

b. Predictors: (Constant), The platforms of e-learning take permission (IV 2)

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.843	.342		5.390	.000
	The platforms of e-learning take permission (IV 2)	.621	.095	.651	6.523	.000

Table 7: analysis of regression for hypothesis 3

The R-value of Table 7 is .651, the R square value is .423 and the Adjusted R square is .413. The significance value of that analysis is .000. This information reveals that the R-value is not so clear to 1 and the significance value is less than 0.05 which helps in moderately supporting the claim of hypothesis 1.

Analysis of correlation

Correlations

		Surveillance systems in the e-learning (DV)	The algorithms of the e-learning (IV 1)	The platforms of e-learning take permission (IV 2)	Algorithms in decision-making process (IV 3)	User rights are adequately protected (IV 4)
Surveillance systems in the e-learning (DV)	Pearson Correlation	1	.905**	.651**	.919**	.798**
	Sig. (2-tailed)		.000	.000	.000	.000
	N	60	60	60	60	60
The algorithms of the e-learning (IV 1)	Pearson Correlation	.905**	1	.515**	.890**	.638**
	Sig. (2-tailed)	.000		.000	.000	.000
	N	60	60	60	60	60
The platforms of e-learning take permission (IV 2)	Pearson Correlation	.651**	.515**	1	.504**	.959**
	Sig. (2-tailed)	.000	.000		.000	.000
	N	60	60	60	60	60
Algorithms in decision-making process (IV 3)	Pearson Correlation	.919**	.890**	.504**	1	.678**
	Sig. (2-tailed)	.000	.000	.000		.000
	N	60	60	60	60	60
User rights are adequately protected (IV 4)	Pearson Correlation	.798**	.638**	.959**	.678**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	60	60	60	60	60

**. Correlation is significant at the 0.01 level (2-tailed).

Table 8: Analysis of correlation

The correlation value can be observed in table 8 which is in this study helps in forming the relation between variables. To gauge the strength in this instance, the Pearson Correlational Test is used which here shows a strong interconnection between variables.

Discussion

Through the e-Learning option learners are able to participate in a strategic learning experience virtually through multi-directional communication and interactive tools. In the process of e-learning, users are able to have the right to choose the way they want to receive learning content (Šlibar et al. 2021). In the e-learning platforms, a specific kind of algorithm is used to increase learning strength and content for a better learning experience. The use of algorithms in learning platforms can help increase the effectiveness of learning outcomes by customising the interface of the learning material on the basis of the interest of a user. It can be seen that the ethical implications for maintaining the privacy of data and the use of algorithms in learning platforms are a highly complex process (Tauhidah et al. 2021). For instance, during the use of e-learning platforms, users often share personal information without having any knowledge about the way that information is going to be stored and used. In the process of making a customised learning experience, each e-learning platforms collect personal information to understand the preferences of users which can be sports to the cyber attackers without having any proper security maintenance by the platform.

Conclusion

The use of ethical standards in the privacy maintenance and security system integration of the e-learning platform has been evaluated in this study. The use of quantitive methods in the data collection process has helped in collecting relevant information effectively. Through the customization of the learning material's interface based on a user's interests, learning platforms that employ algorithms can help improve the effectiveness of learning outcomes. The use of quantitative analysis methods through SPSS tools has helped in providing statistical result that helps in forming the relation between the variables in this study.

References

1. Alshambri, H. & Alassery, F. (2021). Securing Fog Computing For E-Learning System Using Integration of Two Encryption Algorithms. *Journal of Cyber Security*, 3(3), pp.149–166. doi:https://doi.org/10.32604/jcs.2021.022112.
2. Alier, M., Casañ Guerrero, M.J., Amo, D., Severance, C. & Fonseca, D. (2021). Privacy & E-Learning: A Pending Task. *Sustainability*, 13(16), p.9206. doi:https://doi.org/10.3390/su13169206.
3. Alshahrani, M.Y. (2021). Implementation of a Blockchain System Using Improved Elliptic Curve Cryptography Algorithm for the Performance Assessment of the Students in the E-Learning Platform. *Applied Sciences*, 12(1), p.74. doi:https://doi.org/10.3390/app12010074.
4. Hegerius, A., Caduff-Janosa, P., Savage, R. & Ellenius, J. (2020). E-Learning in Pharmacovigilance: An Evaluation of Microlearning-Based Modules Developed by Uppsala Monitoring Centre. *Drug Safety*, 43(11), pp.1171–1180. doi:https://doi.org/10.1007/s40264-020-00981-w.
5. Iman Cahyanto (2023). Privacy Challenges in Using Wearable Technology in Education Literature Review. *Formosa Journal of Applied Sciences*, 2(6), pp.909–928. doi:https://doi.org/10.55927/fjas.v2i6.4272.
6. Jung, S., Cho, S.-H., Kim, K.-H. & Kwon, E.E. (2021). Progress in quantitative analysis of microplastics in the environment: A review. *Chemical Engineering Journal*, [online] 422, p.130154. doi:https://doi.org/10.1016/j.cej.2021.130154.
7. Kabukcu, C. & Chabal, L. (2021). Sampling & quantitative analysis methods in anthracology from archaeological contexts: Achievements & prospects. *Quaternary International*, 593-594, pp.6–18. doi:https://doi.org/10.1016/j.quaint.2020.11.004.
8. Kiennert, C., De Vos, N., Knockaert, M. & Garcia-Alfaro, J. (2019). The Influence of Conception Paradigms on Data Protection in E-Learning Platforms: A Case Study. *IEEE Access*, 7, pp.64110–64119. doi:https://doi.org/10.1109/access.2019.2915275.

9. Kumar, V. & Sharma, D. (2021). E-Learning Theories, Components, & Cloud Computing-Based Learning Platforms. *International Journal of Web-Based Learning & Teaching Technologies*, 16(3), pp.1–16. doi:https://doi.org/10.4018/ijwltt.20210501.oa1.
10. Paris, B., Reynolds, R. & McGowan, C. (2021). Sins of omission: Critical informatics perspectives on privacy in e-learning systems in higher education. *Journal of the Association for Information Science & Technology*. doi:https://doi.org/10.1002/asi.24575.
11. Polydorou Eleni (2023). Towards a Secure & Privacy Compliant Framework for Educational Data Mining. *Lecture notes in business information processing*, pp.534–541. doi:https://doi.org/10.1007/978-3-031-33080-3_35.
12. Rakhimov, M., Yuldashev, A. & Solidjonov, D. (2021). THE ROLE OF ARTIFICIAL INTELLIGENCE IN THE MANAGEMENT OF E-LEARNING PLATFORMS & MONITORING KNOWLEDGE OF STUDENTS. *Oriental renaissance: Innovative, educational, natural & social sciences*, [online] 1(9), pp.308–314. Available at: https://cyberleninka.ru/article/n/the-role-of-artificial-intelligence-in-the-management-of-e-learning-platforms-and-monitoring-knowledge-of-students.
13. Sharma, P., Agarwal, K. & Chaudhary, P. (2021.). E-LEARNING PLATFORM SECURITY ISSUES & THEIR PREVENTION TECHNIQUES: A REVIEW. [online] doi:https://doi.org/10.51319/2456-0774.2021.8.0006.
14. Šlibar, B., Zlatić, L. & Rađep, N.B. (2021). ETHICAL & PRIVACY ISSUES OF LEARNING ANALYTICS IN HIGHER EDUCATION. *ICERI2021 Proceedings*, [online] pp.3064–3074. doi:https://doi.org/10.21125/iceri.2021.0761.
15. Statista, (2023) Share of people having issues with online education platforms in India as of June 2023, by platform Retrieved from: https://www.statista.com/statistics/1416406/india-online-education-platform-users-reporting-issues-by-platform/ on 22nd December, 2023
16. Tauhidah, D., Jayanti, U.N.A.D., Rahmasiwi, A., Pamungkas, R. & Saifulloh, A. (2021). Utilization of e-learning platforms by lecturers during the COVID-19 pandemic in Indonesia. *JPBI (Jurnal Pendidikan Biologi Indonesia)*, [online] 7(3), pp.198–207. doi:https://doi.org/10.22219/jpbi.v7i3.16816.
17. Ungerer, L.M. & Slade, S. (2022). Ethical Considerations of Artificial Intelligence in Learning Analytics in Distance Education Contexts. *Springer briefs in education*, pp.105–120. doi:https://doi.org/10.1007/978-981-19-0786-9_8.