Ethiopian Journal of Business and Social Science

DOI: https://doi.org/10.59122/164F53vv

Volume: 7 Number: 1 , 2024 , Pages: 84~106

ISSN:2707-2770

Faculty Perception and Utilization of Information Communication Technology (ICT) Tools for Self-directed Professional Development

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Article Info

Accepted on March, 2024

Published on: June, 2024

Abstract

In the 21st century, Information and Communications Technology (ICT) has become an essential tool for teachers to develop their skills, knowledge, and ability to cope with the dynamic changes in education. To keep pace with the rapidly evolving educational landscape, teachers update themselves through various platforms including ICT. This study aimed to examine lecturers' perceptions and utilization of ICT for self-directed professional development (SDPD) at selected public universities in Ethiopia. The study adopted a cross-sectional survey design. We employed a systematic random sampling technique to select 205 participants for the questionnaire survey data collection.We conducted a one-sample Wilcoxon signed-rank test and a Kruskal-Wallis mean rank test to analyze lecturers' perceptions of ICT for SDPD and variation across the dimensions. To determine lecturers' level of ICT utilization for SDPD, areas of competence developed through ICT, and the types of ICT tools utilized, we used a one-sample t-test, a one-way ANOVA, and a Kruskal-Wallis test for mean ranking, respectively. The results indicated that lecturers generally have a high level of ICT perception for SDPD. Additionally, the study revealed lecturers utilized ICT to a high level to develop various skills and knowledge. They also utilized diverse ICT tools to develop their SDPD, with educational websites emerging as the most commonly exploited resource. Capitalizing on the helpful perceptions and high ICT utilization for SDPD among lecturers, we suggest the Universities enrich and develop the ICT-assisted professional development initiatives of the Faculty to better meet their evolving needs for quality education.

Keywords: ICT for professional development;ICT perception; ICT utilization; ICT tools;Self-directed professional development

1. INTRODUCTION

Understanding the critical role of information and communication technologies (ICTs) in transforming the education sector, the Ethiopian government has taken several key initiatives, including the National ICT Education Initiative, the Higher Education ICT Initiative, and the Training and Awareness Initiative. These initiatives outline strategic goals and associated ICT programs to widen access to education, support literacy, and facilitate educational delivery and training at all levels of education. To implement these initiatives, the government of Ethiopia drafted two successive ICT policies in 2009 and 2016. The latest ICT Policy and Strategy (FDRE, 2016) identifies ICT-assisted education as a strategic pillar for transforming the nation into a knowledge economy through ICT (Yigezu, 2021).

The commitment of the government to ICT-integrated education is also demonstrated in the Ethiopian Education Development Roadmap for 2018–2030, which emphasizes the need for ICT in education. In this sense, the government has made significant strides in leveraging ICT to transform the education sector, recognizing its indispensable role in enabling quality teaching, learning, research, and community service. To effectively integrate ICT in higher education, the government has established an ICT directorate within universities (MoSHE, 2020).

Giving emphasis to and incorporating ICT into institutions can be valuable in supporting quality teaching-learning, research, and community services, as well as boosting teachers' professional development in higher education. However, placing ICT into institutions alone does not guarantee its effective implementation unless there is a vigorous follow-up system in place. Therefore, it is critical to investigate the current status of ICT integration within higher education institutions. This would allow for an assessment of whether ICT has been utilized as planned to fully leverage its potential for delivering quality education, through the use of evidence-based studies.

Professional development is an ongoing process in the acquisition of knowledge, subject matter expertise, pedagogical skills, and attitudes necessary for effective teaching and learning (Ahmed et al., 2019; Hayes, 2014; Mushayikwa & Lubben, 2009). One of the many methods of professional development for teachers is self-directed professional development (SDPD). SDPD is a modality that promotes self-directed learning and decision-making, allowing teachers to progress at their own pace,

based on their individual needs, interests, and availability (Bleach, 2014; Kyndt et al., 2016). Since ICTs can be a powerful tool to engage teachers (Mushayikwa, 2013; Preston, 2001), ICT-integrated SDPD provides teachers with a flexible platform for accessing additional resources such as online workshops, digital libraries, and discussion forums (Cosgun & Savaş, 2019) without constraints of time and location at an individual pace (Ahmed et al., 2019; Dede, 2006; Mwalongo, 2011).

Concerning the ICT-integrated SDPD for professional development, INEE (2015) stated:

> *Information and Communications Technologies (ICTs) can enhance the teacher learning opportunity by offering multiple opportunities to practice new skills, apply new knowledge, and gain access to new digital resources for classroom teaching. ICT (such as video) allows teachers to observe good practice – especially relevant in areas where diverse examples of teaching and learning are in short supply. ICT can make models of effective teaching available to teachers through audio or video. (P. 132)*

Therefore, ICT simplifies the professional development process for teachers by offering abundant resources and options. It empowers them to take ownership of their learning since it allows them to decide what, when, and how they want to develop their competencies (Murray, 2013; Richards & Farrell, 2005). In contrast, traditional top-down continuous professional development (CPD) programs may not always cater to individual teachers' unique needs in terms of knowledge, practice, or new methods (Dede, 2006; Gaible & Burns, 2005; Murray, 2013; Richards & Farrell, 2005).

Although ICT utilization for professional development depends on many factors, including ICT literacy, beliefs, attitudes, and other circumstances (Boersma & Getu, 2018; Hepp et al., 2004), teachers' perception of ICT is a major and critical factor. Perceptions, in general, influence human actions and shape and direct actions in a certain manner (Boersma & Getu, 2018). Specifically, teacher perceptions of technology adoption can influence its adoption decisions and use (Mohamed et al., 2014; Parasuraman, 2000; Porter & Donthu, 2006; Sugar et al., 2004). Studies have indicated that teachers' perceptions of ICT for professional development play a pivotal role in shaping their engagement with various professional development activities (Ertmer, 2005; Hepp et al., 2004; Loveless, 2003; Umar et al., 2024). Additionally, Ahmed et al. (2019) revealed that faculty had a positive perception of ICT for professional development. Other studies also found that teachers were

aware of the roles of ICT in their professional development (Boersma & Getu, 2018; Bristi, 2014; Mwalongo, 2011).

Concerning ICT utilization for SDPD, previous studies have indicated that teachers have utilized ICT as a medium of professional development (Ahmed et al., 2019; Aprianti, 2017; Cosgun & Savaş, 2019; Mwalongo, 2011). The teachers have employed ICT tools to develop their professional, pedagogical, personal (Aprianti, 2017), social, and career improvement competencies (Richards & Farrell, 2005). Mushayikwa and Lubben (2009) identify key areas in teacher professional development which include practical knowledge and skills, pedagogical content knowledge (PCK), and career development (CD). Practical skills cover teaching methods, innovative techniques, resource acquisition, diverse assessments, and classroom interactions while PCK involves adapting teaching to specific contexts and integrating expertise. Peer networking through experience sharing, coaching, and mentoring is crucial. Besides, the authors also stated staying updated with subject advancements, lifelong learning, and seeking higher qualifications and job opportunities are important to career development. Addressing these areas enhances teachers' SDPD, leading to improved educational outcomes particularly if the professional development is assisted with ICT.

Concerning ICT tools teachers utilize, a study has shown that teachers have used social media platforms such as Facebook groups, discussion forums, and YouTube platforms for professional development to learn about new methods and techniques for language teaching and learning (Cosgun & Savaş, 2019). Besides, teachers have utilized the internet to access and engage with articles, journals, and websites to improve their professional development (Ahmed et al., 2019). Moreover, Ngao et al, (2022) have disclosed teacher educators use different software and learning platforms, social media, and online information, and access learning materials to improve their learning. Similarly, a study conducted at Bahir Dar University has indicated instructors use the Internet to a limited extent for teaching purposes (Boersma & Getu, 2018).

Studies that investigate instructors' perception and utilization of ICT for SDPD are limited in number (Ahmed et al., 2019; Boersma & Getu, 2018; Bristi, 2014; Cosgun & Savaş, 2019; Mwalongo, 2011). Some of them rely on case studies with small sample sizes and employ descriptive statistics to analyze data, thereby making the generalization of their findings challenging (Ahmed et al., 2019; Aprianti, 2017; Boersma & Getu, 2018). The study by Cosgun and Savas (2019) on teachers'

perceptions and use of ICT for professional development included primary, secondary, and university teachers. This study combined the data from these groups in its analysis, and hence, understanding the university instructors' perception and use of ICT for SDPD distinctly is less likely. Consequently, there is a lack of studies that investigate instructors' perceptions and utilization of ICT for SDPD in the context of Ethiopian public universities in general and in the study area in particular. This paucity may impede full comprehension of instructors' perceptions and utilization of ICT for professional development for informed policy decisions and possible remedial intervention if need be. Therefore, this study aims to investigate faculty perceptions and utilization of ICT for SDPD at selected public universities in Ethiopia.

In particular, this study addresses (i) lecturers' perceptions of ICT tools for SDPD, (ii)lecturers' level of engagement in ICT-assisted SDPD, (iii) the areas of competence lecturers develop through ICT, tools and (iv) the ICT tools the lecturers utilized to develop their professional development.

2. RESEARCH METHODOLOGY

2.1. Research Design

This study seeks to investigate faculty perceptions and utilization of ICT for SDPD at four selected public universities in Ethiopia, with a specific focus on the College of Social Sciences and Humanities. To address the study's objectives, the researchers employed a cross-sectional survey design for several reasons.A cross-sectional survey design allows data collection from a large sample size at a specific point in time, providing insights into the participants' perceptions and utilization of ICT for SDPD. The data from a larger sample enables the researchers to obtaina comprehensive understanding of the study's subject matter. Additionally, it empowers the researchers to make group comparisons through statistical analysis, detect small effects, examine subgroup differences, and draw insights that can be generalized to a larger population. Therefore, the cross-sectional survey design maximizes the opportunity for generalization and insights about perceptions and utilization of ICT for SDPD, which can inform policymakers, universities, and program planners for resource allocation and tailoring interventions or services accordingly.

However, it is important to acknowledge that the cross-sectional survey design does not capture changes over time. Cognizant of the limitationsof the cross-sectional survey design and biases

associated with self-reported data, the researchers attempted to analyze and interpretthe data to obtain comprehensive insights into faculty perceptions and utilization of ICT for SDPD.

2.2. Participants and Context of the Study

The participants of this study were drawn from the College of Social Sciences and Humanities of Arba Minch, Dilla, Sodo, and Jinka Universities that were selected purposively as they fall within our university research catchment area. The total population at the selected universities in the mentioned Colleges in the academic years 2023 and 2024 was about 752. The sample size for the questionnaire survey was determined using the sample size determination formula of Kothari (2004), which is given as follows: $n = z^2pqN/ e2 (N-1) + z^2pq$, where: 'n' is the sample size; 'e' is the standard error margin (0.05); 'z' is the standard value of the desired confidence level (95%, which is 1.96); 'p' is the desired sample proportion (0.15), 'N' is the population size and 'q' is 1—p (1–0.15 = 0.85).

A sample size of 202 lecturers was determined for the questionnaire survey. Using a systematic random sampling technique, every third name on the lecturer list was selected. To account for a potential low return rate, we ultimately chose 255 lecturers. Of these, 205 (80.4% of the total) completed and returned the questionnaire appropriately. Therefore, the number of faculty who filled out and returned the questionnaire matches the initially determined sample size.

In terms of gender distribution, the majority of participants were male, comprising 186 individuals, while the number of female participants was smaller, totaling 19. Turning to the participants' educational attainment, a substantial proportion of individuals held a Master's degree (M.A.), with 158 participants having achieved this level of education. Additionally, 47 participants possessed a Doctorate (Ph.D.). With regards to the participants' experience levels, 53 of them had 0-5 years of experience, 49 had 6-10 years, 52 had 11-15 years, and 51 had 16 or more years of experience ensuring varied levels of professional expertise. Concerning the participants' ICT training, 122 of them reported they received training, while 83 of them indicated a lack of ICT training. This distinction in ICT training highlighted variation within the participant pool about their exposure to technological tools and skills.

2.3. Data Collection Instrument

The purpose of the questionnaire was to gather quantitative data from the study participants on their perceptions and use of ICT for SDPD. We adapted and utilized a 5-point Likert scale type questionnaire (Aprianti, 2018; Boersma & Getu, 2018; Magambo, 2007; Sisay, 2017; Tu'ifua-Kautoke, 2015). The early versions of the questionnaire were related to the perception and use of ICT for teaching and learning. Therefore, we slightly modified the items of the questionnaire to align with perceptions and use of ICT for SDPD.

The pilot version of the questionnaire consisted of 51 items divided into four major scales in five parts. The first part focuses on gathering demographic information about the participants, including their sex, age, ICT training, teaching experience, and educational level. The second part comprises items (n=17) aimed at inquiring lecturers' perceptions of ICT for SDPD in six subscales. The third part consists of items (n=17) on lecturers' utilization of ICT for SDPD in six subscales. The fourth part measures the specific areas of competence lecturers develop through ICT, consisting of five (n=5) items. The fifth part of the questionnaire focuses on the ICT tools (n=12) lecturers employ for their SDPD and consists of items related to social media and educational platforms.

The demographic information part of the questionnaire requires respondents to select the most appropriate response among the alternatives or ranges of values. If no suitable option is available to the respondent, a blank space is provided to write their responses. The items in the second, third, and fourth parts of the questionnaire are designed on a 5-point Likert scale, ranging from 1=strongly disagree to 5=strongly agree. The items in the fifth part of the questionnaire are designed on a 5-point Likert scale, ranging from 1=never, 2=rarely, 3=sometimes, 4=often, and 5=always.

2.3.1. Construct Validity of the Questionnaire

The questionnaire on faculty perceptions and use of ICT for SDPD has undergone validation for its construct validity. To begin with, the inter-item correlations among individual items of the questionnaire within each of the six subscales of the scales of perceptions and utilization of ICT for SDPD ranged from .251 to .728 and .254 to .773, respectively at $p<.05$. The inter-subscale correlation values among the subscales measuring perceptions of ICT for SDPD ranged from .453 to .913, while the correlation values among the subscales measuring ICT utilization for SDPD ranged from .328 to

.853, at p<.05. Furthermore, the correlated item-total correlation values at the scale level ranged from .419 to .753 and .412 to .776 for the perceptions and utilization of ICT for SDPD scales, respectively at p<.05.

Concerning the areas of competence lecturers develop through ICT, the inter-item correlations between individual items of the questionnaire ranged from .336 to .676, while the correlated item-total correlation values at the scale level ranged from .324 to .532, p<.05. The final scale is the ICT tools lecturers employ for SDPD. Two items of this scale, which inquired about lecturers' use of blogs and use of internet resources for SDPD, showed negative inter-correlation with the other items of the scale. The negative inter-correlation indicates that the items measure distinct constructs. Consequently, we removed the two items from the scale. After removing the two items, the remaining items demonstrated inter-correlations ranging from .154 to .359, p<.05. Additionally, the correlated item-total correlation values of the scale ranged from .208 to .546, at p=.000.

Therefore, the questionnaire on lecturers' perceptions and utilization of ICT for SDPD, areas of competence lecturers develop through ICT, and the ICT tools they employ for SDPD are valid and can effectively measure the underlying constructs they are intended to measure. Early studies also corroborate the current findings and indicated that high inter-item correlations suggest the items are measuring the same or similar underlying construct (Clark & Watson, 1995; DeVellis, 2003; Roschel et al., 2021). Additionally, a positive item-total correlation between subscales suggests that the dimensions they represent measure similar constructs (Clark & Watson, 1995; DeVellis, 2003; Roschel et al., 2021).

2.3.2. Internal Consistency of the Questionnaire

Questionnaire validation involves checking the internal consistency reliability to ensure the interrelatedness of items within a scale. Table 2.1 and descriptions are provided as illustrated below.

Table: 2.1.

Internal reliability Cronbach alpha Values of Scale

Scale/subscales	**No of items**	**Reliability Coefficient**
1. Perception of ICT for SDPD	17	.92
• Career development (CD)	3	.62
• Pedagogical content knowledge (PCK)	5	.82
• Professional networking (PNW)	3	.77
• Access to resources (ARS)	2	.61
• Research related) (RR)	2	.84
• Practical knowledge & professional skills (PKS)	2	.69
2. Utilization of ICT for SDPD	17	.92
• Career development (CD)	3	.74
• Pedagogical content knowledge (PCK)	5	.85
• Professional networking (PNW)	3	.79
• Access to resources (ARS)	2	.58
• Research related) (RR)	2	.64
• Practical knowledge & professional skills (PKS)	2	56
3. Areas of competence enhanced	5	.84
4. ICT tools for SDPD	9	.72

The scales for measuring perception and utilization of ICT tools for SDPD, and areas of SDPD competence enhanced through ICTtools demonstrated strong reliability with Cronbach's alpha (α) values ≥ .84. The values indicate that the scales consistently measure the claimed variables with a high level of reliability.

However, one item of ICT tools for SDPD which queried participants about their use of YouTube reduced the reliability of the scale below the cut-off value. Consequently, we removed this item and increased the reliability coefficient from .65 to .72. Additionally, some of the subscales, including the ICT use for practical knowledge & professional skills (PKS) for the SDPD, exhibited internal consistency reliability values below the accepted Cronbach alpha cut-off value of .70. Nevertheless, we retained the subscales since the scales to which they belong demonstrated strong reliability values. Therefore, the overall tool for measuring lecturers' perception and utilization of ICT for SDPD, areas of competence enhanced through ICT, and ICT tools employed for SDPD consistently measure the variables of interest.

The final version of the questionnaire, therefore, comprises 48 items divided into four scales and several subscales. The scales for perceptions and utilization of ICT for SDPD each consist of 17 items

(n=17). The areas of competence that lecturers improve through ICT are represented by five items (n=5). The section on the ICT tools for SDPD includes a total of nine items (n=9).

2.4. Methods of Data Analysis

Depending on the type of measurement scale we used, we employed mean and median scores to quantify and organize thedata obtained from the questionnaire survey. To determine whether there was a significant overall difference between the sample median and the hypothetical median (3.00) on lecturers' perceptions of ICT for SDPD at a scale level, we employed a one-sample Wilcoxon signed-rank test. To investigate whether the lecturers' levels of perception of ICT for SDPD varied across subscales, we conducted a Kruskal-Wallis mean ranks test and Dunn's post hoc tests with Bonferroni correction for multiple tests. To determinewhether there was a statistically significant overall difference between the observed and expected mean scores of lecturers' ICT utilization for SDPD,we employed a one-sample t-test.To identify the specific areas of competence lecturers develop through ICT utilization, we conducted a one-way ANOVA. However, we employed a Kruskal-Wallis test for mean ranking to determine the types of ICT tools lecturers utilized for SDPD. Wealso employed effect size to indicate the magnitude of differences when appropriate.

2.5. Ethical Considerations

The researchers initiated the study by acquiring a formal letter from their university that requested the cooperation of the selected universities for data collection. Upon delivering the letter of cooperation to the universities, we met the selected participants and provided them with an explanation of the study's objectives and the specific types of data we sought. Having clarified the objectives of the study, we verbally asked for individual consent to participate in the study. We assured the participants that any personal information they shared would be handled with the utmost confidentiality and would not be disclosed without their explicit permission.

3. RESULTS AND DISCUSSION

3.1. Results

This section introduces the results of the study on faculty perceptions and utilization of ICT for SDPD, the areas of competence they improved through ICT, andthe ICT tools they largely employed for SDPD.

3.1.1. Perceptions of ICT for Self-directed Professional Development (SDPD)

A one-sample Wilcoxon signed-rank test indicates a significant difference ($Z = 12.294$ at $p < .001$ between the sample median (4.39) and the expected median (3.00) values with a large effect size ($r = .86$), (Cohen, 1998). Therefore, the result suggests the lecturers have an overallhigh level of perceptions ofICT for SDPD.

Table 3.1.

Wilcoxon Signed-rank Test Hypothesis Test Summary

Null Hypothesis	Test	Sig	Decision
The sample median equals 3.00	One-Sample Wilcoxon Signed Rank Test	.000	Reject null Hypothesis
Test Statistic	20,301.000		
Standard Error	825.648		
Standardized Test Statistic	12.294		
Asymptotic Sign. (2-sided test)	.000		
Sample median	4.39		
Hypothetical median	3.00		
N	205		

Asymptotic Significances are displayed. The significance level is .05

A one-sample Wilcoxon signed-rank test result does not indicate whether the lecturers' levels of perception of ICT for SDPD vary across subscales or not. To determine whether there is variation in lecturers' perception of ICT for SDPD across subscales or not, a Kruskal-Wallis mean ranks test was conducted, as presented in Table 3.2.

Table 3.2.

Kruskal-Wallis Mean Ranks Test Output Summary

Perception of ICT for SDPD across subscales	Mean Rank
Career development (CD)	602.94
Pedagogical content knowledge (PCK)	495.40
Professional networking (PNW)	672.01
Access resources (ARS)	614.49
Research-related (RR)	721.52
Practical knowledge & professional skills (PKPS)	586.64

$\chi 2 = 49.73$, df=5, p=.000

A Kruskal-Wallis test revealed a significant variation among lecturers' perception of ICT for SDPD across the subscales ($\chi 2\ (5) = 49.73$, $p < .001$, $\varepsilon^2 = .041$) although the effect is moderate. The lecturers showed the highest perception of the usefulness of ICT for the research-related subscale (721.52),

while theirperception of ICT for the pedagogical content knowledge subscale was the lowest (495.40).Dunn's post hoc tests with Bonferroni correction for multiple tests for pairwise comparisons of the subscales (Table 3.3) indicate the lecturers perceive ICT as most useful for developing their research-related (RR) competence, followed by professional networking (PNW), access to resources (ARS), and career development (CD) at adjusted $p < .05$, in descending order of perceived usefulness.

Table 3.3.

Multiple Comparison of Test for Mean Rankings of ICT Perception across Subscales

Sample 1- Sample 2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig. [a]
PCK - CD	107.54	34.63	3.105	.002	.028
PCK - ARS	-119.09	34.63	-3.44	.001	.009
PCK - PNW	-176.61	34.63	-5.10	.000	.000
PCK - RR	-226.27	34.63	-6.53	.000	.000
PKPS -RR	134.88	34.63	3.89	.000	.001
CD - RR	-118.58	34.63	-3.42	.001	.009
ARS - RR	-107.03	34.63	-3.09	.002	.030

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.
a. significance values have been adjusted by the Bonferroni correlation for multiple tests

3.1.2. Utilization of ICT for Self-directed Professional Development (SDPD)

A one-sample t-test result (Table3.4)showed a statistically significant difference between the expected mean (M= 3.00) and the overall observed mean (M= 3.99) score for lecturers' ICT utilization for SDPD [t (204) = 24.03, p = .000 (η^2 = .74)] at the scale level. The effect size is also large (Cohen, 1998).

Table 3.4.

A one-sample t-test statistics of ICT Utilization for SDPD

N = 205	Test Value = 3						
						95% CI	
ICT Use for SDPD	Scale Mean	t	df	Sig. (2-tailed)	Mean difference	Lower	Upper
	3.99	24.033	204	.000	.99	.91	1.08

The result suggests that the lecturers utilize ICT for their SDPD to a greater extent above the expected mean of 3.00. The Likert scale mean categorizations provided indicate that scores between 3.41 and 4.20 fall within the high mean range (Magulod, 2019; Wattananan & Tepsuriwong; 2015). Since the

observed mean of 3.99 falls within this range, it can be concluded that the lecturers reported an overall high level of ICT utilization for SDPD. Therefore, the lecturers at the selected public universities utilize ICT for their SDPD to a high level with a large effect size.

3. 1.3. Areas of Competence Lecturers Develop through ICT

Table 3.5.

Descriptive statistics on Areas of SDPD lecturers develop through ICT Utilization

Areas of Competence	Mean	Std.	Mini.	Max.	Skewness	Kurtosis
Career development	3.78	.95	2.00	5.00	-.45	-.66
Practical knowledge and professional skills	3.64	.98	2.00	5.00	-.43	-.46
Pedagogical content knowledge	3.60	1.07	2.00	5.00	-.32	-.92
Professional networking	3.84	1.03	2.00	5.00	-.68	-.37
Research related skills	3.88	.96	2.00	5.00	-.38	-.91

N = 205

Table 3.5 indicates the mean scores for areas of competence lecturers develop through ICT ranging from 3.60 to 3.88. The highest mean is observed for research-related skills (3.88) and professional networking (3.84), indicating the lecturers relatively use ICT to develop these areas to a high level. Career development (3.78) and practical knowledge and professional skills (3.64) also show a relatively high means. Pedagogical content knowledge (3.60) has the lowest mean among the areas considered, but it is still above the mean score (3.00) of the scale, indicating a reasonable level of attempt to develop it.

A one-way ANOVA (Table 3.6) results indicated statistically significant mean score variations [F (4, 1020) = 3.187, p = .013, $\eta 2$= .012] across areas of competence lecturers attempted to develop through ICT utilization. Although there are significant variationsin the areas of competence lecturers developed through ICT, the magnitude of the variation (effect size, $\eta 2$= .012) is small and could be considered a negligible variation.

Table 3.6.

ANOVA Outputs on areas of competence developed through ICT Utilization

	Sum of squares	df	Mean Square	F	Sig.
Between Groups	12.746	4	3.187	3.188	.013
Within Groups	1019.704	1020	1.00		
Total	1032.45	1024			

N=205 $\eta 2$ = .012

Therefore, the result indicates the lecturers at the selected public universities utilize ICT to develop a range of critical skills and knowledge. Specifically, they leverage ICT to enhance their research-related capabilities, facilitate professional networking, support career development, acquire practical knowledge and expertise, and support their pedagogical content knowledge. The ICT empowers these lecturers to stay up-to-date, collaborate effectively, and continuously refine their teaching and research approaches, ultimately contributing to their professional growth and the overall quality of higher education.

3.1.4. ICT Tools Lecturers Use for SDPD

Table 3.7.

Kruskal-Wallis Mean Ranks Test Output Summary of ICT Tools for SDPD

	ICT Tools for SDPD	Mean Rank
1.	Facebook or Telegram Groups	931.71
2.	LinkedIn	826.47
3.	Social media Forums	644.66
4.	Research gate/square	964.82
5.	Educational websites	1133.01
6.	Educational databases	954.30
7.	Educational applications	1046.47
8.	Online courses	944.81
9	Webinars	860.76

$\chi 2 = 118.728$, df=8, Asymp. Sig =.000

Kruskal-Wallis test results (Table 3.7) reveal significant variations in the ICT tools the lecturers utilize to develop their SDPD [($\chi 2$ (8) = 118.728, $p < .001$, $\varepsilon^2 = .06$)]. The results disclosedthe variation in the ICT tools the lecturers utilize to develop their SDPDis moderate. Consequently, educational websites were found to be the most frequently utilized tool, with a mean rank of 1133.01, while social media forums were the least utilized with a mean rank of 644.66. The remaining ICT tools fall between these two extremes, suggesting that lecturers employ a diverse range of technologies to support their self-directed professional development activities.

3.2. Discussion

The current study provides valuable insights into lecturers' perceptions of ICT for SDPD. The results indicate that lecturers generally have a high level of ICT perception for SDPD. This finding is consistent with earlier studies, which have highlighted faculty members' awareness of the potential of

ICT for professional development (Ahmed et al., 2019; Boersma & Getu, 2018; Bristi, 2014; Mwalongo, 2011).

The study further reveals significant and moderate differences in the lecturers' perception of the usefulness of ICT for SDPD across dimensions. Notably, lecturers perceive ICT as most useful for developing their research-related (RR) competence, followed by professional networking (PNW), access to resources (ARS), and career development (CD), in descending order of perceived usefulness. This pattern aligns with the literature, which suggests that ICT can offer more flexible and effective professional development opportunities for teachers, allowing them to connect with the global academic community (Iluobe, 2013; Sahito & Vaisanen, 2017).

The findings underscore the importance of teachers' perceptions of the mediating roles of ICT in professional development, as these perceptions can influence their actions, shaping and directing their engagement with ICT for professional development (Boersma & Getu, 2018; Cox et al., 2004; Jimoyiannis & Komis, 2006; Porter & Donthu, 2006; Vanderlinde, 2011). Other studies have emphasized that teachers' perceptions of ICT significantly impact their willingness to adopt and effectively use ICT tools for SDPD (Ahmed et al., 2019; Ertmer, 2005; Hepp et al., 2004; Hennessy et al., 2022; Loveless, 2003; Mohamed et al., 2014; Parasuraman, 2000; Porter & Donthu, 2006; Sugar et al., 2004; Thakur, 2012). Teachers who perceive ICT as useful for SDPD professional development are more likely to embrace technology and employ it, while those with undesirable perceptions may not use the ICT tools (Das, 2019; Mouza, 2008; Umar et al., 2024).

Concerning the utilization of ICT for SDPD, the results of the study reveal that the lecturers have an overall high level of ICT utilization at a scale level. This suggests that the lecturers actively use ICT to develop their professional competencies. These findings are consistent with earlier studies that have reported widespread adoption of ICT by teachers for their professional development. For instance, Ahmed et al. (2019), Aprianti (2017), Cosgun & Savaş (2019), Mwalongo (2011), and Richards & Farrell (2005) have all documented teachers' increased reliance on ICT as a medium to support their professional growth and learning. Mushayikwa (2013) further elaborated on the specific ways in which teachers utilize ICT for their professional development. These include using word processing software to create instructional materials, accessing and downloading web-based learning resources, and emailing to network with peers and professional organizations.

The high level of ICT utilization among the lecturers in the study suggests that they have embraced the potential of digital technologies to enhance their professional practice. This alignment between the findings and the existing literature underscores the growing importance of ICT integration in the professional development of educators, as it supports their ability to adapt to the evolving educational landscape and deliver effective, technology-enhanced learning experiences for their students.

The current study findings indicate that lecturers at selected public universities utilize ICT to develop their capabilities across several key areas of professional development. They used ICT to facilitate their research-related activities, enabling lecturers to enhance their research skills and expand their scholarly endeavors. Additionally, they employed ICT tools to support professional networking, allowing lecturers to engage in meaningful exchanges, share experiences, and benefit from coaching and mentoring opportunities.The use of ICT also plays a crucial role in lecturers' career development, empowering them to acquire practical knowledge, and expertise, and stay updated on subject advancements. This, in turn, contributes to their personal and professional competency, as outlined by Aprianti (2017) and Richards and Farrell (2005). Notably, ICT integration helps lecturers strengthen their pedagogical content knowledge (PCK), enabling them to adapt their teaching approaches to specific contexts and effectively integrate their subject matter expertise.

The key areas of teacher professional development identified by Mushayikwa and Lubben (2009) include practical knowledge and skills (PKPS), pedagogical content knowledge (PCK), and career development (CD) through the utilization of ICT by the lecturers. Practical skills, such as teaching methods, innovative techniques, resource acquisition, diverse assessments, and classroom interactions, are enhanced through the use of digital tools and platforms. PCK is improved as lecturers utilize ICT to tailor their teaching to the needs of their students and integrate their disciplinary expertise. Additionally, career development is supported through opportunities for lifelong learning, the pursuit of higher qualifications, and the identification of job prospects.

By addressing these crucial areas of SDPD through the integration of ICT, the lecturers are positioned to enhance their overall professional competence, ultimately leading to improved educational outcomes for their students. The synergistic relationship between ICT utilization and the development of diverse competencies highlights the transformative potential of technology in enhancing the professional growth and effectiveness of university-level educators.

Regarding the types of ICT tools lecturers utilize for their SDPD, the current study reveals that lecturers employ a variety of ICT tools with moderate variation. Accordingly, the findings indicate that educational websites were the most frequently utilized tool, while social media forums were the least utilized. The remaining tools, which include Facebook or Telegram groups, LinkedIn, Research Gate, educational databases, educational applications, online courses, and webinars, fall between these two extremes in terms of frequency of usage.

These findings are corroborated by previous studies on the topic. Cosgun and Savaş (2019) suggest that teachers use social media platforms like Facebook groups and discussion forums as platforms for professional development, enabling them to learn about new methods and techniques for teaching and learning. Ahmed et al. (2019) also found that teachers utilized websites to improve their professional development. Moreover, Thakur (2012) identified a range of ICT tools that teachers commonly employ for their SDPD, such as blogs, social networking platforms, wikis, web quests, multimedia scrapbooks, webinars, online courses, and study groups. Furthermore, teacher educators use different software and learning platforms, use social media, and online information, and access learning materials to improve their learning (Ngao et al., 2022).

The findings from these studies highlight the potential of ICT to support and enable teachers' self-directed professional development. By utilizing a diverse array of ICT tools, lecturers can engage in a wide range of professional development activities, such as accessing educational resources, collaborating with peers, participating in online courses and webinars, and staying up-to-date with the latest trends and best practices in their field.

The prevalence of educational websites as the most frequently utilized tool suggests that lecturers value the accessibility and breadth of information available on these platforms. On the other hand, the relatively lower usage of social media forums may indicate a need for further exploration of how these tools can be effectively integrated into SDPD, particularly in terms of fostering meaningful peer-to-peer interactions and knowledge sharing. Thus, the study highlights the diverse range of ICT tools that lecturers employ for their self-directed professional development, with educational websites emerging as the most commonly utilized resource.

4. CONCLUSION

The current study examined lecturers' perceptions and utilization of ICT for SDPD. The lecturers at the selected public universities have a strong perception of the usefulness of ICT for supporting their SDPD. Lecturers view ICT as most valuable for enhancing their research-related competencies, followed by professional networking, accessing resources, and career advancement. This positive perception of ICT for SDPD indicates that lecturers recognize the potential of technology-enabled learning and development. Concerning the utilization of ICT for SDPD, the results show high levels of ICT utilization for SDPD among the lecturers that demonstrate their active embrace of digital tools and platforms to drive their continuous professional growth. This readiness and adoption of ICT for SDPD provides a solid foundation for universities to further integrate and leverage technology to support their faculty's ongoing professional development.

The finding that lecturers perceive ICT as most useful for research-related competence development points to an opportunity for universities to strengthen their provision of ICT-enabled research support and collaboration tools within the academic ecosystem. By capitalizing on lecturers' positive perceptions and high levels of ICT utilization for SDPD, universities can enhance and expand their ICT-enabled professional development initiatives to better meet the evolving needs of their faculty.

The lecturers at the selected public universities effectively utilize ICT to improve their research practices, facilitate networking and collaboration, support career development, acquire specialized knowledge, and strengthen their pedagogical expertise. The integration of ICT empowers these lecturers to stay current, collaborate efficiently, and continuously refine their teaching and research approaches, ultimately contributing to their professional growth and the overall quality of higher education.

The study found that lecturers use a variety of ICT tools to support their SDPD, with some variation in frequency of use. Educational websites emerged as the most commonly utilized resource, while social media forums were the least frequently used. The remaining tools fell somewhere in the middle in terms of frequency of use. This suggests that lecturers utilize a diverse set of digital resources for their ongoing professional learning, favoring more web-based platforms over social media tools.

Further research is needed to explore the factors influencing lecturers' selection and usage of these ICT tools for SDPD.

The findings of this study may not be generalizable to private universities. The self-reported data on ICT perceptions and utilization could be subject to response bias or limitations in accurately capturing actual utilization patterns. Besides, this study was cross-sectional, capturing a snapshot in time. Longitudinal research could provide a deeper understanding of how lecturers' perceptions and utilization of ICT for SDPD change over time. The study did not explore the factors influencing lecturers' selection and utilization of specific ICT tools for SDPD, which could provide valuable insights for tailoring professional development initiatives. The study also did not delve into the potential challenges or barriers that lecturers might face in effectively integrating ICT into their SDPD, which could inform the development of more comprehensive support strategies. Overall, the study provides valuable insights, but further research is needed to explore the underlying factors, and potential challenges to ensure the effective implementation of ICT-enabled professional development initiatives in higher education.

Statements and Declarations

- We declare that this manuscript is original and has not been sent to any other journals

Competing Interests

- There is no any sort of competing interest concerning this study

Acknowledgments

We would like to acknowledge Arba Minch University for funding this study. We would also like to thank the head of the research coordination office at the College of Social Sciences and Humanities (CSSH) for his genuine and unreserved facilitation of the research funds and timely responses to any query we had. We are also grateful to the teachers who were cooperative and helpful during the data collection.

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