The Path Selection of College Teachers' Job Performance Improvement under Wireless Communication Technology

Quan Luo[*]

School of Physical Education, Hunan University of Arts and Science, Changde, Hunan, 415000, China
513587148@qq.com
*corresponding author

Keywords: Wireless Communication, University Teachers, Work Performance, Improvement Path

Abstract: Wireless communication technology can break the space-time limitation of the teaching environment and enable students to actively acquire knowledge in a specific and realistic situation, which makes students change from passive listeners to active participants in learning. Under the condition of information technology, wireless communication technology has become an inevitable requirement of college education and teaching reform in the new era, and also an important means to improve the quality of college education and teaching. The purpose of this paper is to study the path choice of improving university teachers' work performance based on wireless communication technology. This study selected university teachers as a sample, and conducted an empirical investigation from their work performance and improvement path. This can not only reflect the university teachers' attitude and behavioral intention towards the current wireless communication technology education, but also verify the development status and effect of university teachers in wireless communication technology education from the side. After investigation, it is found that optimizing the training environment of wireless communication technology, establishing a wireless communication technology training evaluation system, and increasing the investment in wireless communication technology training were all effective ways to improve the work performance of university teachers, and their scores were above 4 points.

1. Introduction

The development of wireless communication technology represented by multimedia computer technology and network communication technology has brought great changes to the campus and society. In schools, with the gradual promotion of informatization, teachers' teaching efficiency can be effectively improved [1-2]. While improving the teaching efficiency, it is also necessary to improve the professional level of teachers. In the era of wireless communication technology, teachers need to have the following abilities: basic knowledge of wireless communication technology, comprehensive ability of wireless communication technology and curriculum, etc. [3-4].

Wireless communication technology has brought great convenience to the educational community, and it is necessary to improve the quality of teachers in order to use wireless communication technology effectively [5-6]. The report by Garima Mathur was a descriptive survey report aimed at exploring how teachers can better use information and communication technology in secondary education in Nigeria. He conducted a simple random sampling survey of 620 teachers. After the expert confirmed, he collected data. The research findings provided strategies to improve the quality of teachers, including seminars, workshops and meetings for teachers, hiring staff from the Human Resources Department to plan and create teachers, providing teaching in the scientific and technological environment, and discussing the application and implementation strategies of information and communication technology at the staff conference, etc. [7]. K Kavitha took universities and the "social mining" model as the main research object, and evaluated teachers' performance based on student evaluation to improve teachers' teaching skills and recommended courses. Based on the SocialMining model, he used typical machine learning methods such as SocialMining to conduct statistical analysis of student evaluation. He used these indicators as evaluation indicators to measure the performance of the algorithm. Finally, he applied this model to Aguascalientes State University in Mexico, and concluded that it is feasible (85%) to use machine learning methods to conduct emotional analysis on teachers' performance evaluation opinions [8]. Therefore, it is of practical significance to study the path selection of improving university teachers' work performance under wireless communication technology.

The research results of this paper have certain reference value for exploring and improving the quality of teachers' work. This study would explore the impact of wireless communication technology on teacher performance. It is suggested that universities should focus on improving teachers' job performance and take more actions to improve job satisfaction, so as to strengthen organizational commitment and increase work input.

2. Wireless Communication Technology and Work Performance of University Teachers

2.1 Work Performance of University Teachers

University teachers are a group of knowledge workers who need to adapt to the changes of the environment and organization constantly and effectively. Therefore, the work performance of university teachers is divided into four dimensions: task performance, relationship performance, learning performance, and innovation performance [9]. Among them, the performance of the work is that teachers are dutiful in their work and master more knowledge and technology. Relational performance mainly shows that teachers are willing to help colleagues and take on some work beyond their responsibilities. Learning performance mainly refers to that teachers have the willingness to learn and take learning behaviors, thus achieving certain results. Innovation performance refers to the innovation willingness, innovation behavior and achievements of teachers in education and research [10-11].

2.2 Wireless Communication Technology

(1) IrDA (Infrared Data Association) technology

IrDA technology, also known as infrared communication technology, is a technology to achieve point-to-point communication through infrared [12-13]. IrDA standard is a point-to-point data transmission protocol and an alternative cable used in conventional devices. It has the following advantages: first, it does not need to apply for frequency of use, and the communication cost is low; second, infrared communication transmits data by optical means, so no wireless channel resources would be occupied, and it has good anti-interference ability and high confidentiality; third, it has a

high data transfer rate and is suitable for transmitting massive documents and multimedia materials; fourth, the infrared device has the advantages of small size, small power consumption, convenient connection, convenient use and convenient mobile communication [14-15].

(2) Bluetooth technology

The operating frequency of Bluetooth technology is 2.4 GHz ISM, and the spectrum is expanded through frequency hopping [16]. Frequency hopping expansion technology refers to dividing a frequency band into multiple frequency hopping channels. On a link, the wireless transceiver continuously jumps from one link to the next according to a specific coding sequence on a link. According to the Bluetooth 1.0 B standard, in the 2.4GHz-2.4835GHz-ISM band, "hopping" 1600 hops/s can achieve 79 channels with a bandwidth of 1 MHz. The adoption of frequency hopping expansion technology makes Bluetooth have good anti-interference capability [17]. On the one hand, the sender and receiver communicate according to certain rules. It is difficult for other devices to listen to the sent information and cannot interfere with each other according to the same rules. On the other hand, because the instantaneous bandwidth of the frequency hopping signal is very narrow, the spectrum amplification technology can double the narrow frequency band and greatly reduce external interference. In addition, in order to enhance the confidentiality of information, Bluetooth also uses authentication, password and other technologies.

Bluetooth supports point-to-point and point-to-multipoint connections. Therefore, several Bluetooth can form a piconet wirelessly. A single piconet cannot connect more than 8 devices at the same time. When the number of devices is large, it is necessary to build multiple piconets, and these piconets can also be interconnected to form a special distributed network, thus forming a "multiple piconets" network to achieve high-speed communication between devices [18].

The advantage of Bluetooth technology is that it works on 2.4 Gb ISM bandwidth, which has been disclosed worldwide. Its advantages are high data transmission rate, low energy consumption, strong anti-interference ability and good communication security. Within the effective range, it can bypass obstacles for communication, and the communication is not constrained by the observation angle and direction.

(3) Wi-Fi technology

Compared with Bluetooth technology, the security performance of Wi-Fi (Wireless High Frequency) technology is slightly lower, but the distance of wireless communication is much higher, about 100 meters. It can meet the needs of families, offices and even small buildings.

Wi-Fi technology has great advantages. Its coverage of radio waves can reach 100m. In addition, its transmission rate is very high, up to 11 megabits per second, and has certain penetration.

(4) Radio frequency technology

The emergence of RFID (Radio Frequency Identification) technology provides a simple, economical and practical method for achieving close wireless communication. At the same time, it also has a small power consumption, which makes it widely used in mobile phones. Radio wave technology has been widely used in smart home, remote monitoring, home automation, security alarm, vehicle anti-theft and other fields.

2.3 Wireless Communication Technology Training for Teachers

The goal of the training for teachers is to continuously optimize and improve certain abilities, and to improve the training according to the problems found in the training. The specific process is shown in Figure 1.

```
┌─────────────────────────┐
│ Information    technology│◄──┐
│ training for teachers    │   │
└─────────────────────────┘   │
            │                  │
            ▼                  │
┌─────────────────────────┐   │
│ Promotion and acceleration│  │
└─────────────────────────┘   │
            │                  │
            ▼                  │
┌─────────────────────────┐   │
│ Professional growth of teachers│
└─────────────────────────┘   │
            │                  │
            ▼                  │
┌─────────────────────────┐   │
│ Improvement and optimization│─┘
└─────────────────────────┘
```
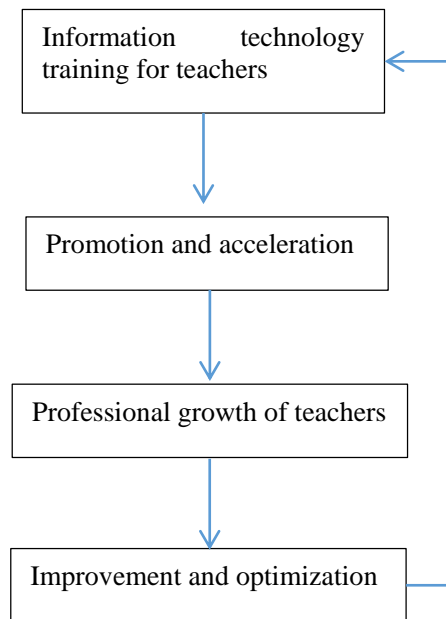
Figure 1: Relationship between teacher training and teacher professional development

The training discussed in this study is mainly about the wireless communication technology training for teachers, which refers to any activity taken by the education department to improve teachers' knowledge and skills in order to meet the needs of teachers' professional development [19-20].

(1) Cultivation of optimism

The best way to cultivate optimism is to explain the problem in a positive way and make corresponding changes on this basis. Positive attribution refers to attributing positive things to their own, lasting and universal, while negative things to external, temporary and environment-related factors. That is to say, the positive things that happen every day are attributed to oneself, and the reasons for these positive things are under one's control. This impact would continue to enable them to deal with any situation in life smoothly. For example, in the wireless communication technology environment, the reason why teachers are not optimistic about wireless communication technology is mainly because they are not strong in the application ability of wireless communication technology in teaching, which leads to distrust of the application ability of wireless communication technology. They do not have enough confidence in wireless communication technology, so when training students' ability, they also do not attach importance to the training of students' ability to skillfully use computers. Therefore, if teachers want to understand this, they must strengthen their study of wireless communication technology. Only in this way can they apply what they have learned. Finally, teachers should have enough confidence in the application of wireless communication technology. While improving their own skills, they should also pay attention to the training of students' computer operation skills, thus reflecting the teachers' positive attitude towards wireless communication technology.

(2) Applying information technology to achieve transcendence

To surpass oneself is to improve oneself by adapting to the environment. In the wireless communication technology environment, if teachers want to surpass themselves, they must effectively use wireless communication technology means to improve themselves on the basis of adapting to the wireless communication technology environment. In this context, teachers must adjust it to better provide help for teaching and students' learning. For example, in the face of

wireless communication teaching media, teachers should not only simply use multimedia computers and electronic whiteboards, but also learn to use multimedia computers and electronic whiteboards to better display the teaching content, so that students can develop better cognitive construction of the teaching content. To sum up, wireless communication technology should not only be a tool to help teaching, but also be a cognitive tool that allows teachers and students to build deeper knowledge and achieve self-transcendence.

3. Investigation and Exploration on the Path Selection of Improving University Teachers' Work Performance under Wireless Communication Technology

3.1 Questionnaire Preparation

(1) Basic personal information of university teachers

The basic personal information mainly includes the gender, age, marital status and part-time administrative positions of university teachers.

(2) Work performance

In the survey, job performance is divided into four aspects, namely task performance, relationship performance, learning performance and innovation performance.

3.2 Experimental Samples and Data Acquisition

With university teachers as the main body of the survey, the questionnaire survey lasted more than one month. Random sampling, snowball sampling and convenient sampling are adopted, mainly in four ways: on-site distribution, paper mail, WeChat push, and consulting company collection. Finally, 313 valid questionnaires were obtained. In the survey, detailed data sources are shown in Table 1.

Table 1: Data sources

Questionnaire distribution method	Valid questionnaire
On-site distribution	112
Paper mail	78
WeChat push	54
Collection by consulting company	69

Basic information of university teachers participating in this survey: the proportion of men was slightly higher than that of women; among the respondents, the number of university teachers aged between 30 and 40 was the largest, about 73%; about 65% of teachers were married. The proportion of master's degree and doctoral degree reached more than 85%; more than half of the teachers had no experience in studying abroad, and only 10% had more than three years of experience in studying abroad; the teachers interviewed were mainly lecturers and associate professors. The distribution of teachers in key universities and general universities was relatively balanced, and the scope of majors was also relatively balanced. About 20% of university teachers held administrative positions at the same time; there were a little more teachers with 3-5 years of teaching experience.

The t-test formula used in this paper is:

$$t = \frac{\overline{X} - \mu}{\frac{\sigma X}{\sqrt{n}}}$$

(1)

$$t = \frac{\overline{X_1} - \overline{X_2}}{\sqrt{\frac{(n_1-1)S_1^2 + (n_2-1)S_2^2}{n_1 + n_2 - 2}(\frac{1}{n_1} + \frac{1}{n_2})}}$$ (2)

Among them, s is the standard deviation of the sample, and n is the number of samples.

4. Exploration of the Path Selection for Improving the Work Performance of University Teachers under Wireless Communication Technology

4.1 Impact of Optimization of Wireless Communication Technology Training Environment on Teachers' Work Performance

According to the survey of teachers' questionnaires, the overall score on the impact of wireless communication technology training environment factors on teachers' work performance was relatively high, and the score of optimizing training environment on task performance was 4.82, as shown in Figure 2.
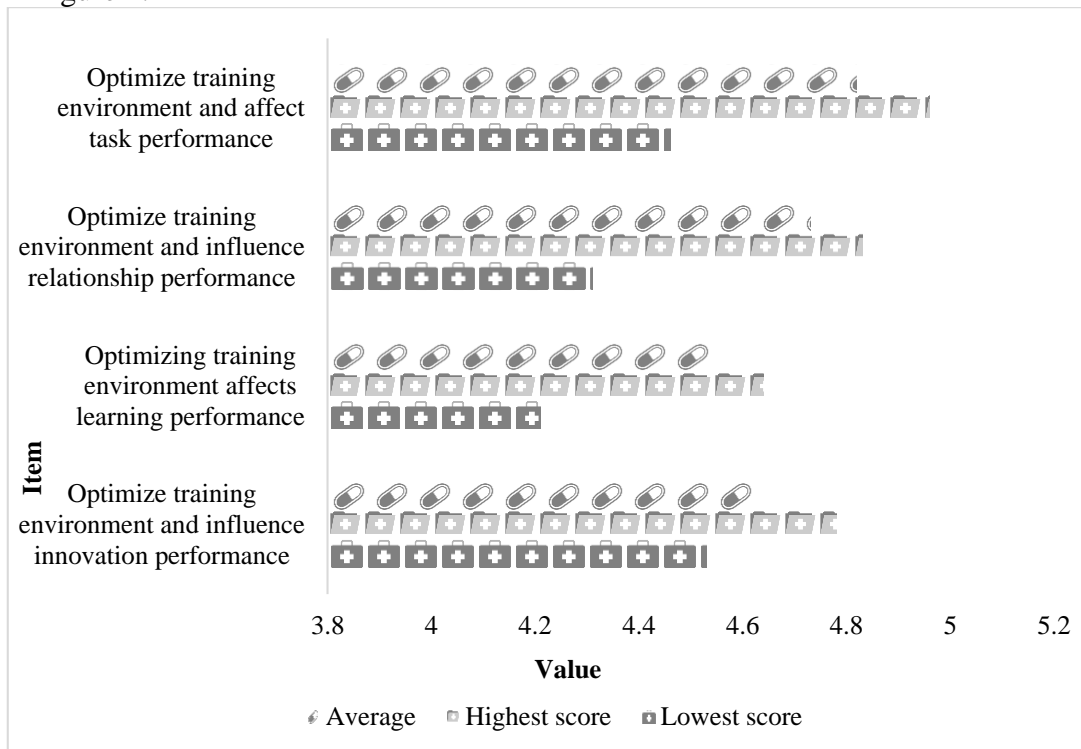

Figure 2: Investigation results of training environmental factors

In the minds of teachers, there was a strong desire to participate in the training, which also showed that teachers recognize the application of wireless communication technology in teaching. However, in terms of environment, it may be the training environment and equipment environment, or the teachers and schools around it may not pay enough attention to training, which led to unsatisfactory work performance. Therefore, in terms of training, attention should be paid to optimizing the training environment and breaking the traditional training shackles.

4.2 Impact of the Establishment of Wireless Communication Technology Training Evaluation System on Teachers' Work Performance

In Figure 3, in the "Impact of the creation of wireless communication technology training evaluation system on teachers' work performance" level, the scores of "Creating training evaluation system affects task performance", "Creating training evaluation system affects relationship performance" and "Creating training evaluation system affects innovation performance" were all below 4.5 points, but the difference was not significant. The score on the topic "Creating a training evaluation system affects learning performance" was more than 4.8 points, which showed that most teachers believed that the training evaluation system can affect learning performance, and would reflect on classroom teaching and reduce working hours and workload.
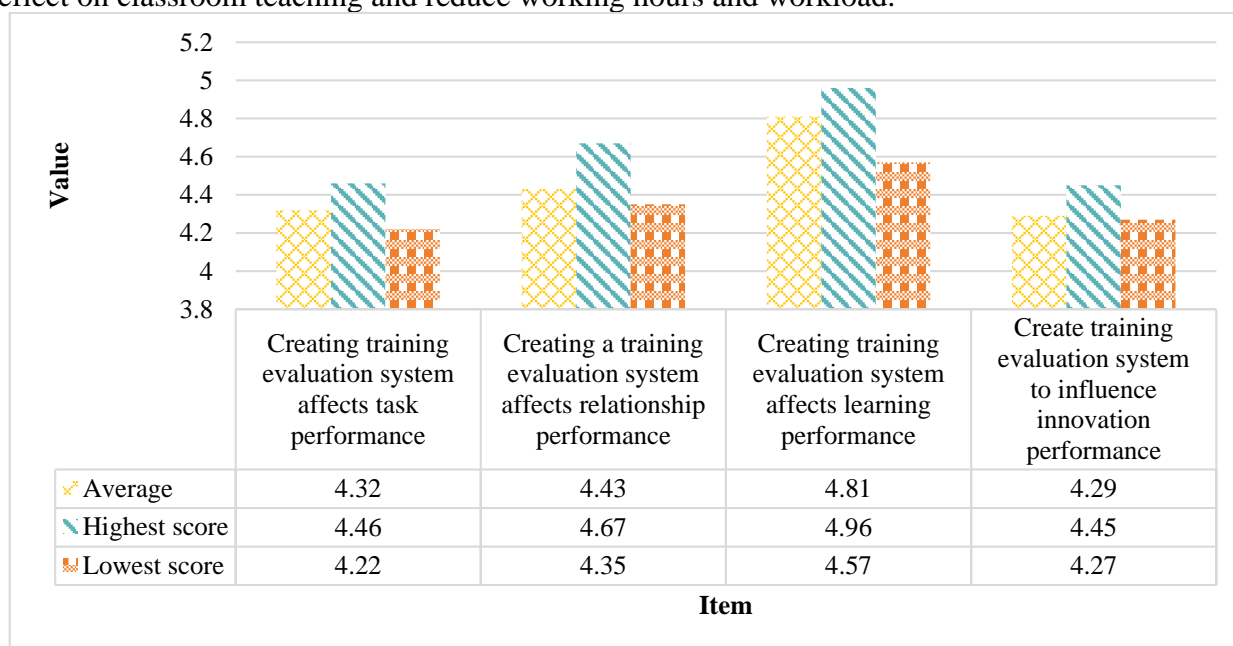
	Creating training evaluation system affects task performance	Creating a training evaluation system affects relationship performance	Creating training evaluation system affects learning performance	Create training evaluation system to influence innovation performance
Average	4.32	4.43	4.81	4.29
Highest score	4.46	4.67	4.96	4.45
Lowest score	4.22	4.35	4.57	4.27

Figure 3: Survey results of training evaluation system factors

The traditional training method of "just listening and not doing" can no longer meet the needs of teachers, and the integrated training method of "training and evaluation" can be adopted in the training method. In the training courses, emphasis should be placed on improving the time for teachers to use the training content and conducting more exercises. After that, an appropriate training evaluation system was used to evaluate the quality of teacher training and test it. If there are problems, they should be solved in the classroom, so as to avoid the dilemma that teachers understand in the training but have problems in the classroom. The course design of training should pay more attention to the actual teaching situation, which can be based on a classic case of wireless communication technology teaching, and take problem-based training as the main line to improve the training effect. The survey before training, the inspection during training and the evaluation after training are indispensable to achieve better training results.

4.3 Impact of Increasing Wireless Communication Technology Training Input on Teachers' Work Performance

In Figure 4, at the level of "the impact of increasing wireless communication technology training input on teachers' work performance", teachers scored more than 4.8 points on the issue of "increasing training input affects task performance", but the score on the issue of "increasing

training input affects innovation performance" was lower than 4.3 points. This shows that although the development of wireless communication technology education has tended to be routine, the innovation in education is not enough.

	Increasing training input affects task performance	Increasing training input affects relationship performance	Increasing training input affects learning performance	Increasing training input affects innovation performance
Percentage	4.88	4.55	4.46	4.21
Highest score	4.94	4.65	4.64	4.42
Lowest score	4.66	4.33	4.21	4.07

Figure 4: Investigation results of training input factors

In the course of the survey, it can be seen that due to the differences in areas and school levels, teachers have great differences in the training of wireless communication technology. In township middle schools, teachers have very strong training expectations, but they have not been given too many opportunities to participate in training, or even have no chance to participate in training at all. Therefore, their application ability in wireless communication technology needs to be improved. Teachers in provincial cities have many opportunities to participate in training, but their expectations of training are not high. Therefore, teachers in towns and counties should increase investment in equipment and training, and strengthen training, so as to improve the training level of the whole teacher.

5. Conclusions

With the advent of the information age, people have realized that integrating the teaching method of wireless communication technology into the curriculum can enable students to better understand the content of the curriculum and better self-learning. However, with the progress of the times, more attention should be paid to teachers' acceptance and teaching level of wireless communication technology. It was hoped to further explore whether the teachers found this teaching style helpful and whether they could actively apply it. In terms of practical application, this study analyzes the factors that affect the performance of university teachers. The results obtained would help university administrators to solve the problems in teachers' work performance in a targeted and scientific way, and give corresponding suggestions according to their own problems. At present, most colleges and universities are still using the traditional management mode, and lack of innovation in the management mode. They focus too much on the development of the school and neglect to pay attention to the needs of individual teachers, thus leading to the phenomenon of teachers being psychologically stressed and working against the goals of the school, which in a way can negatively affect the performance of some teachers. Using wireless communication technology

to change the current situation, so that all teachers can be treated fairly and justly, thus reducing or reducing the degree of job burnout, which is also an urgent task for school managers.

References

[1] Alanood Abdulaziz, Makhmoor Bashir, Abdulaziz Abdulmohsen Alfalih. (2022) The impact of work-life balance and work overload on teacher's organizational commitment: do Job Engagement and Perceived Organizational support matter. Educ. Inf. Technol. 27(7): 9641-9663

[2] Ellen Rusman, Jeroen Storm: MirrorMe@work. (2022) A Theory-Informed Methodology to Support Novice Teachers' Individual and Collective Professional Development at the Workplace. Int. J. Mob. Blended Learn. 14(2): 1-10 (2022)

[3] Akta, D., & Zmen, H. (2022). Assessing the performance of turkish science pre-service teachers in a tpack-practical course. Education and Information Technologies, 27(3), 3495-3528.

[4] Aloys Iyamuremye, Janvier Mukiza, Ezechiel Nsabayezu, Fidele Ukobizaba, Kizito Ndihokubwayo. (2022) Web-based discussions in teaching and learning: Secondary school teachers' and students' perception and potentiality to enhance students' performance in organic chemistry. Educ. Inf. Technol. 27(2): 2695-2715

[5] Anna-Lisa Max, Sarah Lukas, Holger Weitzel. (2022) The relationship between self-assessment and performance in learning TPACK: Are self-assessments a good way to support preservice teachers' learning? J. Comput. Assist. Learn. 38(4): 1160-1172

[6] Sule Betul Tosuntas, Zuhal Çubuk çu, Gary Beauchamp. (2021) A new model for the factors that affect interactive whiteboard usage of teachers and its effect on performance. Educ. Inf. Technol. 26(3): 3575-3592

[7] Garima Mathur, Abhijeet Singh Chauhan. (2021) Teacher Evaluation of Institutional Performance: Managing Cultural Knowledge Infrastructure in Knowledge Organisations. Int. J. Knowl. Manag. 17(4): 93-108

[8] K. Kavitha. (2021) Assessing Teacher's Performance Evaluation and Prediction Model Using Cloud Computing Over Multi-dimensional Dataset. Wirel. Pers. Commun. 119(4): 3207-3221

[9] Megnounif Abdellatif, Kherbouche Asma. (2020) Knowledge Management Promising Contribution to University Performance: Empirical Study Based on Teachers' Opinions. J. Inf. Knowl. Manag. 19(3): 2050022:1-2050022:39

[10] Lisa A. Dieker, Carrie L. Straub, Michael C. Hynes, Charles E. Hughes, Caitlyn Bukathy, Taylor Bousfield, Samantha Mrstik. (2019) Using Virtual Rehearsal in a Simulator to Impact the Performance of Science Teachers. Int. J. Gaming Comput. Mediat. Simulations 11(4): 1-20

[11] Damilola Adesina, Chung-Chu Hsieh, Yalin E. Sagduyu, Lijun Qian. (2023) Adversarial Machine Learning in Wireless Communications Using RF Data: A Review. IEEE Commun. Surv. Tutorials 25(1): 77-100

[12] Tomoaki Ohtsuki. (2023) Machine Learning in 6G Wireless Communications. IEICE Trans. Commun. 106(2): 75-83

[13] Shubhanshi Singh, Drishti Kedia, Neha Rastogi, T. Velmurugan, Prakasam Periasamy. (2021) P2P mobility management for seamless handover using D2D communication in B5G wireless technology. Peer-to-Peer Netw. Appl. 14(4): 1988-1997

[14] Surajit Deka, Kandarpa Kumar Sarma. (2020) JSCC-UFMC and Large MIMO Technology for High Data Rate Wireless Communication. Int. J. Mob. Comput. Multim. Commun. 11(4): 42-66

[15] Punnarumol Temdee, Chayapol Kamyod, Hamed Yahoui, Uma S. Jha, Minoru Okada. (2020) Special Issue on: Towards a "Smart Society" Through Digital and Wireless Communication Technology. Wirel. Pers. Commun. 115(4): 2667-2669

[16] Jasem Altammar, Salwa Aljassar. (2021) The effect of microteaching on the enhancement of female mathematics and social studies teachers' skills in the College of Education at Kuwait University. Int. J. Knowl. Learn. 14(4): 324-344

[17] Javaria Javaid, Saira Hanif Soroya, Khalid Mahmood. (2020) Impact of personal and organizational factors on knowledge sharing attitude of university teachers in Pakistan. Electron. Libr. 38(2): 317-336

[18] Francesc M. Esteve-Mon, Maria Angeles Llopis-Nebot, Jordi Adell-Segura. (2020) Digital Teaching Competence of University Teachers: A Systematic Review of the Literature. Rev. Iberoam. de Tecnol. del Aprendiz. 15(4): 399-406

[19] P. Jayanthi Nirmala, P. Sivakumar, S. Selvakumar, R. Daphine. (2022) Efficacy of technology enabled learning in science at diploma in teacher education level. Educ. Inf. Technol. 27(8): 10665-10680

[20] Dervis Pasa, Cigdem Hursen, Hafize Keser. (2022) Determining teacher candidates' levels of twenty-first century learner and teacher skills use. Educ. Inf. Technol. 27(8): 11537-11563