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Does computer proficiency and work motivation influence career development in teacher professional education?

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Abstract: This study aims to investigate the influence of computer skills and work motivation on the career development of teacher candidates enrolled in the Teacher Professional Education In-Service Program (Batch 1 of 2023) at the Institute for Educational Personnel Development, Nusa Cendana University, Kupang. Employing a quantitative approach with an ex-post facto design, data were collected from a randomly selected sample and analyzed using Path Analysis. The findings reveal that computer skills have a significant positive effect on work motivation (path coefficient = 0.646; $\rho < 0.001$), and work motivation has a direct impact on teacher career outcomes (path coefficient = 0.346; $\rho = 0.030$). Additionally, computer skills indirectly influence teacher careers through work motivation (combined path coefficient = 0.233). The model accounts for 97.8% of the variance in teacher career development ($R^2 = 0.978$). These results underscore the need for teacher education programs to incorporate comprehensive digital literacy training and motivational strategies. Enhancing infrastructure and equitable access to technology is also vital to support professional growth. Future studies should examine long-term impacts to inform policy and practice in teacher professional development.

Keywords: *Computers and teacher/student careers, Influence of work motivation, Path analysis.*

1. Introduction

The rapid advancement of digital technology has drastically transformed the education landscape, pushing educational institutions to adapt swiftly to new learning paradigms. Teachers, as the frontline actors in this transformation, are now expected to integrate digital tools effectively to foster engaging, student-centered learning environments. Research has shown that educators who master digital competencies are better equipped to design interactive materials, facilitate active learning, and personalize instruction according to student needs [1]. Unfortunately, such capabilities are not uniformly developed, particularly in developing countries like Indonesia, where access to technology, training, and institutional support remains highly uneven [2].

In parallel, teacher work motivation is increasingly recognized as a critical determinant of teaching quality and professional growth. According to Self-Determination Theory, both intrinsic and extrinsic motivation play a central role in shaping teacher engagement and job satisfaction [3]. Motivated teachers are more open to innovation, more resilient in the face of challenges, and more likely to commit to long-term professional development [4]. However, in many areas of Indonesia, teacher motivation is threatened by systemic issues such as low salaries, high workloads, and limited recognition.

In response to these challenges, the Indonesian government, through the Directorate of Teacher Professional Education, launched the Teacher Professional Education (PPG) program as mandated by Law No. 14 of 2005. The program aims to enhance the professionalism of teachers by certifying competencies in pedagogy, subject matter, and social interaction. Yet, the implementation of this

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program has faced significant obstacles. Many participants report difficulties in integrating technology into their teaching and indicate that their motivation fluctuates due to external stressors like economic hardship and institutional pressure [5].

Despite the importance of both technological competence and motivation, previous research rarely examines the interaction between these variables and their combined effect on teacher career development. Studies tend to isolate one factor, leaving a critical gap in understanding how these components work together [6]. Furthermore, teacher development models often assume baseline competencies and motivation levels that do not reflect the realities on the ground.

The gap becomes even more pronounced when considering regional disparities, especially in eastern Indonesia. Universitas Nusa Cendana (UNDANA) in Kupang serves as a central hub for implementing the PPG In-Service program for eastern provinces. However, participants in this region often face compounded barriers: limited internet access, outdated equipment, and a lack of contextualized training materials tailored to the local teaching realities. Preliminary observations at UNDANA show that many PPG students struggle to meet digital requirements and often lack structured support in building both skills and motivation, which are critical for long-term career development.

The lack of research specifically focused on the conditions at UNDANA within the PPG framework represents a missed opportunity to understand and improve teacher professional preparation in eastern Indonesia. As one of the few institutions tasked with administering the program in remote areas, UNDANA provides a valuable context to study the intersection of technological competence and motivation in real-world, under-resourced conditions. Exploring this context will sharpen the relevance and urgency of this study, filling a critical knowledge gap.

Moreover, teaching in such settings involves more than mastering content; it demands adaptive, reflective practitioners who can work under constraints while maintaining enthusiasm for their profession. Teachers without adequate preparation in digital tools often fall back on traditional methods, further exacerbating the distance between curriculum goals and classroom practice. This disconnect contributes to poor student outcomes and stagnation in teacher careers [7].

In light of these issues, this study seeks to explore how digital competence and work motivation influence teacher career development, particularly within the PPG program at Universitas Nusa Cendana. By integrating both psychological and technological variables, the study aims to provide a more holistic understanding of the professional growth process. Furthermore, this research addresses a critical empirical gap by analyzing both direct and mediated effects through the use of path analysis modeling.

Furthermore, this research will offer practical recommendations for policy makers and education stakeholders. These include integrating digital literacy modules into all levels of teacher training, developing motivational enhancement strategies such as mentoring and recognition programs, and ensuring that certification initiatives like PPG are context-sensitive. The goal is to create a supportive ecosystem that nurtures both competence and motivation, thereby improving teacher retention, effectiveness, and ultimately, student achievement.

The theoretical implications of this study are equally significant. By extending Self-Determination Theory into the domain of digital education, the study tests the interplay of internal motivation and external skillsets in shaping professional identity. This integration may enrich the current body of motivational theories in education, particularly in the Global South context where socio-economic constraints often shape teacher behavior in unique ways.

2. Method

This study aims to analyze the influence of computer proficiency and work motivation on teacher career development in the In-Service Teacher Professional Education Program (PPG) Batch 1 in 2023 at the Teacher Training Institute (LPTK) of Nusa Cendana University (Undana), Kupang. An ex-post facto research design was employed because the variables studied—such as computer skills and career development—had already occurred and could not be manipulated directly. This design is appropriate

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for exploring causal relationships based on naturally occurring data. A path analysis approach was used to identify both direct and indirect relationships among the variables, making it preferable to other quantitative methods that may only detect linear or bivariate associations.

This study utilized a survey method to collect data from a population of PPG In-Service students, aiming to gain a comprehensive understanding of the challenges they face in integrating technology and maintaining motivation throughout the professional certification process. The sample was selected using area random sampling from the five teacher education programs under the PPG In-Service Batch 1 at LPTK Undana, ensuring that the data captured represented various academic disciplines.

Data were collected through a combination of questionnaires and document analysis. The questionnaire was developed using a five-point Likert scale (ranging from 1 = strongly disagree to 5 = strongly agree). Each construct was measured using multiple indicators: for example, the computer skills construct included items such as "I am confident using digital learning platforms like Google Classroom," while the work motivation construct included items like "I feel enthusiastic about improving my teaching skills." Career development was measured through indicators such as "I am actively pursuing professional certification and training opportunities. Expert judgment from three university lecturers specializing in education and psychometrics was used to assess content validity. The reliability of each construct was tested using Cronbach's Alpha, with all variables exceeding the 0.7 threshold, indicating high internal consistency.

Ethical clearance was obtained from the Faculty of Teacher Training and Education at Nusa Cendana University. All participants were informed about the purpose of the study, and informed consent was obtained before distributing the questionnaire. Participation was voluntary, and anonymity and confidentiality of respondents were strictly maintained throughout the research process.

The data collected were analyzed using path analysis to test the hypothesized causal relationships between computer proficiency (X1), work motivation (X2), and teacher career development (X3). This approach provided a clear and visual understanding of how each variable influenced one another, both directly and indirectly. The findings are expected to contribute significantly to the formulation of educational policies that promote professional competence development among teachers through the PPG program in Indonesia.

3. Research Design

This study uses the Path Analysis method to identify direct and indirect influences between research variables. This analysis aims to test the causal relationship between the variables of computer skills (X1), work motivation (X2), and career (X3) of students/teachers. With this approach, the relationship between variables in the research model can be described visually, thus clarifying the structure of the relationship to be tested. The design of this study can be explained as follows:

- X1: Computer skills possessed by students/teachers.
- X2: Student/teacher work motivation.
- X3: Student/teacher career.

This analysis model allows researchers to understand the extent to which computer proficiency and work motivation influence careers, both directly and through indirect channels.

4. Population and Sample

The population of the study was all students/teachers of the In-Service Teacher Professional Education Program (PPG) Batch 1 of 2023 at the Teacher Training Institute (LPTK) of Nusa Cendana University, Kupang. This population includes participants who have received computer training as part of the PPG program and are in the process of obtaining teacher certification. The study focused on the odd semester of the 2023 academic year.

The research sample was selected using the Area Random Sampling technique. This technique is used to ensure representation of various groups in the population, so that the research results can be

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generalized. The sample consists of students/teachers who have completed most of the PPG program and are in the process of obtaining teacher certification. The determination of the sample considers the distribution of PPG participants in five study programs at LPTK Undana.

5. Data Collection Tools

To obtain comprehensive and valid data relevant to the research objectives, data collection was carried out using multiple instruments specifically developed to measure the constructs of computer skills, work motivation, and teacher career development. The instruments were chosen based on their suitability for capturing both subjective perceptions and objective records related to the In-Service Teacher Professional Education Program (PPG) at Nusa Cendana University.

5.1. Questionnaire

The primary instrument for data collection was a structured questionnaire designed to assess the respondents' perceptions of their own computer proficiency, levels of work motivation, and career development progress. The questionnaire utilized a five-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*), which enabled the quantification of responses and facilitated subsequent statistical analysis, particularly for path modeling. The computer skills dimension included items such as "I am confident in using digital tools to support teaching and learning," while work motivation included statements like "I actively seek out opportunities for professional growth." The career development section assessed progress indicators such as engagement in certification, training, and responsibilities in professional teaching roles.

5.2. Document Analysis (Documentation)

To enhance the reliability and validity of the self-reported data obtained through the questionnaire, supporting documentation was also analyzed. This included training completion certificates, digital skill assessment results, certification records, and administrative documentation related to the participants' involvement in the PPG program. These documents served as triangulation tools to verify the claims made by participants in the questionnaire, thus strengthening the overall methodological rigor of the study. The integration of documentary evidence allowed the researchers to validate whether participants' perceived levels of competence and motivation were consistent with their actual progress in the program.

6. Data Collection

Data collection was conducted using the Ex-post facto technique, where data was taken after the incident occurred. This study used Area Random Sampling to ensure representativeness of samples from various study programs in In-Service PPG Batch 1 of 2023 at LPTK Undana. The data collected includes information related to:

1. Computer ability: Training results records and questionnaires that evaluate the level of computer mastery of students/teachers.
2. Work motivation: Data related to work motivation obtained through questionnaires and assessment documents from the PPG program.
3. Career: Information about student/teacher career development, including certification processes and other professional achievements.

Data collection was carried out during the odd semester of the 2023 academic year. The data obtained were analyzed using Path Analysis to evaluate the causal relationship between the research variables. This study is expected to provide insight into the influence of computer mastery and work motivation on the career development of PPG teachers.

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Information:
X1 = computer skills received by students/teachers
X2 = Student/teacher work motivation
X3 = Student/teacher career

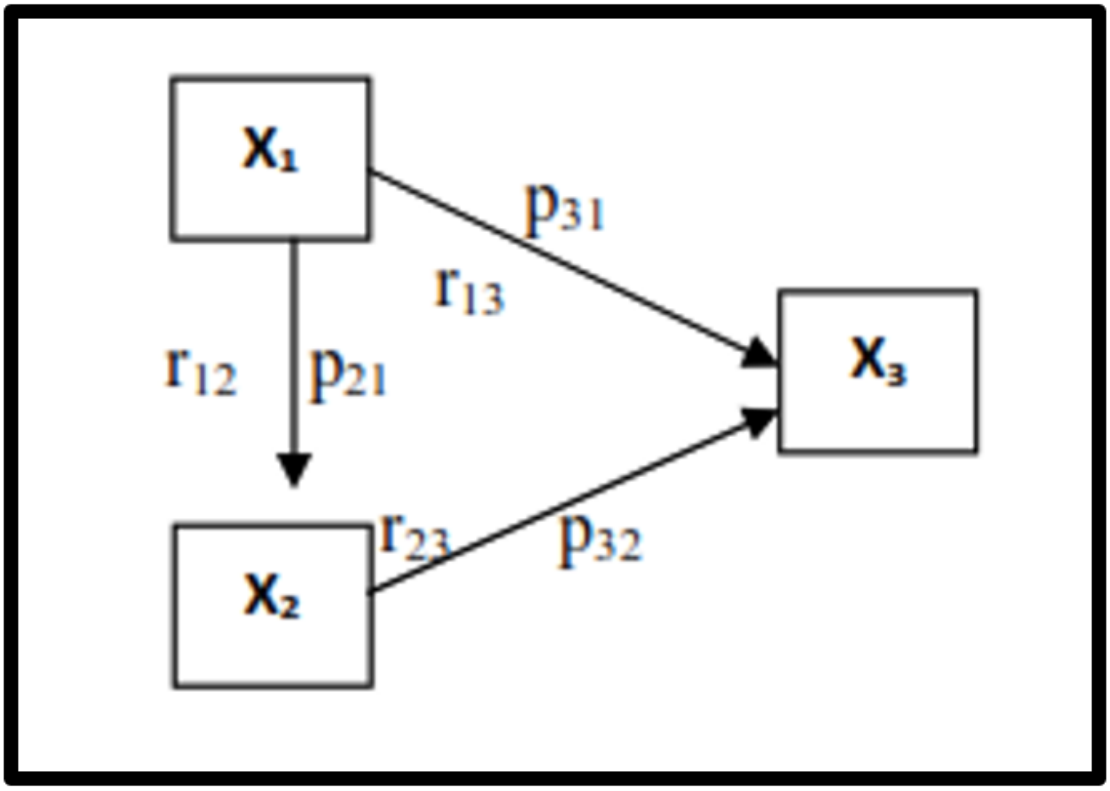

Figure 1.
Path Analysis.

7. Results and Discussion

This study confirms the relationship between computer skills, work motivation, and career of students/teachers of the In-Service Teacher Professional Education Program (PPG). The results of the validity test indicate that all instruments used in the study are valid. The reliability values, measured using Cronbach's Alpha, show high internal consistency for all variables: 0.851 for computer skills (X1), 0.731 for work motivation (X2), and 0.814 for career (X3). These results ensure that the data collected can be used reliably for further analysis.

From the results of the normality test using Kolmogorov-Smirnov, all variables show a normal data distribution with a value of $\rho > 0.05$. This allows the application of the path analysis method, which requires data with a normal distribution. In addition, the homogeneity test shows that the variance between groups in the sample is homogeneous with a value of $\alpha > 0.05$, meeting the basic assumptions of the analysis.

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Table 1.
Results of validity, normality, homogeneity tests.

Variables	Validity	Reliability (Cronbach's Alpha)	Normality (ρ > 0.05)	Homogeneity (α > 0.05)	Interpretation of Results
Computer Skills (X1)	Valid	0.851	Kolmogorov: 0.200	Median: 0.650	Increase work and career motivation.
Work Motivation (X2)	Valid	0.731	Kolmogorov: 0.150	Median: 0.650	Support career development directly.
Career (X3)	Valid	0.814	Kolmogorov: 0.200	Median: 0.650	Directly influenced by work motivation and computer skills.

Computer literacy has a direct influence on the career development of students/teachers. Students/teachers who have good computer literacy tend to be better able to integrate technology into their teaching, which supports career advancement. In addition, computer literacy also affects work motivation, which in turn has a positive impact on careers. Thus, computer literacy has both direct and indirect effects on the careers of students/teachers.

Work motivation was found to be an important factor that directly affects career. Motivated teachers tend to be more active in following training, participating in certification, and showing a high commitment to their professional development. This motivation not only improves the quality of teaching but also makes a significant contribution to career development.

Teacher career is influenced by a combination of computer skills and work motivation. This relationship shows that mastery of technology, supported by high work motivation, can significantly increase career opportunities for students/teachers in the PPG program. These results provide recommendations that the PPG program needs to strengthen technology training and motivate participants to achieve optimal results.

8. Hypothesis Testing

8.1. Direct Influence of Computer Skills (X1) on Career (X3)

The results of the path analysis show that computer skills have a significant direct influence on the career of students/teachers with a path coefficient (P13) of 0.646. This result is supported by the statistical test significance value of $\rho < 0.001$, which means that this relationship is significant at a 99% confidence level. The correlation coefficient between computer skills and career is 0.988, indicating a very strong relationship. Thus, increasing computer skills directly contributes to improving the career of students/teachers in the Teacher Professional Education Program (PPG).

8.2. Direct Influence of Work Motivation (X2) on Career (X3)

Work motivation also has a significant direct influence on career, with a path coefficient (P23) of 0.346. The significance value of the statistical test of $\rho = 0.030$ indicates a significant relationship at the 95% confidence level. The correlation coefficient between work motivation and career is 0.984, which also indicates a very strong relationship. This confirms that work motivation is an important factor in supporting teacher career development.

8.3. Indirect Influence of Computer Skills (X1) on Career (X3) through Work Motivation (X2)

Computer skills also have an indirect effect on career through work motivation, with an indirect effect coefficient of 0.233 (result of $P13 \times P23 = 0.646 \times 0.346$). This relationship is significant because the direct path coefficients P13 and P23 are each significant. This shows that increasing computer skills not only improves career directly, but also through increasing work motivation, which then affects career positively.

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8.4. Suitability of Research Model

The results of the regression test show that the research model has a very good level of fit, with an R Square value of 0.978. This means that 97.8% of the variability in career (X3) can be explained by computer skills (X1) and work motivation (X2). The remaining 2.2% is explained by other factors outside the model. The F value = 912.791 with a significance of ρ <0.001 indicates that the overall regression model is significant and suitable for use in the analysis.

8.5. Coefficient of Determination of Other Factors Outside the Model (Residual)

The influence coefficient of factors outside the model (ρX3ε) is calculated as:

$$\rho_{X3\varepsilon} = \sqrt{1 - R^2} = \sqrt{1 - 0.978} = \sqrt{0.022} = 0.148$$

This value indicates that other factors outside the model have little influence on student/teacher careers.

8.6. Path Diagram and Interpretation

The following path diagram illustrates the relationship between the research variables:

- Direct influence of X1 on X3:0.646
- Direct influence of X2 on X3:0.346
- Indirect effect of X1 to X3 through X2:0.233

The total impact of computer skills on career (both direct and indirect) is:

Total Influence X1 → X3=P13+(P13×P23)=0.646+0.233=0.879

(Total Influence X1 → X3) = P13 + (P13 × P23) = 0.646 + 0.233 = 0.879.

Total Influence X1 → X3=P13+(P13×P23)=0.646+0.233=0.879

Table 2.
Path Analysis Results.

Relationship Between Variables	Path Coefficient	Correlation Coefficient	Interpretation
Computer Skills (X1) → Career (X3)	0.646	0.988	The immediate impact is significant; increased computer skills directly enhance careers.
Work Motivation (X2) → Career (X3)	0.346	0.984	Direct influence is significant; work motivation is a major factor in career development.
Computer Skills (X1) → Work Motivation (X2) → Career (X3)	0.233	-	The indirect effect is significant; computer skills increase work motivation, which has an impact on career.

The results of this study confirm that computer skills and work motivation are key factors in the career development of PPG students/teachers. This relationship is not only direct, but also indirect through work motivation. With a model that has a very good fit, this study provides a strong empirical basis for improving technology training and work motivation strategies in PPG programs.

9. Discussion

The results of the study showed that computer skills have a significant direct influence on career with a path coefficient of 0.646 and a correlation of 0.988 (ρ <0.001). This finding indicates that mastery of technology is key to supporting teacher career development. According to Tampubolon, et al. [8] technology skills not only improve administrative performance but also expand opportunities for professional development in the modern work environment [8]. Computer skills allow teachers to apply digital tools in learning, such as the use of classroom management systems and interactive presentations. This is in line with West [9] which states that technology can increase student engagement and facilitate the achievement of learning goals [9].

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In addition, computer skills are also an indicator of modern competence that improves the professional reputation of teachers. According to Widi and Kusuma [10] the use of technology increases the productivity, efficiency, and added value of an educator's career [10]. Technology training for teachers has also been shown to increase motivation and relevant skills to support career development. Sukmawati [11] showed that technology-based training plays an important role in improving skills relevant to future needs [11].

Furthermore, Hui [12] study highlighted the role of technology in career development through social networking and online job platforms. Technologically savvy teachers can use these platforms to build professional networks and access additional job opportunities [12].

Thus, computer literacy not only provides direct benefits but also creates a multiplier effect that affects careers through skill enhancement, learning innovation, and professional networking. The government needs to pay attention to technology training to improve the quality of teaching and career prospects of teachers.

Work motivation was found to have a significant direct effect on career, with a path coefficient of 0.346 and a correlation of 0.984 ($\rho = 0.030$). Work motivation plays an important role in career success because it can encourage teachers' active involvement in professional development. According to Deci and Ryan [13] intrinsic and extrinsic motivation increase job satisfaction and dedication to tasks, which are key to career development [14].

Motivated teachers tend to be more open to innovation and more committed to following professional training. Dalimunthe, et al. [15] showed that strong motivation significantly affects performance, which then has a positive impact on career development [15].

Furthermore, work motivation contributes to improving the quality of teaching. Teachers who have high levels of motivation tend to be more creative and innovative in designing learning strategies. According to Law [16] motivation is a key element in the successful adoption of technology in learning, which supports teachers' careers [16].

Work motivation is also influenced by the work environment and rewards. Wau and Purwanto [17] found that a supportive work environment and adequate rewards can significantly increase work motivation [17].

Computer skills were found to have an indirect effect on career through work motivation, with a path coefficient of 0.233. This indicates that work motivation functions as a significant mediator in the relationship between technology mastery and career development. In this context, computer mastery by teachers increases their self-efficacy, which encourages self-confidence and commitment to professional tasks. A study by Arsawan, et al. [18] showed that technological skills often affect a person's intrinsic motivation to advance their career, especially when technology is used effectively in daily activities.

Increased work motivation due to mastery of technology allows teachers to be more involved in digital-based learning and administration activities. In the research location, teachers who are skilled in using software such as Google Classroom and Canva are able to design more interactive learning methods, which not only increase student engagement but also provide a deep sense of professional achievement. This phenomenon supports the findings of Hui [12] which states that mastery of technology can increase motivation through the achievement of better work results.

Work motivation also encourages teachers' participation in professional training and certification that is essential for their career development. According to Dalimunthe, et al. [15] high motivation significantly influences teachers' success in participating in training and development programs. At the research location, many teachers reported that the computer training they received in the PPG program had increased their confidence to participate more actively in certification. This shows that work motivation triggered by technology mastery has a direct impact on increasing professional capacity.

However, although many teachers in the research sites showed positive responses to technology training, there were gaps in implementation. Infrastructure limitations, such as uneven internet access and limited hardware, were barriers for some teachers to fully integrate technology into their teaching.

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This condition is in line with the findings of Law [16] who highlighted that lack of institutional support can undermine work motivation, even though technical skills have been mastered.

Work motivation also allows teachers to be more creative in designing technology-based learning strategies. In the research location, teachers with high work motivation tend to be more active in exploring new methods to improve student learning outcomes. For example, the use of digital tools to adapt teaching materials to students' needs has a positive impact not only on the quality of teaching but also on their professional recognition.

On the other hand, there are challenges faced in maintaining teacher work motivation. High administrative burdens and lack of financial rewards at the research site often hinder teachers' ability to focus on professional development. This is confirmed by Wau and Purwanto [17] who showed that minimal incentives can significantly reduce work motivation, which in turn affects career development.

Nevertheless, the findings of this study underscore the importance of work motivation as a catalyst in connecting technology skills to careers. Work motivation not only strengthens the direct relationship between computer skills and careers but also adds value through achieving higher professional development goals. Governments and educational institutions need to increase access to technology training while creating a supportive work environment to ensure teachers are motivated to continue to develop.

In the research sites, work motivation was shown to play a significant role in encouraging teachers to integrate technology into their teaching practices. Despite infrastructure challenges, teachers who had better access to technology training tended to be more proactive in developing themselves. This suggests that when work motivation is nurtured through adequate institutional support, technology proficiency can be a very effective factor in advancing teachers' careers. Therefore, more inclusive policies are needed to ensure that all teachers have equal opportunities to improve their skills and advance their careers through high work motivation.

10. Conclusion

The conclusion of this study shows a significant relationship between computer skills, work motivation, and career development of students/teachers of the In-Service Teacher Professional Education Program (PPG) at Nusa Cendana University. Computer skills have a significant direct effect on career, with a path coefficient of 0.646 and a correlation of 0.988 (ρ <0.001). This confirms that teachers who have good computer skills can be more effective in integrating technology into learning and administration, which ultimately supports their career advancement. On the other hand, work motivation was also found to have a significant direct effect on career, with a path coefficient of 0.346 and a correlation of 0.984 (ρ = 0.030). These findings indicate that teachers who are highly motivated are more likely to participate in professional development, which strengthens their position in the career ladder.

In addition to the direct influence, computer skills also have an indirect influence on career through work motivation, with a path coefficient of 0.233. This shows that mastery of technology not only improves teacher efficiency and competence, but also encourages work motivation that has a positive impact on their careers. The research model used has a very good fit, with an R Square value of 0.978, which means that 97.8% of the variability in career can be explained by computer skills and work motivation. The remaining 2.2% is explained by other factors outside the model. The high significance of the F test (F = 912.791; ρ <0.001) further strengthens the validity of the model used in this study.

However, this study has several limitations. One limitation is the limited population coverage, which is only on PPG In-Service students/teachers at Nusa Cendana University, which limits the generalization of the research results to a wider population. In addition, constraints on technology access at the research location, such as limited hardware and internet connection, can affect the research results and interpretation of the relationship between variables. The ex-post facto research design also

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provides limitations because it does not allow full control over the independent variables, so that causal relationships can only be based on statistical assumptions.

The findings of this study have important implications for policy and practice. Practically, this study emphasizes the importance of technology training as part of the PPG program. This training not only improves computer skills but also motivates teachers to develop professionally. From a policy perspective, governments and educational institutions need to ensure the availability of adequate technology infrastructure across the region to ensure all teachers have equal access to technology. In addition, this study provides a theoretical contribution by highlighting the important role of work motivation as a mediator in the relationship between computer skills and careers.

For the future, this study provides an opportunity for a broader study involving populations from different institutions and regions to increase the generalizability of the results. Longitudinal design research is also needed to identify the long-term impact of technology training on teachers' careers. In addition, including additional variables such as institutional support, financial rewards, and workload can provide more comprehensive insights into the factors that influence teacher career development. Thus, this study not only provides an in-depth understanding but also paves the way for the development of better educational policies and practices in the future.

Transparency:

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

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