



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

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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 that 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 that 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

Cognizant of the vital role of information and communication technologies (ICTs) in changing the education sector, the government of Ethiopia has taken several significant initiatives, of which the National ICT Education, the Higher Education ICT, and the Training and Awareness Initiatives are some (FDRE, 2009; 2016). The mentioned initiatives aimed at widening access to education, supporting literacy, and smooth educational delivery and training at all levels of education (FDRE, 2009; 2016). To implement these initiatives, two successive ICT policies were drafted in 2009 and 2016, respectively. The recent ICT Policy and Strategy (FDRE, 2016) articulated ICT-assisted education has become a strategic stake to transform the country into a knowledge economy (Yigezu, 2021).

The commitment of the government to ICT-integrated education is also recognized in the Education Development Roadmap of Ethiopia (MoE, 2018), directing the transformation of the education sector, improving quality teaching, learning, and research. To successfully integrate ICT in higher education in particular, the government has reinforced universities to establish ICT at a directorate level (MoSHE, 2020) to support quality teaching-learning, research, community services, and enhance the professional development of teachers.

Nevertheless, placing ICT into institutions alone could not guarantee its actual implementation unless a strong follow-up system is in place. Therefore, it is critical to investigate the current status of ICT integration within higher education institutions. The study would allow for an assessment of whether ICT has been utilized as planned influencing its potential for delivering quality education, through the use of evidence-based studies.

Professional development is an ongoing process of updating oneself through the acquisition of knowledge, subject matter expertise, pedagogical skills, and attitudes required 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 (Richards & Farrell, 2005; Murray, 2013). 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). Teachers' perceptions of technology adoption could encourage its implementation (Mohamed et al., 2014; Parasuraman, 2000; Porter & Donthu, 2006; Sugar et al., 2004). Studies have shown that teachers' awareness of ICT for professional development, in particular play a critical role in influencing their commitment to different professional development endeavors (Ahmed et al., 2019; Boersma & Getu, 2018; Bristi, 2014; Ertmer, 2005; Hepp et al., 2004; Loveless, 2003; Mwalongo, 2011; Umar et al., 2024).

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 specifically embrace teaching methods, innovative techniques, resource acquisition, varied assessments, and classroom interactions. Similarly, PCK encompasses adapting teaching to specific contexts as well as integrating expertise. Peer networking through experience sharing, coaching, and mentoring is crucial. Besides, Mushayikwa and Lubben (2009) also stated that 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, a study conducted by Ngao et al. (2022) unveiled that teacher educators employed varied software, learning platforms, social media, online information, and access to learning materials to improve their profession. Similarly, a study conducted at Bahir Dar University showed instructors use the Internet to a limited degree for teaching purposes (Boersma & Getu, 2018).

Studies conducted in relation to instructors' perception and utilization of ICT for SDPD are inadequate (Ahmed et al., 2019; Boersma & Getu, 2018; Bristi, 2014; Cosgun & Savaş, 2019; Mwalongo, 2011). Some of the studies are case studies with small sample sizes and employed descriptive statistics to analyze data, in which their findings are inconclusive (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 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. The dearth of studies related to instructors'

perceptions and utilization of ICT for professional development could be a barrier to understanding these issues and to taking data-driven decisions and conceivable corrective measures if need be. Therefore, studying faculty perceptions and utilization of ICT for SDPD at selected public universities in Ethiopia could be one step towards understanding weaknesses and strengthening the decent experience in ICT for SDPD.

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 sought to investigate faculty perceptions and utilization of ICT for SDPD at four selected public universities in Ethiopia, with a specific emphasis on the College of Social Sciences and Humanities. To address the objectives of the study, the study adopted a cross-sectional survey design for several reasons. This design enables the collection of data from a large sample size at a definite point in time about perceptions and utilization of ICT for SDPD. The data from a larger sample could give opportunity to obtain a comprehensive understanding of the subject matter of the study and draw insights generalizable to a larger population. The comprehensive insights from such a large sample can inform policymakers, universities, and program planners to share resources and adapt interventions accordingly.

Nevertheless, a cross-sectional survey design could not capture changes over time. Cognizant of the limitations of the design of the study and biases related to self-reported data, we analyzed the data with inferential statistics to acquire a comprehensive understanding of faculty perceptions and utilization of ICT for SDPD.

2.2. Participants 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, which 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: $n = \frac{z^2 pqN}{e^2 (N-1) + z^2 pq}$, 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 $1-p$ ($1-0.15 = 0.85$).

The estimated sample size for the questionnaire survey was 202 participants. We applied a systematic random sampling technique to select every third person from the list. To compensate for a possible low return rate, we selected 245 lecturers, above the estimated sample size. Out of 245 participants, only 205 (80.4% of the total) filled out the questionnaire appropriately, which was approximately equal to the predetermined sample size of 202.

In terms of gender distribution, the majority of participants were male, comprising 186 individuals, while the number of female participants was smaller, totaling 19. In relation to the participants' educational level, 158 participants have achieved a Master's degree (M.A.). Additionally, 47 participants possessed a Doctorate (Ph.D.). Regarding the experience levels of the participants, 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. In relation to the participants' ICT training, they reported that 122 of them had an ICT training background, while 83 of them reported a lack of ICT training. Hence, it seems that the results highlighted a discrepancy in the participants' exposure to technological tools and skills.

2.3. Data collection instrument

The purpose of the questionnaire was to gather quantitative data about the study participants' perceptions and utilization of ICT for SDPD. The questionnaire was adapted from previous works (Aprianti, 2018; Boersma & Getu, 2018; Magambo, 2007; Sisay, 2017; Tu'ifua-Kautoke, 2015) to fit the current study. The questionnaires of the early works 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 ICT for SDPD in a 5-point Likert scale.

The pilot version of the questionnaire consisted of 51 items divided into four major scales in five parts. The first part of the questionnaire was about demographic information of the participants, including their ICT training, teaching experience, and educational attainment. 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). 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 values of the questionnaires

| 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 ICT tools, demonstrated strong reliability with Cranach's alpha (α) values $\geq .84$. 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

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 decide whether there was a statistically significant overall difference between the observed and expected mean scores of lecturers' ICT utilization for SDPD, we applied 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 utilized a Kruskal-Wallis test for mean ranking to determine the types of ICT tools lecturers utilized for SDPD. We also made use of effect size to indicate the magnitude of the differences discussed above, where deemed applicable.

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. 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, and the ICT tools they largely employed for SDPD.

3.1.1. Perception 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 overall high level of perceptions of ICT 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 their perception 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 method for multiple tests

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

A one-sample t-test result (Table 3.4) showed a statistically significant difference between the expected mean ($M = 3.00$) and the overall observed mean ($M = 3.99$) score for ICT utilization for SDPD [$t(204) = 24.03$, $p = .000$ ($\eta^2 = .74$)] at scale level. The effect size is also large (Cohen, 1998).

Table 3.4. A one-sample t-test statistic 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 than 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 (Bluman, 2017; 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 that 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 mean. 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 variations in 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 results showed that the lecturers at the selected public universities utilized ICT to develop a variety of critical skills and knowledge. Particularly, they utilized ICT to improve their research-related skills, ease professional networking, support their career development, improve their practical knowledge and expertise, and advance their pedagogical content knowledge. ICT-integrated professional development would enable lecturers to stay updated with developments, collaborate, and continuously upgrade their teaching and research approaches, which in the long run contribute to 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

The Kruskal-Wallis test results (Table 3.7) revealed significant and yet moderate variations in the lecturers utilization of ICT tools to improve their SDPD [$(\chi^2 (8) = 118.728, p < .001, \varepsilon^2 = .06)$]. Subsequently, the most frequently utilized tool was educational websites while social media forums were the least, with a mean rank of 1133.01 and 644.66, respectively for educational websites and social media forums. The remaining ICT tools have been falling between the aforementioned two extremes, implying that lecturers utilize a variety of tools to support their professional development activities.

3.2. Discussion

The results of the current study revealed that lecturers largely have good awareness of the helpfulness of ICT for SDPD. Preceding studies also divulged that faculty members had the awareness of the potential of ICT for enhancing their professional development (Ahmed et al., 2019; Boersma & Getu, 2018; Bristi, 2014; Mwalongo, 2011). Although the study found that lecturers mainly have good awareness of the value of ICT for SDPD, it disclosed the presence of significant and reasonable differences in the lecturers' perception of ICT for SDPD across the dimensions. Particularly, the lecturers perceived 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. Aligned with the current findings, literature recommends that ICT has the capacity to provide flexible and effective professional development opportunities for teachers, and may connect them with the global academic community for sharing experience (Iluobe, 2013; Sahito & Vaisanen, 2017).

The current study result underlined the importance of teachers' ICT perception as a mediator in the professional development of teachers. Several studies disclosed perception can influence teachers' actions, shape and direct their engagement with ICT for professional development (Boersma & Getu, 2018; Cox et al., 2004; Jimoyiannis & Komis, 2006; Porter & Donthu, 2006; Vanderlinde, 2011). Similarly, studies emphasized that teachers' ICT perception can meaningfully influence their readiness to implement 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). Therefore, teachers who perceive ICT as a valuable tool for SDPD are more likely to integrate technology and implement it, while teachers who developed an undesirable perception may not utilize 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 results are consistent with previous studies that teachers widely use ICT 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. Teachers utilize ICT for their professional development to produce instructional materials with word processing software, access and download web-based learning resources, and establish a network with peers and professional organizations (Mushayikwa, 2013).

The current study results show that lecturers at selected public universities utilize ICT to develop their competencies across several vital areas of professional development. Accordingly, they used ICT to facilitate their research-related work, improve their research skills, and develop their academic endeavors. Moreover, they employed ICT tools to proliferate professional networking, involve in meaningful interactions, share experiences, and benefit from training and mentoring opportunities. Furthermore, they used ICT for career development, acquired hands-on knowledge and expertise, and stayed updated on subject improvements. Studies pointed out that such ICT use contributes to teachers' personal and professional development (Aprianti, 2017; Richards & Farrell, 2005). Thus, it seems apparent to conclude that ICT integration reinforces teachers' pedagogical content knowledge (PCK), enabling them to acclimate their teaching to specific situations and effectively integrate their subject matter knowledge.

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. Lecturers' ICT utilization to modify their teaching to the requirements of their students improved their PCK. Additionally, it enhanced the lecturers' career development and opportunities for lifelong learning.

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. Aligned with the results of the current study, teachers have used social media like Facebook groups and discussion forums as platforms for professional development about new methods and techniques for teaching and learning (Cosgun & Savaş, 2019). They also have employed blogs, social networking platforms, wikis, web quests, multimedia scrapbooks, webinars, online courses, and study groups (Thakur, 2012) and websites to improve their professional development (Ahmed et al., 2019). Moreover, several software and learning platforms, social media, online information, and learning materials have been used to improve their profession (Ngao et al., 2022).

The result of the study revealed educational websites as the most frequently utilized tool, signifying that lecturers value the accessibility and extensiveness of information available on these platforms. In contrast, the comparatively underuse of social media forums for educational purposes may show a

need for additional exploration of how these tools can be integrated into SDPD. Particularly, how social media forums could be employed to develop meaningful peer-to-peer interactions and knowledge sharing. Therefore, it appears adequate to conclude that the lecturers utilized a range of variety of ICT tools to satisfy their self-directed professional development, with educational websites emerging as the most regularly utilized resource.

4. Conclusion

The current study disclosed that lecturers have a strong perception of the usefulness of ICT for developing their SDPD. They understand ICT as the most valued tool to improve their research-related skills, professional networking, access to resources, and career development. The lecturers' understanding of ICT for SDPD shows the values and the potential of technology-integrated learning and development. In addition, the results display that the lecturers utilize ICT tools and platforms to improve their continuous professional development. Specifically, they utilize ICT to improve their research practices, facilitate networking and collaboration, support career development, acquire expert knowledge, and reinforce their pedagogical skills. Therefore, ICT empowers the lecturers to stay updated, upgrades their teaching and research approaches, improves their professional growth, and enhances the overall quality of higher education. Although the study indicated lecturers employ a variety of ICT tools for their SDPD, educational websites appeared as the most frequently utilized resource, while social media forums were the least frequently used.

The scope of the study is delimited to selected public universities, and its findings may not be generalizable to other universities. The self-reported data are subjected to response bias. In addition, this study is cross-sectional, capturing data at a snapshot in time. The study did not explore factors influencing lecturers' selection and utilization of specific ICT tools for SDPD that might provide valuable insights for adapting professional development accordingly. We recommend future studies to adopt a longitudinal research that could provide change over time on perceptions and utilization of ICT for SDPD.

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

Competing Interests: There are no any sort of competing interests

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