Professional Development and Digital Competency as Determinants on Productivity of Teacher Education Graduates

Jean A. Aquino[1, *], Daryl Niko L. Cempron[1], Raul C. Orongan[1]

[1] Professional Education Department, College of Education, Central Mindanao University, Musuan, Bukidnon, Philippines 8714

* jeanaquino@cmu.edu.ph

Abstract. This study focused on the crucial need for teachers in modern society to acquire and enhance various skills and knowledge to engage effectively. It assessed the Professional Development and Digital Competency of Teacher Education graduates and their impact on productivity. The study's objectives included evaluating the teacher's professional development in aspects like shared leadership, shared values, collective learning, and supportive conditions and assessing their digital competency in terms of anxiety, productivity, importance, and confidence. Teacher's professional development was moderately demonstrated, while digital competency showed a high level of importance but moderate levels of anxiety, productivity, and confidence. The productivity of teacher education graduates was evident, and there was a significant correlation between their Professional Development and Digital Competency and productivity. Notably, the variables that emerged as the most influential determinants of productivity were supportive conditions in professional development and the teacher's perceived importance and confidence in digital competency. These results imply that sustainable and result-oriented efforts must be experienced to further align teacher education with the evolving demands of modern society, suggesting that teachers should proactively assimilate and accommodate feedback, stay updated with technology, participate in online communities, engage and be intrinsically motivated in self-directed learning, and reflect on their practices to enhance productivity.

Keywords: Professional Development, Digital Competency, Productivity.

1 Introduction

The increasing "digitalization" of various aspects of the knowledge society has changed how we connect, communicate, access our work, learn, and produce new knowledge [1]. In an educational context, digital competence is often referred to as the knowledge, skills, creativity, and attitudes regarding how teachers, TEs, and STs can use digital technology for teaching and learning [2]. The notion of the digitally competent citizen

has been implemented nationally and prompted various educational reforms, such as revised curricula that make schools accountable for providing opportunities for students to develop digital competence [3]. Over the past ten years, digital competence has been steadily included in curricula, assessments, and classroom activities. In the same time frame, the phrase was subject to policy-making procedures that led to descriptions of digital abilities as one of the five fundamental skills for academic learning. The nation's prosperity, security, and future well-being depend on an educational system that prepares students with the knowledge and skills required to compete in an evolving global economy successfully.

Teachers play an important role in preparing students to meet the opportunities and challenges of the modern workforce, which is why training teachers in ICT implies professionalizing their figures by incorporating desirable professional competencies to optimize their professional performance [4]. It is through teacher training that professionals can find a great partner. The literature provides the need for better training in the knowledge, skills, and attitudes required to promote student learning in a growing technological world [2]. Thus, emphasis is placed on the need to incorporate into the educational context all the educational tools and possibilities technologies to design and develop teaching and learning processes according to the evolving needs emanating from the students.

Education has long been recognized as a powerful catalyst for positive change across various dimensions of society, including the social, political, economic, and cultural spheres [5]. In this context, teachers play a pivotal role in the educational process. Professional development is integral to a teacher's growth, encompassing experience, knowledge, and systematic reflection on teaching practices [6]. It involves participation in workshops and related formal meetings [7] and is guided by the interdependent concepts of learning, engagement, and improved practice [8].

Digital competency is increasingly recognized as a crucial skill for teachers, encompassing pedagogical understanding and awareness of its impact on student development [2]. Modern education demands 21st-century skills, including problem-solving, communication, creativity, and critical thinking [9]. Anxiety about technology can hinder effective teaching, with teachers experiencing unease, apprehension, or fear [10]. Confidence in technology use is crucial for educators [11] to integrate technology into their classrooms effectively [12].

Teacher productivity is influenced by various factors, including classroom management, subject mastery, teaching methods, and learning environment [13]. Teacher professional development is linked to work productivity [14], while effective teaching practices are associated with student outcomes [15]. Professional growth is essential for teachers' identity and development. Teachers must continually enhance their skills to meet the demands of the 21st century [16]. Contextual factors, such as school resources and home backgrounds, can impact teachers' performance [17]. Teacher training institutions shape teacher competence [18]. Additionally, integrating technology, pedagogy, and content knowledge (TPACK) is essential for preparing teachers for the digital age [19].

With the plethora of studies investigating teachers' professional development, digital competency, and productivity, [20], for instance, had focused on digital teaching competence in curricular documents for training which is clustered into three areas of knowledge: technological competence, pedagogical compatibility, and social awareness. Similarly, [19] a study analyzed the competence of Technology, Pedagogy, and Content Knowledge (TPACK) of Education technology alumni in supporting their profession to become professional teachers. Moreover, another study [21] analyzed teachers' views and attitudes on their participation in continuous professional development (CPD) training courses and their usefulness for the improvement of digital knowledge and skills which are part of teacher digital competence – so necessary for meeting the educational challenges of the 21st century.

Despite the growing emphasis on the importance of digital competency and teacher professional development in modern education, there is a notable absence of comprehensive studies that investigate the intersection of digital competence and teacher productivity within a diverse range of educational contexts. While there is a wealth of research discussing the significance of digital skills and professional development for educators, there is a lack of research that systematically examines how the acquisition and integration of digital competencies by teachers directly affect their overall productivity and, consequently, student outcomes. This gap in the existing literature calls for a focused inquiry into the nuanced relationship between digital competence, teacher professional development, and their combined impact on educational effectiveness across various educational settings.

As a synthesis, teacher development and digital competence are integral to modern education. Effective professional development, leadership, shared vision, and educator collaboration are essential for enhancing teaching practices. Moreover, teachers must navigate technology-related anxiety, build confidence, and integrate digital skills into their teaching. Ultimately, teacher productivity and student outcomes are closely intertwined and influenced by various factors within the teaching and learning process. Considering these pedestals, this research shows the relationships between professional development and digital competency in the productivity of teacher education graduates through the lens of descriptive-correlational design and linear regression analysis.

2   Methodology

A questionnaire enables quantitative data to be collected and standardized so that the data are internally consistent and coherent for analysis [22]. Hence, a survey questionnaire was used to determine the Professional Development, Digital Competency, and Productivity of Teacher Education Graduates serving as public teachers in Malaybalay City, Valencia City, and Bukidnon divisions. The survey questionnaire comprised Ninety-nine questions with three (3) subcategories. The survey is a questionnaire form that features questions about the research subject. Thus, the content, form, and number of the questions vary according to the subject of the research objectives. Moreover, a 5-point Likert scale questionnaire was used to operationalize qualitative data about the teacher's professional development, digital competency, and productivity.

The study utilized a descriptive-correlation design to determine the Professional Development, Digital Competency, and Productivity of Teacher Education Graduates of the School Year 2022-2023. Descriptive correlational design is used in research studies that provide static pictures and establish the relationship between variables [16]. As indicated in the trajectory of this study, this design was appropriate for the topic mentioned above because in conducting the study, the researchers collected data based on the participants' behavior, attitudes, and experiences.

Moreover, ethical considerations had been ensured in the collection, utilization, and disposal of the data through the CMU Institutional Research Ethics Committee to secure the privacy of the identities involved in the study and the confidentiality of the data. The researchers sought permission first from the institution to conduct the study. Next, researchers sought permission from the three (3) DepEd Division offices, namely the DepEd Division of Malaybalay, the DepEd Division of Valencia City, and the DepEd Divisions of Bukidnon, to gather data. Furthermore, participants were given a consent form for their participation along with the survey questionnaire. After collecting the data, the researchers analyzed the data using descriptive-correlational design.

3   Results and Discussion

Textual and numerical presentation is used in the discussion to obtain a methodical understanding of the teacher's professional development, digital competency, and productivity. By carefully looking at the results, "moderately demonstrated" is observed mainly in the participants' responses. This means that their perceptions of their experiences in productivity and digital competency are just a bare minimum compared to what is expected to be experienced, except on the matter of importance as to the extent of digital competency, which indicates "highly demonstrated." As onlookers of this study, this appears slightly odd considering that the Department of Education has been invested with a variety of supports and mechanisms from both government and non-government organizations in increasing and improving teachers' productivity and digital competency, which leads to a thought "is this observed inadequacy just mainly factored by teachers' micro and macrosystem? Or factored by the teachers' characterization of their so-called "make believe willingness." After all, willingness must be translated into personal actions for a desirable change.

Table 1. Level of Teacher's Professional Development

Professional Development	Mean	Qualitative Interpretation
Shared and Supportive Leadership	3.29	Moderately Demonstrated
Shared Values and Vision	3.39	Moderately Demonstrated
Collective Learning and Application	3.41	Moderately Demonstrated
Supportive Conditions-Structure	3.27	Moderately Demonstrated
	3.34	Moderately Demonstrated

Table 1 shows the level of teachers' professional development. Regarding Shared and Supportive Leadership, the result shows an overall mean of 3.29, indicating "moderately demonstrated." Leadership is an essential component of effective teacher professional development; thus, this overall rating reveals that shared and supportive leadership is one of the strongest predictors of teachers' professional development. The results were consistent with a study [23] stating that teachers can learn through participation in various school courses when they reflect on their teaching and in observation of and reflection on others' teaching in co-operation with colleagues.

In terms of Shared Values and Vision, results show a grand mean of 3.39, indicating "moderately demonstrated." This result is consistent with a study [24], which concluded that, for sustainable human development and social growth, there is a need for value-based education. So, the teachers and teacher education institutions may ponder over the 'erosion of moral values among pupils and their 'actual restoration,' which seems complex but is in no way impossible.

The result in the aspect of Collective Learning and Application denotes the teacher's professional development as "moderately demonstrated," with an overall mean of 3.41. The result of the present study shows that the teachers had moderately demonstrated in this area. It stipulates that they often practiced the indicated task in developing their ability and skill as teachers in their designated workplace. Teachers' collective learning, as Lodders and Meijers [25] emphasize, is critical for the successful implementation of innovative programs in schools. Moreover, the result in this area is consistent with a study [26] that teachers learned classroom skills primarily by reflecting on their teaching practices and getting ideas from colleagues. This might indicate that as long as the teachers reflect on the same topic alone or together, individual and collective learning may extend their knowledge by supplementing each other and might help to improve teachers' classroom interaction skills.

In addition, the result regarding Supportive Condition-Structures shows an overall mean of 3.27, which denotes "moderately demonstrated." This result indicates that Supportive Conditions – Structures of teachers working collaboratively in sharing teaching lessons and developing assessment items, play a critical role in promoting their professional development. Such study [27] back this up, stating that teachers improved their understanding of the critical supportive conditions and mechanisms that an effective model must have for teachers' professional development, which can lead to better student learning outcomes. Furthermore, "Supporting teacher leadership entails comprehending the concept, awakening teachers' awareness of their own leadership potential, and then providing opportunities for teacher leadership development." [28].

Table 2. Extent of Teacher's Digital Competency

Digital Competency	Mean	Qualitative Interpretation
Anxiety	3.28	Moderately Demonstrated
Productivity	3.50	Moderately Demonstrated
Importance	3.53	Moderately Demonstrated
Confidence	3.08	Moderately Demonstrated
	3.35	Moderately Demonstrated

Table 2 presents the digital competency of teachers in terms of Anxiety with an overall mean of 3.39, "moderately demonstrated." This aligns with Chang [10], who views computer anxiety as the teachers' discomfort, apprehension, and fear of coping with ICT tools or uneasiness in expecting adverse outcomes from computer-related operations. Moreover, In other words, teaching Anxiety as a dynamic process is affected and changed by the practice and experiences [29].

The digital competency of teachers in terms of productivity, with an overall mean of 3.50, states "moderately demonstrated." This result aligns with a study of Utami and Vioreza [30] that productivity at work is the most pivotal factor among organizational factors as a requirement for teachers to plan, execute, and monitor every educational activity for the sake of school goal attainment. Moreover, in other words, teacher work productivity is generally measured by work results in the form of quantity, quality, and professional development activities [31].

Moreover, the digital competency of teachers in terms of importance, with an overall mean of 3.39, shows "moderately demonstrated." This is true with several studies [1], [32], which stated that teachers integrating technology into their classrooms are critical in assisting students in developing capacity for life in the twenty-first century

Table 2 further presents the digital competency of teachers in terms of confidence with an overall mean of 3.08, "moderately demonstrated." The indicators are the following: "A job using computers would be very interesting" (3.52), "When there is a problem with a computer run that I cannot immediately solve, I would stick with it until I have the answer" (3.01), "The challenge of solving problems with computers does not appeal to me" (2.79), "I don't think I would do advanced computer work" (2.85), "If a problem is left unsolved in the workplace, I would continue to think about it afterward" (3.13), "I am sure I could learn a computer language and programming in relation to my work." (3.23). A study [30] discovered increased confidence in teachers who can use multiple technology integration strategies and are given the opportunity to practice teaching with technology while thoroughly understanding the educational technology's utility.

Table 3. Degree of Teacher Education Graduates' Productivity

Productivity	Mean	Qualitative Interpretation
Teaching-Learning Process	3.46	Moderately Demonstrated
Student's Outcome	3.43	Moderately Demonstrated
Professional Growth and Development	2.85	Moderately Demonstrated
	3.25	Moderately Demonstrated

Table 3 presents the teacher education graduates' productivity in terms of the teaching-learning process, with a mean of 3.46 "moderately demonstrated." This is consistent with the study of [33], who mentioned that the teachers' teaching practices, instructional competence, professional and personal characteristics, punctuality, and attendance are relevant to the teaching-learning process. Furthermore, Munna and Kalam [34] believe that learning is a cardinal factor that a teacher must consider while teaching students. This is consistent with a study of Paolini [35] that building a competent community of

learners also requires that instructors be prepared and well-versed in their subject matter, design courses that reflect standards, and communicate course content and expectations. Furthermore, Hammer et al. [36] believed that self-evaluation requires self-reflection and enables the instructor to assess his or her growth over time to highlight and acknowledge improvement.

Moreover, table 3 presents the teacher education graduates' productivity toward professional growth and development. Having a mean of 2.85, indicating "moderately demonstrated," means that the teachers' experiences in their work allowed them to enhance their teaching skills and strengthen them simultaneously [21]. However, the results were consistent with the study of Glattenhorn [37] stating that by gaining increased experience in one's teaching role, one systematically gains increased experience in one's professional growth through examination of one's teaching ability.

Table 4. Correlation of Professional Development, Digital Competency, of Productivity of Teacher Education Graduates

INDICATORS	PRODUCTIVITY	
	r-value	Probability
Professional Development	.370	.000**
Shared and　　　Supportive Leadership	.259	.001**
Shared Values and Vision	.338	.000**
Collective Learning and Application	.358	.000**
Supportive Conditions- Structures	.373	.000**
Digital Literacy	.337	.000**
Productivity	.364	.000**
Importance	.371	.000**
Confidence	.325	.000**

** $p < 0.01$

Table 5. Regression Analysis on the Productivity of Teacher Education Graduates

Indicators	Unstandardized Coefficients		Standardized Coefficients Beta	t	Sig.
	B	Std. Error			
(Constant)	1.425	0.255		5.582	0.000
Supportive Conditions	0.230	0.053	0.307	4.345	0.000
Importance	0.164	0.072	0.195	2.285	0.024
Confidence	0.158	0.074	0.180	2.152	0.033
	R=0.495	R²=0.245	F-value=17.436	Sig.=0.000	

This study examined the correlation analysis of teacher education graduates' professional development, digital competency, and productivity. Table 4 shows the highly significant relationship between professional development (r=0.370, p=0.000**) and digital competency (r=0.337, p=0.000**) toward the productivity of teacher education graduates. This implies that a significant increase in professional development and digital competency will also significantly increase the productivity of teacher education graduates. The null hypothesis, which states that "there is no significant relationship between the professional development and digital competency of teacher education graduates concerning their productivity," is thus rejected in light of this finding. These results suggest that teachers who work together over an extended time to increase their productivity generate the most significant student achievement gains. This is true in the study of Berry et al. [38] which states, "Teachers are more likely to stay in the classroom and feel invested in their careers and schools if they report having more influence over school policies and higher levels of job autonomy."

Table 5 shows only three (3) independent variables, such as supportive conditions, importance, and confidence, best predict the productivity of teacher education graduates of Central Mindanao University, College of Education. This implies that the promising productivity of teachers was influenced by supportive conditions with the beta weight value of ß= 0.307 and p-value of 0.000; importance, ß= 0.195 and p-value of 0.024 and confidence, ß= 0.180 and p-value of 0.033.

The R-squared value of the variable was 0.24. This indicates that 24% of the teachers' productivity was attributed to supportive conditions, importance, and confidence, while 76% can be explained by other variables not included in the regression model. Furthermore, the F-ratio revealed that the overall regression model fits the data well. The table shows that the 42 independent variables statistically significantly predict the dependent variable as indicated: F = 17.436; p< 0.000.

This finding rejected the null hypothesis that stated there is no predictor variable of teachers' productivity. Therefore, supportive conditions, importance, and confidence are correlated with teachers' productivity. Supportive Conditions help teachers to close the gap between theory and practice. Essential supportive conditions and mechanisms an effective model must have for teachers' professional development can lead to better student learning outcomes [39].

Digital competence has grown in importance in the educational context, and it is now recognized as one of the essential competencies that instructors must learn in today's society. Advancing students' skills in using 'educational' applications and digitally sourced information, or understanding effective blends of pedagogical, content, and technological knowledge, is seen as supporting integrating digital resources into teaching to enhance subject learning outcomes [40]. Teachers must gain the knowledge and skills necessary to boost their confidence in using the technology at their disposal [11]. Accordingly, a similar early emphasis contributed to narrow, 'tool-oriented approaches, where teaching is reduced to relatively trivial software instruction' [9].

4   Conclusion

In unlocking the experiences and perspectives of the samples, the research findings revealed several key insights. Firstly, it was observed that the teacher's professional development level was moderately demonstrated across various dimensions, including shared and supportive leadership, shared values and vision, collective learning and application, and supportive conditions and structures. Secondly, when assessing the extent of teacher's digital competency, it was found that importance was highly demonstrated, indicating that educators recognized the significance of digital skills. However, anxiety, productivity, and confidence in digital competency were moderately demonstrated, posing that the interplay of efforts from the teachers themselves or drives from the Department of Education or from the direct work environment are already there, hence 'moderately demonstrated', but the sustainability or consistency of it is in question. This is particularly influenced by the fact that the teachers' professional development level in all dimensions studied in this study are moderately demonstrated. In retrospect, the key factor for a felt and experienced professional and digital competency success as seen in this study are the sustainability of the result-oriented efforts.

Furthermore, the research highlighted the clear evidence of teacher education graduates' productivity in their roles. This productivity underscored the significance of their contributions to the educational process. Moreover, the study identified a significant correlation between the productivity of teacher education graduates and their levels of professional development and digital competency. Among the variables examined, supportive conditions, along with the perceived importance and confidence in digital competency, emerged as the most influential factors in capturing the productivity of teacher education graduates. These findings emphasized the importance of fostering supportive environments and enhancing digital competency to elevate educators' productivity in education further.

Recommendations

Based on the study's limitations and conclusions, several recommendations emerge for educators. Firstly, teachers are encouraged to proactively engage in professional development by attending subject-specific workshops, conferences, online courses, and webinars. They can also benefit from joining professional organizations and collaborating with fellow educators to enhance their teaching methods. Seeking feedback from colleagues and administrators, reflecting on teaching practices, and staying abreast of the latest research and educational trends are vital components of this development.

Secondly, teachers should remain technologically savvy and incorporate the latest tools and platforms into their teaching. This may involve participating in workshops and webinars focusing on digital tools such as learning management systems, online collaboration platforms, and educational apps.

Thirdly, educators are advised to allocate time for self-directed learning and explore new digital tools. This exploration could encompass experimenting with various apps

or software, enrolling in online courses, and reading educational technology blogs and articles.

Fourthly, teachers should persist in seeking feedback, reflecting on their teaching practices, and staying updated with current research and educational trends. Staying updated with technology, participating in online communities, engaging in self-directed learning, and self-reflection should be ongoing practices.

Fifth, educators might consider using specific variables to assess their productivity, including classroom management, lesson planning and delivery, technology integration, student engagement, motivation, and continuous professional development.

Lastly, the study suggests the need for further research to delve deeper into the relationship between professional development and digital competency and its impact on the productivity of teacher education graduates. This will contribute to a more comprehensive understanding of effective teaching practices in the digital age.

References

1. E. Brynjolfsson and A. McAfee, Eds., "The second machine age: Work, progress, and prosperity in a time of brilliant technologies.," 2014.
2. R. J. Krumsvik, L. Ø. Jones, M. Øfstegaard, and O. J. Eikeland, "Upper Secondary School Teachers' Digital Competence: Analysed by Demographic, Personal and Professional Characteristics," Nordic Journal of Digital Literacy, vol. 10, no. 03, pp. 143–164, Oct. 2016, doi: https://doi.org/10.18261/issn.1891-943x-2016-03-02.
3. O. Erstad, S. Kjällander, and S. Järvelä, "Facing the challenges of 'digital competence,'" Nordic Journal of Digital Literacy, vol. 16, no. 02, pp. 77–87, Aug. 2021, doi: https://doi.org/10.18261/issn.1891-943x-2021-02-04
4. J. Tejada Fernández and K. V. Pozos Pérez, "Nuevos escenarios y competencias digitales docentes: Hacia la profesionalización docente con TIC," *Profesorado, Revista de Currículum y Formación del Profesorado*, vol. 22, no. 1, pp. 25–51, Mar. 2018, doi: https://doi.org/10.30827/profesorado.v22i1.9917.
5. "(PDF) Education as an instrument of social change and enhancing teaching-learning process with the help of technological development," ResearchGate. https://www.researchgate.net/publication/325143953_Education_as_an_instrument_of_social_change_and_enhancing_teaching-learning_process_with_the_help_of_technological_development
6. J. C. Richards and R. Schmidt, Eds., "Longman dictionary of language teaching and applied linguistics.," 2003. Beijing: Foreign Language Teaching and Research Press. doi:10.1080/13674580701687807
7. T. Ganser, "An Ambitious Vision of Professional Development for Teachers," NASSP Bulletin, vol. 84, no. 618, pp. 6–12, Oct. 2000, doi: https://doi.org/10.1177/019263650008461802.
8. P. V. Bredeson, "The architecture of professional development: materials, messages and meaning," International Journal of Educational Research, vol. 37, no. 8, pp. 661–675, Jan. 2002, doi: https://doi.org/10.1016/s0883-0355(03)00064-8.
9. K. Ala-Mutka, "Mapping digital competence: Towards a conceptual understanding", Jan. 2011, (JRC 67075)

10. S. E. Chang, "Computer anxiety and perception of task complexity in learning programming-related skills," Computers in Human Behavior, vol. 21, no. 5, pp. 713–728, Sep. 2005, doi: https://doi.org/10.1016/j.chb.2004.02.021.

11. T. Hartsell, S. Herron, H. Fang, and A. Rathod, "Improving Teacher's self confidence in Learning Technology Skills and Math Education through Professional Development," International Journal of Information and Communication Technology Education, vol. 6, no. 2, pp. 47–61, Jan. 2010, Accessed: Oct. 16, 2023. [Online]. Available: https://aquila.usm.edu/fac_pubs/15689

12. Y. Baek, J. Jung, and B. Kim, "What makes teachers use technology in the classroom? Exploring the factors affecting facilitation of technology with a Korean sample," Computers & Education, vol. 50, no. 1, pp. 224–234, Jan. 2008, doi: https://doi.org/10.1016/j.compedu.2006.05.002.

13. A. M. Usop, M. L. KADTONG, and A. Sajid, "Work Performance and Job Satisfaction among Teachers," Semantic Scholar, 2013. https://www.semanticscholar.org/paper/Work-Performance-and-Job-Satisfaction-among-Usop-KADTONG/079778c486fb7258e3359821e55ff548e1de0439

14. E. C. A. Dr, "Amadi, E. C. & Anaemeotu P. (2013). Professional development of teachers' academic performance in Secondary Schools in Etche Local Government Area of Rivers State, Nigeria," Academic Medicine, Accessed: Oct. 16, 2023. [Online]. Available: https://www.academia.edu/73785739/Amadi_E_C_and_Anaemeotu_P_2013_Prof

15. A. S. MacSuga-Gage, B. Simonsen, and D. E. Briere, "Effective Teaching Practices that Promote a Positive Classroom Environment," Beyond Behavior, vol. 22, no. 1, pp. 14–22, 2012, Available: https://eric.ed.gov/?id=EJ1006541

16. "McBurney, D., & White, T. L. (2009). Research methods. Belmont, CA Wadsworth Cengage Learning. - References - Scientific Research Publishing," www.scirp.org. https://www.scirp.org/(S(lz5mqp453edsnp55rrgjct55))/reference/ReferencesPapers.aspx?ReferenceID=846406

17. K. L. Thaba-Nkadimene and S. D. Mmakola, "Examining the performance of teacher graduates from Limpopo rural university," South African Journal of Higher Education, vol. 33, no. 5, Nov. 2019, doi: https://doi.org/10.20853/33-5-3596.

18. J. Huffman, "The Role of Shared Values and Vision in Creating Professional Learning Communities," NASSP Bulletin, vol. 87, no. 637, pp. 21–34, Dec. 2003, doi: https://doi.org/10.1177/019263650308763703.

19. K. Agustini, I. W. Santyasa, and N. M. Ratminingsih, "Analysis of Competence on 'TPACK': 21st Century Teacher Professional Development," Journal of Physics: Conference Series, vol. 1387, p. 012035, Nov. 2019, doi: https://doi.org/10.1088/1742-6596/1387/1/012035.

20. E. J. Instefjord and E. Munthe, "Educating digitally competent teachers: A study of integration of professional digital competence in teacher education," Teaching and Teacher Education, vol. 67, pp. 37–45, Oct. 2017, doi: https://doi.org/10.1016/j.tate.2017.05.016.

21. B. Mizova, R. Peytcheva-Forsyth, and B. Gospodinov, "Challenges to the development of teachers' professional digital competences – Bulgarian perspective," THERMOPHYSICAL BASIS OF ENERGY TECHNOLOGIES (TBET 2020), 2021, doi: https://doi.org/10.1063/5.0041818.

22. [22] S. Roopa and M. Rani, "Questionnaire Designing for a Survey," The Journal of Indian Orthodontic Society, vol. 46, no. 4, pp. 273–277, Oct. 2012, doi: https://doi.org/10.5005/jp-journals-10021-1104.

23. M. B. Postholm, "Teachers' professional development: a theoretical review," Educational Research, vol. 54, no. 4, pp. 405–429, Nov. 2012, doi: https://doi.org/10.1080/00131881.2012.734725.

24. Y. Netragaonkar and S. A. Bhat, Eds., "OCCUPATIONAL EFFICACY AND JOB SATISFACTION OF SCHOOL EDUCATIONAL ADMINISTRATORS IN KASHMIR," Sep. 2014. https://www.researchgate.net/publication/305851999

25. N. Lodders and F. Meijers, "Collective learning, transformational leadership and new forms of careers guidance in universities," British Journal of Guidance & Counselling, vol. 45, no. 5, pp. 532–546, Jan. 2017, doi: https://doi.org/10.1080/03069885.2016.1271864.

26. J. Castelijns, M. Vermeulen, and Q. Kools, "Collective learning in primary schools and teacher education institutes," Journal of Educational Change, vol. 14, no. 3, pp. 373–402, Apr. 2013, doi: https://doi.org/10.1007/s10833-013-9209-6.

27. M. K. Williams, T. S. Foulger, and K. Wetzel, "Preparing Preservice Teachers for 21st Century Classrooms: Transforming Attitudes and Behaviors About Innovative Technology," Journal of Technology and Teacher Education, vol. 17, no. 3, pp. 393–418, Jul. 2009, Accessed: Oct. 16, 2023. [Online]. Available: https://www.learntechlib.org/primary/p/28216/

28. M. Katzenmayer and G. Moller, Awakening the Sleeping Giant: Helping Teachers Develop as Leaders. Second Edition. Corwin Press, Inc, 2001. Available: https://eric.ed.gov/?id=ED454185

29. "Pekrun, R. (1992). The Impact of Emotions on Learning and Achievement Towards a Theory of Cognitive/Motivational Mediators. Applied Psychology, 41, 359-376. - References - Scientific Research Publishing," www.scirp.org. https://www.scirp.org/(S(351jmbntvnsjt1aadkposzje))/reference/ReferencesPapers.aspx?ReferenceID=2222683 (accessed Oct. 16, 2023).

30. P. P. Utami and N. Vioreza, "Teacher Work Productivity in Senior High School," International Journal of Instruction, vol. 14, no. 1, pp. 599–614, Jan. 2021, doi: https://doi.org/10.29333/iji.2021.14136a.

31. Anisah, N. Gistituati, and Rusdinal, "Analysis of Factors Affecting Teachers' Productivity," www.atlantis-press.com, Dec. 12, 2020. https://www.atlantis-press.com/proceedings/icoie-20/125948044

32. J. Dockstader, "Teachers of the 21st Century Know the What, Why, and How of Technology Integration," T.H.E. Journal, vol. 26, no. 6, pp. 73–74, 1999, Available: https://www.learntechlib.org/p/86540/

33. S. Sansaluna, L. Bawa, A. Camua, and L. Untong, "Senior High School Students' Anxiety and Performance in Learning English," Advances in Social Sciences Research Journal, vol. 8, no. 4, pp. 605–612, May 2021, doi: https://doi.org/10.14738/assrj.84.10018.

34. A. Sayed Munna and A. Kalam, "Application of Theories, Principles and Models of Curriculum Design: A Literature Review," International Journal of Multidisciplinary and Current Educational Research (IJMCER), vol. 3, no. 1, 2021, Available: https://files.eric.ed.gov/fulltext/ED610962.pdf

35. A. Paolini, "Enhancing Teaching Effectiveness and Student Learning Outcomes," 2015. Available: https://files.eric.ed.gov/fulltext/EJ1060429.pdf

36. [36] D. Hammer et al., "Recognition of Teaching Excellence," American Journal of Pharmaceutical Education, vol. 74, no. 9, p. 164, Sep. 2010, doi: https://doi.org/10.5688/aj7409164.

37. A. A. Glatthorn, "Cooperative Professional Development: Peer-Centered Options for Teacher Growth," Educational Leadership, vol. 45, no. 3, pp. 31–35, 1987, Available: https://eric.ed.gov/?id=EJ367354

38. B. Berry, A. Daughtrey, and A. Wieder, "Teacher Leadership: Leading the Way to Effective Teaching and Learning," Center for Teaching Quality, Jan. 2010, Available: https://www.researchgate.net/publication/234686653_Teacher_Leadership_Leading_the_Way_to_Effective_Teaching_and_Learning

39. T. Yang and X. Hong, "Early childhood teachers' professional learning about ICT implementation in kindergarten curriculum: A qualitative exploratory study in China," Frontiers in Psychology, vol. 13, Oct. 2022, doi: https://doi.org/10.3389/fpsyg.2022.1008372.

40. G. Falloon, "From digital literacy to digital competence: the teacher digital competency (TDC) framework," Educational Technology Research and Development, vol. 68, no. 5, Mar. 2020, doi: https://doi.org/10.1007/s11423-020-09767-4.