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Awareness, Perception, and Utilization of E-Learning Platforms: A Community-Service Framework for STEM Teacher Development

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ABSTRACT

This study examined STEM teachers' awareness, perception, and utilization of e-learning platforms for self-study and translated the findings into a community-service framework for professional development. A quantitative survey assessed platform awareness, perceived ease of use, perceived usefulness, and utilization among public junior secondary school teachers in Akinyele Local Government Area, Oyo, Nigeria. Teachers demonstrated strong personal awareness and generally positive perceptions of e-learning platforms, although institutional promotion and regular self-study engagement remained comparatively limited. Perceived ease of use and perceived usefulness were positively associated with platform utilization. The findings support community-service activities focusing on digital literacy, guided platform use, collaborative professional learning, institutional awareness, and sustained teacher support to strengthen technology-mediated self-study and professional development.

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1. INTRODUCTION

Digital technologies have expanded opportunities for teachers to access professional knowledge, instructional resources, online communities, and self-directed learning beyond conventional training environments. E-learning platforms can support flexible professional learning by allowing teachers to access resources according to their own schedules and instructional needs. However, the educational value of such platforms depends not only on availability but also on whether teachers perceive them as useful, manageable, and relevant to their professional practices. The Technology Acceptance Model identifies perceived usefulness and perceived ease of use as central factors influencing technology acceptance [1]. Teachers' intention to use technology is influenced by beliefs concerning its usefulness and accessibility [2]. Extensions of technology-acceptance research also emphasize that interventions, institutional support, and facilitating conditions can influence technology adoption [3].

Teacher professional development increasingly extends beyond formal workshops and institutional courses. Professional learning can include reflection, independent inquiry, collaborative engagement, and continuous updating of instructional knowledge [4]. Online environments create additional opportunities for teachers to direct their own learning, select resources, and revisit professional content according to individual needs. Longitudinal evidence on teachers' self-directed online learning indicates that teachers use different strategies to locate, evaluate, organize, and apply online professional resources [5]. Digital professional networks may also support exchange of ideas, professional collaboration, and access to expertise beyond teachers' immediate institutional environments [6].

The effectiveness of technology-mediated professional learning nevertheless depends on more than access to digital tools. Teachers' knowledge, confidence, beliefs, and institutional culture interact in shaping meaningful technology integration [7]. This issue is particularly relevant to STEM teachers because their professional learning may involve rapidly changing scientific knowledge, digital simulations, data-related applications, instructional demonstrations, and technology-supported teaching resources. In Oyo State, existing evidence indicates varying levels of digital literacy among science teachers, suggesting the need for continuing professional support [8]. Recent evidence from the same state has also highlighted the importance of teachers' digital literacy and readiness for effective technology-supported teaching [9].

The Nigerian educational context presents additional challenges. Digital gaps in rural secondary schools and remote communities can restrict access to online learning opportunities and limit consistent engagement with e-learning resources [10]. Experiences with digitized education in Nigeria also demonstrate the importance of technological preparedness, access, and institutional support in sustaining online learning [11]. In resource-constrained environments, the usefulness of mobile and digital learning systems depends partly on whether technologies are accessible, contextually appropriate, and manageable for users [12]. More broadly, unequal access to digital infrastructure and institutional resources can intensify existing educational inequalities [13].

These conditions make teacher self-study particularly important. Self-study allows teachers to extend professional learning beyond scheduled training by independently accessing content, reflecting on professional needs, developing competence, and experimenting with instructional resources. The motivational quality of such engagement is

also important. Self-Determination Theory emphasizes autonomy, competence, and relatedness as important conditions supporting meaningful engagement and learning [14]. Intrinsic and extrinsic motivation can therefore influence whether teachers engage consistently with professional-learning opportunities and whether such engagement becomes sustained rather than occasional [15].

E-learning platforms provide multiple forms of support for teacher self-study. Open educational resources can reduce barriers to accessing professional and instructional materials while allowing resources to be adapted to particular learning contexts [16]. Learning management systems can organize content, communication, assessment, and learning activities within structured digital environments [17]. In addition, widely accessible applications and content-sharing platforms may provide less formal opportunities for independent learning and professional interaction. Their value, however, depends on teachers' awareness, digital competence, motivation, and capacity to integrate available resources into meaningful professional learning.

Within the context of public junior secondary schools, e-learning can therefore be understood not simply as a technological resource but as part of a broader professional-development environment. Awareness determines whether teachers recognize available learning opportunities, while perceived ease of use affects their confidence in navigating platforms. Perceived usefulness reflects whether teachers consider the platforms relevant to their professional needs, and utilization indicates the extent to which these perceptions are translated into actual self-study practices.

These dimensions also provide a basis for community service in teacher education. Community-service activities can translate assessment findings into practical professional support through digital-literacy workshops, guided demonstrations of e-learning platforms, collaborative resource development, mentoring, peer-learning sessions, and school-based follow-up. Such activities can be directed toward identified professional needs rather than delivered as generic technology training. Community service can therefore connect empirical assessment with teacher capacity building, institutional participation, and continuing professional learning.

The need for such an approach is evident when individual awareness is not accompanied by equally strong institutional promotion or routine utilization. Teachers may understand the potential value of digital resources while still requiring support in platform navigation, independent learning strategies, resource evaluation, and integration of online learning into professional practice. Assessment of awareness, perception, and utilization can therefore provide evidence for designing professional-development activities that respond to actual teacher experiences.

This study aimed to: (i) assess STEM teachers' awareness of e-learning platforms for self-study; (ii) examine their perception of the ease of use of e-learning platforms; (iii) determine their perception of the usefulness of e-learning platforms for professional self-study; (iv) evaluate the extent of platform utilization; (v) determine the relationships between perceived ease of use, perceived usefulness, and utilization; and (vi) translate the findings into a community-service framework for strengthening digital professional development among STEM teachers. The novelty of this study lies in connecting technology-acceptance assessment with community-service-oriented teacher development. Rather than treating awareness, perception, and utilization only as descriptive technology-adoption variables, the

study uses these dimensions to identify practical areas for digital literacy, self-directed learning support, collaborative professional development, and institutional engagement among STEM teachers in public schools.

2. LITERATURE REVIEW

2.1. E-learning platforms and teacher professional learning

E-learning platforms encompass digital environments that facilitate access to educational resources, communication, learning activities, and professional interaction. Their educational value extends beyond the delivery of formal online courses because digital environments may also support independent learning, peer exchange, instructional preparation, and continuing professional development. Learning management systems provide structured environments in which learning materials, activities, communication, and progress can be organized. Such systems may support self-paced professional learning when teachers have sufficient motivation and digital competence to engage independently [17]. Open educational resources provide another pathway for professional learning by increasing access to adaptable educational materials [16]. For STEM teachers, such resources can support content updating, instructional preparation, exploration of scientific concepts, and access to alternative teaching materials. Informal platforms can also contribute to professional learning. Teachers may use digital communication tools, video-sharing platforms, and professional networks to locate instructional materials, exchange ideas, and discuss classroom challenges. Professional learning networks can extend teachers' access to knowledge and professional interaction beyond institutional boundaries [6]. Consequently, e-learning for teacher development should be viewed as a combination of formal and informal digital-learning opportunities rather than being limited to institutionally managed learning systems.

2.2. Self-study and digital professional development

Teacher professional development is an ongoing process involving the development of subject knowledge, pedagogy, professional judgment, and reflective practice [4]. Self-study contributes to this process by enabling teachers to identify personal learning needs and independently seek relevant knowledge or skills. Online environments can strengthen self-study by increasing flexibility in when, where, and how teachers engage with professional resources. Teachers can search for instructional materials, view demonstrations, participate in professional communities, revisit difficult concepts, and experiment with digital resources. Research on teachers' self-directed online learning demonstrates that professional learning can involve purposeful strategies for locating, organizing, evaluating, and applying online information [5]. Self-study should therefore not be interpreted simply as passive access to information. Meaningful self-directed learning requires reflection, resource evaluation, professional relevance, and application. Digital competence becomes particularly important because teachers must distinguish useful professional content from less relevant or unreliable information and determine how new knowledge can support teaching.

2.3. Awareness and digital competence

Awareness represents an important initial condition for engagement with e-learning platforms. Teachers cannot meaningfully evaluate or use resources they do not know are available. However, awareness alone does not ensure meaningful utilization. Teachers also require the competence and confidence necessary to navigate platforms, evaluate resources,

and integrate learning into professional practice. Teacher technology adoption is shaped by interactions among knowledge, beliefs, confidence, and institutional culture [7]. Evidence from science teachers in junior secondary schools in Oyo State similarly indicates the importance of digital literacy for effective engagement with technology-supported education [8]. Research on teacher readiness in the same context further reinforces the importance of strengthening digital competence as part of professional preparation [9]. Institutional awareness programs should be accompanied by opportunities for practical engagement. Community-service activities can therefore combine information about available platforms with guided exploration, digital-literacy development, resource evaluation, and practical applications related to STEM teaching.

2.4. Perceived ease of use

Perceived ease of use refers to the degree to which individuals believe that using a technological system requires relatively little effort. Within the Technology Acceptance Model, perceived ease of use influences attitudes and willingness to engage with technology [1]. Teacher-focused technology-acceptance research also indicates that ease of use contributes to teachers' intentions to adopt technological tools [2]. For self-study, perceived ease of use is particularly important because independent learning requires teachers to engage with platforms without continuous external assistance. Difficult navigation, unfamiliar interfaces, or insufficient confidence may discourage exploratory learning even when useful content is available. Therefore, community-service activities designed to strengthen e-learning utilization should include practical demonstrations and opportunities for teachers to develop confidence through guided experience.

2.5. Perceived usefulness

Perceived usefulness describes the extent to which users believe that a technology can improve their performance or help them achieve relevant objectives [1]. For STEM teachers, usefulness may involve improving subject knowledge, accessing teaching resources, acquiring new pedagogical strategies, or applying digital skills in classroom practice. Perceived usefulness can influence whether teachers consider e-learning worthwhile enough to incorporate into their professional routines [2, 3]. A platform that is technically accessible may still remain underused if teachers cannot identify clear professional benefits. Community-service activities should therefore connect platform demonstrations with authentic teacher needs, such as updating STEM content, finding instructional resources, improving lesson preparation, and supporting professional collaboration.

2.6. Utilization of e-learning platforms

Utilization represents the practical engagement of teachers with e-learning resources for professional purposes. Actual use may differ from awareness or positive perception because structural, motivational, and institutional factors can interfere with continued engagement. Nigerian studies have documented digital-access challenges affecting e-learning in secondary-school and remote-community contexts [10]. Experiences with digitized education similarly emphasize the importance of infrastructure and institutional preparedness [11]. Resource constraints do not necessarily eliminate the potential for digital professional learning. Contextually appropriate mobile and online systems can support learning when technological requirements are manageable and users receive appropriate support [12]. However, broader inequalities in infrastructure and access can influence who is able to participate consistently

in digitally mediated learning [13]. Utilization should therefore be considered as the outcome of interacting individual and contextual factors. Awareness, perceived usefulness, perceived ease of use, motivation, competence, infrastructure, and school support may jointly shape whether teachers use e-learning resources occasionally or integrate them into continuing professional learning.

2.7. Technology Acceptance Model

The Technology Acceptance Model provides the principal cognitive explanation for teachers' adoption of e-learning platforms. Perceived usefulness and perceived ease of use influence attitudes and behavioural intentions toward technology [1]. Teacher-focused applications of technology-acceptance research have similarly demonstrated the relevance of these constructs for educational technology adoption [2]. The model is particularly suitable for the present study because perceived ease of use and perceived usefulness correspond directly with the variables measured among STEM teachers. Technology Acceptance Model extensions further emphasize that organizational and intervention-related factors may influence adoption [3]. This perspective provides a basis for connecting assessment findings with community-service strategies such as training, practical support, peer assistance, and institutional encouragement.

2.8. Self-Determination Theory

Technology acceptance explains whether teachers perceive e-learning systems as manageable and professionally valuable, but sustained self-study also involves motivation. Self-Determination Theory provides a complementary perspective by emphasizing autonomy, competence, and relatedness as important psychological needs associated with motivated engagement [14]. Autonomy is relevant when teachers independently determine what and how they need to learn. Competence relates to their confidence in navigating digital resources and applying what they learn. Relatedness is reflected in professional interaction, peer support, and participation in learning communities. Contemporary Self-Determination Theory further distinguishes between different qualities of intrinsic and extrinsic motivation and their implications for sustained engagement [15]. Combining technology acceptance with motivational perspectives therefore provides a broader understanding of e-learning utilization. Teachers may perceive a platform as easy to use and useful but still engage inconsistently when motivation, institutional support, or opportunities for professional interaction are limited.

2.9. Community service for digital professional development

Community service can translate digital-learning assessment into structured teacher-development activities. The assessment of awareness can identify whether teachers require greater exposure to available e-learning resources. Perceived ease-of-use findings can guide practical digital-literacy activities, while perceived usefulness can inform demonstrations that connect platforms with authentic STEM professional needs. Utilization findings can identify areas requiring continued mentoring, collaborative learning, and institutional encouragement. The relationship among these assessment dimensions and their community-service applications is summarized in **Table 1**. The framework connects the evidence collected from teachers with possible professional-development activities and the expected contribution of each activity to digital self-study. The framework positions community service as an evidence-informed professional-development process. Assessment identifies teacher experiences and needs, capacity-building activities respond to those needs, and school-based

follow-up supports continuing engagement. In this way, e-learning adoption is connected with digital competence, self-directed learning, professional collaboration, and institutional support.

Table 1. Community-service framework for supporting STEM teachers' e-learning-based professional development.

ASSESSMENT AREA	COMMUNITY-SERVICE FOCUS	MAIN PARTICIPANTS	EXPECTED CONTRIBUTION
E-learning awareness	Platform awareness and guided orientation	STEM teachers and school leaders	Broader knowledge of available professional-learning resources
Perceived ease of use	Digital-literacy and platform-navigation workshop	STEM teachers	Greater confidence in independent platform use
Perceived usefulness	Demonstration of STEM-related professional applications	STEM teachers	Stronger recognition of professional relevance
Platform utilization	Guided self-study and collaborative digital-learning activities	STEM teachers	More consistent use of e-learning for professional learning
Institutional support	School-based mentoring and monitoring	STEM teachers and school leaders	Sustained professional engagement and follow-up

3. METHOD

3.1. Research Design and Participants

his study employed a quantitative survey design among STEM teachers in public junior secondary schools in Akinyele Local Government Area, Oyo State, Nigeria. The study area comprised approximately 150 STEM teachers across 35 junior secondary schools. A two-stage sampling procedure was employed in which 10 schools were randomly selected, followed by the inclusion of 55 available STEM teachers from the selected schools.

3.2. Research Instrument

Data were collected using the E-Learning Awareness, Perception, and Utilization Questionnaire (ELAPUQ). The instrument measured demographic characteristics, awareness of e-learning platforms, perceived ease of use, perceived usefulness, and platform utilization using a five-point Likert scale. Content validity was established through expert review. A pilot study involving 20 STEM teachers outside the main sample yielded Cronbach's alpha coefficients ranging from 0.714 to 0.744, indicating satisfactory internal consistency.

3.3. Data Analysis

Descriptive statistics were used to answer the research questions, while Pearson correlation analysis examined the relationships between perceived ease of use, perceived usefulness, and platform utilization. Statistical analysis was conducted using SPSS, with statistical significance evaluated at an alpha level of 0.05.

3.4. Community-Service Interpretation

The findings were interpreted to identify community-service priorities for STEM teacher development. Awareness, perception, and utilization results were linked with digital-literacy

support, platform orientation, guided self-study, professional collaboration, institutional participation, and school-based monitoring.

4. RESULTS AND DISCUSSION

4.1. Characteristics of STEM Teachers

The demographic characteristics provide important context for interpreting teachers' engagement with e-learning platforms. The participants represented different educational qualifications and levels of teaching experience, indicating that digital professional-development needs may vary across the teaching workforce. Differences in professional preparation and experience can influence teachers' confidence, familiarity with instructional technologies, and approaches to self-directed professional learning [4, 7].

The demographic distribution is presented in **Table 2**. Female teachers constituted the majority of respondents. Most participants held either a Bachelor of Education or Bachelor of Science qualification. Teaching experience showed two relatively prominent groups, consisting of teachers in the early years of service and those with more than fifteen years of experience. Community-service activities should accommodate different levels of professional experience rather than assume uniform digital-learning needs.

Table 2. Demographic characteristics of participating STEM teachers.

VARIABLE	CATEGORY	FREQUENCY (n)	PERCENTAGE (%)
Gender	Female	34	61.8
	Male	21	38.2
Educational Qualification	NCE	12	21.8
	B.Ed	20	36.4
	BSc	16	29.1
	M.Ed	4	7.3
	Others	3	5.5
Teaching Experience	1-5 years	21	38.2
	6-10 years	8	14.5
	11-15 years	6	10.9
	Above 15 years	20	36.4

4.2. Awareness of E-Learning Platforms

Awareness represents an important foundation for digital professional learning because teachers need to recognize available resources before they can evaluate or utilise them. The findings indicate strong personal awareness of e-learning platforms among STEM teachers, but institutional promotion was comparatively weaker. This pattern is relevant because digital engagement may remain dependent on individual initiative when schools provide limited systematic exposure or encouragement. The detailed awareness results are presented in **Table 3**. Awareness of platforms designed for teachers' professional development recorded the highest mean, while familiarity with different platforms and previous information or training also received high ratings. In contrast, school or educational-authority promotion of e-learning platforms received a moderate rating. The pattern suggests a difference between individual awareness and institutional support. Awareness is largely established at the individual level, while institutional promotion remains an area for further support. This interpretation is consistent with evidence indicating uneven digital literacy and readiness among science teachers in Oyo [8, 9]. It also reflects broader findings that access to digital-

learning opportunities does not automatically produce sustained institutional engagement in Nigerian schools [10, 11]. From a community-service perspective, the findings support platform-orientation activities involving teachers and school leaders. Such activities can introduce available professional-learning platforms, clarify their relevance to STEM teaching, and reduce dependence on individually acquired information.

Table 3. Awareness of e-learning platforms among STEM teachers.

ITEM STATEMENT	SD n (%)	D n (%)	U n (%)	A n (%)	SA n (%)	Mean
I am aware of the existence of e-learning platforms designed for teachers' professional development.	1 (1.8)	0 (0.0)	1 (1.8)	34 (61.8)	19 (34.5)	4.27
I have received information or training on available e-learning platforms for STEM teachers.	3 (5.5)	0 (0.0)	4 (7.3)	36 (65.5)	12 (21.8)	3.98
I am familiar with different e-learning platforms that can support self-study.	3 (5.5)	0 (0.0)	3 (5.5)	36 (65.5)	13 (23.6)	4.02
My school/educational authority promotes awareness of e-learning platforms for teachers.	18 (32.7)	0 (0.0)	8 (14.5)	24 (43.6)	5 (9.1)	2.96

Note: Mean interpretation: 1.00-1.49 = Very Low; 1.50-2.49 = Low; 2.50-3.49 = Moderate; 3.50-4.49 = High; 4.50-5.00 = Very High.

4.3. Perceived Ease of Use

Perceived ease of use influences whether teachers consider e-learning platforms manageable for independent professional learning. Teachers generally reported positive perceptions of the ease of using e-learning platforms. Clarity and understandability received the highest assessment, while ease of navigation and confidence in independent use received comparatively lower ratings, although they remained within the high category. The detailed results are summarized in **Table 4**.

Table 4. Perceived ease of use of e-learning platforms among STEM teachers.

ITEM STATEMENT	SD n (%)	D n (%)	U n (%)	A n (%)	SA n (%)	MEAN
I find it easy to learn how to use e-learning platforms for self-study.	5 (9.1)	0 (0.0)	6 (10.9)	35 (63.6)	9 (16.4)	3.78
Navigating e-learning platforms does not require much effort.	7 (12.7)	0 (0.0)	10 (18.2)	30 (54.5)	8 (14.5)	3.58
I feel confident in my ability to use e-learning platforms without external help.	7 (12.7)	0 (0.0)	9 (16.4)	30 (54.5)	9 (16.4)	3.62
Using e-learning platforms is clear and understandable.	1 (1.8)	0 (0.0)	3 (5.5)	41 (74.5)	10 (18.2)	4.07

Note: Mean interpretation: 1.00-1.49 = Very Low; 1.50-2.49 = Low; 2.50-3.49 = Moderate; 3.50-4.49 = High; 4.50-5.00 = Very High.

The highest mean was recorded for the clarity and understandability of e-learning platforms. Teachers also indicated that learning how to use the platforms was relatively easy. Confidence in independent use and ease of navigation remained within the high range but showed comparatively lower means. The results support the Technology Acceptance Model, which identifies perceived ease of use as an important factor influencing technology acceptance [1]. Teacher-focused technology research also indicates that ease of use contributes to willingness to engage with educational technologies [2]. Nevertheless, the variation in navigation and independent-use confidence suggests that general familiarity should not be interpreted as equal digital competence among all teachers. Community-service activities can respond to this pattern through practical platform-navigation sessions and guided exercises. Such support can focus particularly on teachers who are aware of e-learning resources but remain less confident in independent use.

4.4. Perceived Usefulness for Self-Study

Perceived usefulness reflects whether teachers recognize e-learning platforms as relevant to their professional needs. The findings demonstrate generally positive perceptions across all evaluated aspects, particularly regarding the integration of newly acquired knowledge into teaching. The detailed results are shown in **Table 5**. Using e-learning platforms to integrate new knowledge into teaching obtained the highest mean. Enhancing professional knowledge and competence and improving the effectiveness of self-study also received high ratings. Although the item concerning general improvement of self-study recorded the lowest mean within this dimension, it remained within the high range. The pattern is consistent with the Technology Acceptance Model because perceived professional benefit can strengthen willingness to use technology [1-3]. Teacher professional learning is more meaningful when new knowledge can be connected with classroom practice [4,5]. Community-service activities should therefore demonstrate concrete applications of e-learning resources to STEM content, instructional preparation, and professional problem solving rather than focus only on platform features.

Table 5. Perceived usefulness of e-learning platforms for self-study.

ITEM STATEMENT	SD n (%)	D n (%)	U n (%)	A n (%)	SA n (%)	Mean
E-learning platforms can improve my self-study practices as a STEM teacher.	4 (7.3)	0 (0.0)	14 (25.5)	32 (58.2)	5 (9.1)	3.62
E-learning platforms can enhance my knowledge and professional competence.	4 (7.3)	0 (0.0)	4 (7.3)	34 (61.8)	13 (23.6)	3.94
E-learning platforms make my self-study more effective and efficient.	4 (7.3)	0 (0.0)	7 (12.7)	32 (58.2)	12 (21.8)	3.87
Using e-learning platforms helps me integrate new knowledge into my teaching.	2 (3.6)	0 (0.0)	7 (12.7)	33 (60.0)	13 (23.6)	4.04

Note: Mean interpretation: 1.00-1.49 = Very Low; 1.50-2.49 = Low; 2.50-3.49 = Moderate; 3.50-4.49 = High; 4.50-5.00 = Very High.

4.5. Utilization of E-Learning Platforms

Utilization provides an indication of how awareness and positive perceptions are translated into professional practice. Teachers use e-learning platforms for several professional purposes, but frequent personal use for self-study is comparatively weaker. As presented in **Table 6**, applying skills gained from e-learning platforms in teaching received the highest mean. Encouraging other teachers to use e-learning platforms and using platforms to update STEM knowledge also received high ratings. In contrast, frequent personal use for self-study was rated at the moderate level. The results reveal a distinction between recognising the professional value of e-learning and developing regular self-study habits. Teachers appear particularly willing to apply acquired skills in teaching and encourage colleagues, but individual routine engagement is less consistent. Similar research emphasizes that teachers' online professional learning depends on self-regulation, professional relevance, and continuing engagement [5]. Structural and access-related challenges may also influence sustained use in Nigerian and other resource-constrained environments [10-13]. Community service should extend beyond introductory platform training. Guided self-study schedules, professional-learning groups, peer mentoring, and periodic reflection may help convert occasional engagement into more sustained professional learning.

Table 6. Extent of utilization of e-learning platforms for self-study practices.

ITEM STATEMENT	SD n (%)	D n (%)	U n (%)	A n (%)	SA n (%)	Mean
I frequently use e-learning platforms for my self-study practices.	11 (20.0)	0 (0.0)	8 (14.5)	32 (58.2)	4 (7.3)	3.44
I rely on e-learning platforms to update my knowledge in STEM subjects.	5 (9.1)	0 (0.0)	8 (14.5)	37 (67.3)	5 (9.1)	3.77
I apply skills gained from e-learning platforms in my teaching practices.	0 (0.0)	0 (0.0)	9 (16.4)	35 (63.6)	11 (20.0)	4.04
I encourage other teachers to use e-learning platforms for professional development.	4 (7.3)	0 (0.0)	9 (16.4)	33 (60.0)	9 (16.4)	3.84

Note: Mean interpretation: 1.00-1.49 = Very Low; 1.50-2.49 = Low; 2.50-3.49 = Moderate; 3.50-4.49 = High; 4.50-5.00 = Very High.

4.6. Perceived Ease of Use and Platform Utilization

The first relationship analysis examined whether teachers' perceived ease of use was associated with utilization of e-learning platforms for self-study. The findings indicate a positive and statistically significant relationship. The statistical results are presented in **Table 7**. Perceived ease of use had a mean of 3.76, while utilization had a mean of 3.70. The correlation coefficient was 0.681, with $p < 0.001$, indicating a statistically significant positive association. The null hypothesis was therefore rejected. The result is consistent with Technology Acceptance Model assumptions that technologies perceived as easier to use are more likely to be accepted and utilized [1, 2]. However, the correlation should be interpreted as an association rather than proof that ease of use independently causes higher utilization. Other factors, including digital competence, motivation, access, and institutional support, may also influence engagement [7, 10-15]. From a community-service perspective, the finding supports practical digital-literacy activities designed to reduce navigation barriers and strengthen teachers' confidence in independent platform use.

Table 7. Correlation between perceived ease of use and utilization of e-learning platforms.

VARIABLE	N	MEAN	SD	df	r	Sig. (2-tailed)
Perceived Ease of Use	55	3.76	0.75	53	0.681**	0.000
Utilization	55	3.70	0.65	53		

Note. $df = N - 2$. Statistical significance was evaluated at $\alpha = 0.05$; ** $p < 0.001$.

4.7. Perceived Usefulness and Platform Utilization

The second relationship analysis examined the association between perceived usefulness and utilization. This relationship was stronger than the association observed for perceived ease of use, suggesting that teachers' perceptions of professional value are particularly important to their engagement. The results are presented in **Table 8**. Perceived usefulness had a mean of 3.86, while utilization had a mean of 3.70. The correlation coefficient was 0.749, with $p < 0.001$, indicating a statistically significant positive association. The null hypothesis was therefore rejected. The strong positive association is consistent with technology-acceptance research emphasizing perceived usefulness as a central determinant of adoption [1-3]. Teachers are more likely to engage with digital resources when they perceive clear professional value, such as improving STEM knowledge, supporting instructional preparation, or strengthening teaching practice. The finding also has motivational implications. Self-Determination Theory suggests that meaningful and sustained engagement is strengthened when learning activities support competence, autonomy, and personally valued goals [14, 15]. Community-service activities should therefore demonstrate not only how platforms operate but also why particular platforms and resources are useful for teachers' professional needs.

Table 8. Correlation between perceived usefulness and utilization of e-learning platforms.

VARIABLE	N	MEAN	SD	df	r	Sig. (2-tailed)
Perceived Usefulness	55	3.86	0.68	53	0.749**	0.000
Utilization	55	3.70	0.65	53		

Note. $df = N - 2$. Statistical significance was evaluated at $\alpha = 0.05$; ** $p < 0.001$.

4.8. Community-Service Implications for STEM Teacher Development

The combined findings indicate a clear pattern. Teachers demonstrate strong personal awareness and generally positive perceptions, but institutional promotion and habitual self-study remain comparatively weaker. Ease of use and perceived usefulness are both positively associated with utilization, with perceived usefulness demonstrating the stronger relationship. These findings provide an evidence base for targeted community-service activities rather than generic digital-training programs. The relationship between the empirical findings and appropriate community-service priorities is summarized in **Table 9**. Institutional awareness can be addressed through structured orientation, usability challenges through practical digital-literacy support, positive usefulness perceptions through STEM-specific demonstrations, and moderate routine self-study through guided professional-learning activities and peer mentoring. Community service can therefore connect assessment, capacity building, professional collaboration, and institutional support. Digital-literacy activities can strengthen competence, STEM-focused demonstrations can reinforce perceived usefulness, and peer-learning structures can support autonomy and relatedness. School

leaders can further contribute by promoting available platforms and supporting regular professional-learning opportunities. This integrated approach positions e-learning as part of continuing teacher development rather than as an occasional technological activity.

Table 9. Community-service priorities based on e-learning assessment findings.

RESEARCH FINDING	COMMUNITY-SERVICE PRIORITY	MAIN PARTICIPANTS	INTENDED CONTRIBUTION
Strong personal awareness but weaker institutional promotion	School-based platform orientation and awareness activities	STEM teachers and school leaders	Strengthening systematic institutional awareness
Positive ease-of-use perceptions with variation in confidence and navigation	Practical platform-navigation and digital-literacy sessions	STEM teachers	Strengthening independent and confident use
High perceived usefulness	STEM-focused platform demonstrations and resource-sharing activities	STEM teachers	Connecting platform use with professional needs
Moderate frequency of personal self-study	Guided self-study, peer mentoring, and professional-learning groups	STEM teachers	Encouraging sustained professional engagement
Positive association between ease of use and utilization	Hands-on digital support	STEM teachers	Reducing usability barriers
Strong positive association between usefulness and utilization	Professionally relevant digital-learning activities	STEM teachers and school leaders	Strengthening meaningful and continued utilization

5. CONCLUSION

STEM teachers generally demonstrated strong awareness and positive perceptions of e-learning platforms, although institutional promotion and regular personal self-study remained comparatively limited. Perceived ease of use and perceived usefulness were positively associated with platform utilization, emphasizing the importance of both usability and professional relevance. The findings support community-service activities focusing on digital literacy, guided platform exploration, STEM-related resource use, peer mentoring, and institutional support. Integrating these activities into school-based professional development can strengthen sustained digital self-study, collaborative learning, and teachers' capacity to use e-learning resources meaningfully for continuing professional growth.

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7. AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. The authors confirmed that the paper is free from plagiarism.

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