

INSTRUCTIONAL and Technological Leadership Behavior of School Heads as Predictors of Professional Development of TEACHERS

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ABSTRACT

This research investigates the extent to which school heads' instructional and technological leadership behaviors influence and predict teachers' professional development. A quantitative research design using the descriptive-correlational method was employed. The respondents comprised public secondary school teachers in the Division of Davao Oriental. Adapted questionnaires were used to obtain information from the respondents. The findings revealed that the levels of instructional leadership, technological leadership, and teacher professional development were very high. Further, there are significant relationships between instructional leadership and teachers' professional development, and between technological leadership behavior and teachers' professional development. Furthermore, instructional and technological leadership behaviors significantly influence teachers' professional development.

KEYWORDS: *instructional leadership, technological leadership behavior, professional development, Philippines*

INTRODUCTION

Teacher professional development is about how teachers learn to enhance and renew their teaching skills (Setiawan, 2020). It is important in developing students' critical and creative thinking. Nevertheless, teachers lack the proper training to enhance these skills effectively (Franco & Vieira, 2019). Additionally, studies by Nemenzo (2018) indicate that teachers face various challenges that hinder their ability to deliver lessons that capture students' interest and connect with their daily lives.

Teachers encounter a variety of challenges when applying learning approaches appropriate to varied student needs in different school settings. This includes teachers lacking proper training and resources to implement inclusive education effectively, especially for students with disabilities (Allam & Martin, 2021). Issues include that, although teachers demonstrate robust conceptual knowledge and planning ability, their metacognitive skills are inadequate to effectively develop students' higher-order thinking skills (HOTs) at the elementary level in Eastern Samar (Gutierrez, 2015).

Further, instructional leadership is a model of school leadership that supports principals' collaboration with teachers in designing and developing teaching procedures that foster enhanced pupil achievement (Brolund, 2016). This policy involves setting specified goals and implementing interventions through coaching, mentoring, and professional development, among other approaches (Brolund, 2016). Empirical results repeatedly indicate positive correlations between principals' instructional leadership and the development of professional teachers. Meanwhile, technological leadership is a notion that encompasses several constructs, namely visionary leadership, a culture of learning in the digital age, excellence in professional practice, improvement on a system-wide basis, and citizenship in the digital world (Gulpan & Baja, 2020). The technology leadership of principals significantly influences teachers' professional development and integration of technology in schools. Studies show a positive link between the principals' technology leadership and the teachers' technology integration.

Principals' instructional leadership has been shown to positively affect teacher professional development (Ahmad et al., 2024). Precisely, specifying school mission, directing instructional programs, and creating school learning climate led to teachers' growth (Ahmad et al., 2024). Few studies have examined the interconnection between instructional and technological leadership behaviors and their cumulative impact on teachers' professional growth. With this, a study is needed to examine the instructional and technological leadership behaviors of school heads as predictors of teachers' professional development. This study focuses on the need to equip teachers with the relevant skills and competencies to succeed in 21st-century learning environments, including whether and how leadership will respond to teachers' and learners' needs.

Statement of the Problem

1. What is the level of instructional leadership of school heads in terms of:

instructional resource provider; maintain visible presence; professional development; maximize instructional time; monitoring students' progress; feedback on teaching learning; and curriculum implementation?

2. What is the level of technological leadership behavior of school heads in terms of: motivation; orientation; support; and precaution?

3. What is the level of professional development of teachers in terms of: thematic knowledge; learning environment; cooperation; educational technology; research base; educational planning; evaluation; and development of human resource?

4. Is there a significant relationship between; instructional leadership and professional development of teachers and technological leadership behavior and professional development of teachers?

5. Do instructional leadership and technological leadership behavior significantly influence professional growth?

METHODOLOGY

Research Designs. This research utilized a quantitative research design, namely the descriptive correlational design.

Respondents. The respondents of this study were the junior high school teachers from the selected schools in the Division of Davao Oriental. At School A, there were 59 junior high school teachers. School B has 38 teachers from junior high school. School C has 63 junior high school teachers. The respondents were selected using cluster sampling, with all schools in the district serving as the sampling frame and three schools randomly selected. In those selected schools, junior high school teachers with five or more years of experience were included.

Research Instrument. The study used a survey questionnaire, divided into three parts. This includes the Instructional Leadership by Akram et al. (2016), Technological Leadership Behavior by Durnali (2022), and Professional Development of Teachers by Ayyoobi et al. (2016). The research was guided by Path-Goal Theory and Constructivist Theory. Mean, standard deviation, Pearson product-moment correlation, and multiple linear regression were used to assess the significance of the data.

Ethical Considerations. This study was submitted to the Research Ethics Committee of the University of the Immaculate Conception. Upon careful consideration, the study was deemed ethically sound and received ethical clearance.

RESULTS AND DISCUSSION

Level of Instructional Leadership of School Heads

The overall level of instructional leadership of school heads is 4.43, described as very high, indicating that instructional leadership is consistently demonstrated. It implies that school heads play a crucial role in providing the necessary resources, supporting teachers' professional growth, and maintaining a strong presence within the school community. They also prioritize effective use of instructional time, monitor student progress, and ensure alignment of teaching practices with the curriculum, all of which contribute to a positive, productive learning environment. In addition, the overall standard deviation is 0.54, which is less than 1, indicating that the respondents' ratings are clustered around the mean.

This result supports the findings of the research by Heikka et al. (2019), which identified that grade school principals achieved a very high level of instructional leadership. Henceforth, Hallinger et al. (2018) noted the very high level of instructional leadership among Malaysian principals.

Table 1
Level of Instructional Leadership of School Heads

Indicators	Mean	SD	Description
Instructional Resource Provider	4.38	.59	Very High
Maintain Visible Presence	4.44	.61	Very High
Professional Development	4.54	.57	Very High
Maximize Instructional Time	4.34	.62	Very High
Monitoring Students Progress	4.23	.77	Very High
Feedback on Teaching- Learning	4.52	.64	Very High
Curriculum Implementation	4.55	.61	Very High
Overall Mean	4.43	.54	Very High

Instructional Resource Provider. It reveals that the category mean is 4.38, which is very high, with item ratings ranging from 4.27 to 4.58. Consequently, the item *organizing and delivering instructional materials to teachers has a mean rating of 4.27*, while the item *encouraging teachers to use instructional materials freely* has a mean rating of 4.58. This means the school head's efforts to provide instructional resources are highly effective, with a strong emphasis on supporting teachers' access to and use of these materials. This finding is consistent with the study by Bieda et al. (2020), which found that

principals in US schools were high-level providers of instructional materials to teachers.

Maintain Visible Presence. It reveals that the category mean is 4.44, which is very high, with item ratings ranging from 4.17 to 4.56. Consequently, the item *visiting classes regularly to observe teaching and learning* shows a mean rating of 4.17, while the item *visibly present in school for teachers and students* shows a mean rating of 4.56. This means the school heads consistently maintain a very high level of visibility and presence within the school, which significantly supports both teachers and students. This discovery aligns with Gawlik's (2018) study, which found that principals maintained a very high level of visible presence in their schools.

Professional Development. It has garnered a very high category mean rating of 4.54, with a range of 4.47 to 4.61. Notably, the item *developing follow-up plans for assessing professional development* has a mean rating of 4.47, while the item *planning faculty meetings for professional development* shows a rating of 4.61. This suggests that the school principal places a strong emphasis on teacher professional development, with a very high level of commitment to supporting continuous growth and improvement. This result is in agreement with the research of Acton (2021), which highlighted the very high level of support from principals for quality professional development for teachers. Additionally, this outcome aligns with the findings of Admiraal et al. (2021), who reported that principals supported teachers in effective professional development programs to a very high degree.

As Asad Juma (2024) notes, for improving educational quality and student outcomes, teacher professional development (PD) is paramount. The responsibilities of school leaders have shifted from merely managing the school to stimulating learning, ensuring the quality of learning, and offering professional development and learning opportunities to all the teachers (Kalaichelvi & Aida Hanim, 2020)

Maximize Instructional Time. The mean ratings for the different items ranged from 3.65 to 4.61, with a category mean of 4.34, indicating very high ratings. The item reflects *ensuring that students do not use teachers' class time for regular meetings*, with a mean rating of 3.65. Meanwhile, the item *encouraging all teachers to come to class well-prepared and on time* shows a mean rating of 4.61. This means that the school principal demonstrates a very high commitment to maximizing instructional time, with a particular focus on

ensuring teachers are well-prepared and punctual for class, as reflected in the high rating of 4.61. This finding aligns with the study by Sterret et al. (2018), which found that principals allocate instructional time to a very high level to boost student learning outcomes. Moreover, this result is consistent with the findings of Hochbein et al. (2021), who stressed that principals maximize instructional time to a great extent to build a focused learning environment.

Monitoring Students' Progress. As assessed by respondents, it has a very high category mean of 4.23 with mean ratings ranging from 4.14 to 4.35. The item *reviewing students' work during classroom instruction* has the same mean rating of 4.14. On the other hand, the items' *meeting teachers individually to discuss student progress* and *requesting teachers to send students' progress reports to parents* have the same mean rating of 4.35. This implies that the principal effectively oversees student progress through direct involvement with teachers and informing parents accordingly. This outcome aligns with the study by Allensworth & Hart (2018), which found that principals in certain grade schools in the United States monitor students' progress extensively to identify areas for improvement and implement focused interventions.

Feedback on Teaching-Learning. The item mean scores ranged from 4.37 to 4.60, with a category mean of 4.52, which is very high. The item *giving verbal and written feedback to teachers* has a mean rating of 4.37, whereas the item *praising outstanding students on their achievement publicly* shows a mean rating of 4.60. This means the principal effectively balances feedback for both teachers and students, fostering a positive, motivating learning environment. This result is consistent with the study by Grissom et al. (2021), which found that principals provided timely feedback on teaching and learning to a very high degree. Hence, according to the reports of Alkaabi and Almaamari (2020), who indicated that principals provided timely feedback on teaching and learning to teachers to a very high degree.

Curriculum Implementation. The mean rating of the different items, ranging from 4.49 to 4.59 with a category mean of 4.55, was described as very high. The item *ensuring that students' marks reflect curriculum implementation* has a mean rating of 4.49, while the item *encouraging the preparation of lesson plans to make the curriculum effective* has a mean rating of 4.59. This means that the principal prioritizes both the assessment of curriculum effectiveness and the preparation necessary for successful teaching. This result aligns with the work by Pak et al. (2020), which found that principals exhibited a very high rate

of effective curriculum implementation by offering clear guidance, support, and facilitation to teachers.

Level of Technological Leadership Behavior

In Table 2, the level of technological leadership behavior is presented with an overall mean of 4.37, indicating very high levels. This means that technological leadership behavior is always observed. This indicates that the school head consistently demonstrates a strong commitment to guiding, supporting, and motivating teachers to use technology effectively and responsibly in the school environment. The high ratings across categories such as motivation, orientation, support, and precaution reflect the school head's proactive approach in ensuring that technology is not only integrated into teaching practices but also used ethically and safely. which is less than one, suggesting that the ratings are clustered near the mean.

The result supports the work of Thannimalai & Raman (2018), who found a highly significant influence of technology leadership on principals' support for teachers' integration of digital tools in secondary schools.

Table 2
Level of Technological Leadership Behavior

Indicators	Mean	SD	Description
Motivation	4.47	.64	Very High
Orientation	4.39	.67	Very High
Support	4.29	.77	Very High
Precaution	4.34	.78	Very High
Overall Mean	4.37	.66	Very High

Motivation. The mean ratings for the different items ranged from 4.43 to 4.49, with a category mean of 4.47, indicating very high ratings. The item *trying to address teachers’ concerns about the use of technology at school* reflects a mean rating of 4.43, while the item *motivating teachers to use technology at school* shows a mean rating of 4.49. This indicates a strong and consistent effort by the school head/principal to foster a positive attitude towards technology use among teachers, ensuring that their concerns are addressed and actively motivating them to integrate technology into their teaching practices. This result aligns with Chiu's (2022) research, which found a very high level of effectiveness in transformational leadership behaviors among school principals in inspiring teachers to integrate technology. Likewise, Mayantao & Tantiado (2024) revealed that when school heads actively motivate and support their teachers through encouragement and recognition, it results in a very high level of

confidence and actual use of digital tools in classroom teaching.

Orientation. It has garnered a very high category mean rating of 4.39, with ratings ranging from 4.33 to 4.44. Notably, the item *informing teachers about unnecessary use of technology at school* reflects a mean rating of 4.33. Meanwhile, the item *creating clear expectations about the use of technology at school* shows a mean rating of 4.44. This means that the teachers generally agree that the school head is actively guiding the use of technology, setting clear expectations, and effectively communicating its appropriate use. These ratings reflect a strong, positive perception of the principal's role in leading technology integration, ensuring its meaningful and responsible use within the school. This finding is similar to the study of Reganon (2023), which found that school heads' technological leadership, including orienting teachers on ICT integration, significantly enhances classroom instruction, resulting in a very high level of technology utilization.

Support. The mean rating for the items ranged from 4.16 to 4.43, with a category mean of 4.29, and was described as very high. The item *providing the hardware upgrades needed in the teaching process at school* reflects a mean rating of 4.16, while the item *ensuring that the information technology tools needed at school are ready for use* shows a mean rating of 4.43. This means that the teachers view the school head's efforts to support technology integration as highly effective. This result supports the research of Sánchez et al. (2022), who found that principals who offered a high degree of support through mentoring, continuous training, and resource availability led to very high levels of technology adoption among teachers.

As Hughes & Burke (2014) note, to effectively lead in the digital era, principals need to understand digital literacy, citizenship, and virtual learning environments, and to assist teachers in becoming facilitators of technology-mediated learning.

Precaution. As assessed by respondents, it has a very high category mean of 4.34 with mean ratings ranging from 4.29 to 4.41. The item *expressing awareness on legal issues related to the use of technology* has a mean rating of 4.29. On the other hand, the item *leading the use of computers in accordance with ethical values at school* reflects a mean of 4.41. This implies that the teachers perceive the school head's efforts to implement technology-related precautions at the school as very high. These ratings reflect a strong perception

of the school head's leadership in managing and mitigating the risks associated with technology use, fostering a responsible, legally compliant environment for both students and staff. This finding is in harmony with the study of A'mar et al., (2022), in Palestinian public schools, principals' technology leadership, including aspects related to legal and ethical technology use, was reported at high levels. In addition, research by A'mar & Eleyan (2022) in Palestinian public schools documented that principals' technology leadership, including aspects related to the legal and ethical use of technology, was at high levels.

Level of Professional Development of Teachers

Table 3 shows that the overall mean for professional development is 4.54. It is described as very high, indicating that teachers' professional development is consistently evident. This means that teachers consistently experience and recognize strong support for their professional development, as reflected by the very high overall mean rating of 4.54. The high rating suggests that the school prioritizes and provides continuous opportunities for teachers to enhance their skills and knowledge. It indicates that professional development activities are readily available and actively encouraged, contributing to teachers' ongoing growth and effectiveness. The overall standard deviation is 0.50, indicating that respondents' responses are closer to the mean.

This result corroborates the research of Saadiah Shuib et al., (2021), which identified that Bhutan and Malaysia have teachers' professional development and performance at very high levels, with high positive correlations between the two. Moreover, a study by Barrera-Pedemonte (2016) found a very high level of effectiveness in teacher professional development (TPD) that involves curriculum-led training.

Table 3
Level of Professional Development of Teachers

Indicators	Mean	SD	Description
Thematic Knowledge	4.55	.57	Very High
Learning Environment	4.60	.54	Very High
Cooperation	4.57	.58	Very High
Educational Technology	4.59	.53	Very High
Research Base	4.24	.72	Very High
Educational Planning	4.57	.57	Very High
Evaluation	4.58	.56	Very High
Development of Human Resource	4.64	.53	Very High

Over-all Mean	4.54	.50	Very High
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Thematic Knowledge. The mean ratings for the different items ranged from 4.52 to 4.58, yielding a category mean of 4.45, which is very high. Adding on, the items *introducing specialized knowledge to students that enable them to answer ambiguities and solve problems* show a mean rating of 4.52, while the items *providing patterns for students to teach skills, concepts and thinking process* reflects a mean rating of 4.58. This finding indicates that the teachers perceive the school's professional development opportunities as highly effective in enhancing their ability to impart specialized knowledge and essential skills to students. Overall, this suggests that the professional development initiatives are effectively helping teachers refine their teaching strategies and deepen their students' learning experiences. This aligns with Palmer's (2020) findings, which identified a very high impact of teacher enthusiasm on students' motivation to learn. Likewise, Orosz et al. (2015) conducted a study that showed a highly significant correlation between teacher enthusiasm and decreased academic cheating among students.

Learning Environment. It reveals that the category mean is 4.60, which is very high. The table further shows that the items' mean ratings range from 4.55 to 4.66. It is shown that the item *creating a suitable class environment is effective with students' learning* has a mean rating of 4.55, and the item *encouraging students to cooperate with each other* has a mean rating of 4.66. This implies that teachers rate professional development programs very highly for creating a better learning environment, suggesting that professional development has a very strong positive effect on student engagement and the creation of a cooperative-friendly environment. This finding aligns with the research of Barrett et al. (2015), which found a very high impact of classroom design on students' learning outcomes. In the same vein, a study by Riaz and Asad (2019) found a very high correlation between students' academic performance in mathematics at the secondary level and positive classroom environments.

Cooperation. The table shows that the category mean is very high at 4.57. The mean rating of the different items ranged from 4.49 to 4.62. The item *asking parents, supervisors and family members to accept the role of a private teacher at home* has a mean rating of 4.49, while on the other hand, the item *understanding the role of family, the teacher has to make continual relationships with parents* reflects a mean of 4.62. This implies that the teachers perceive the

professional development programs as highly effective in fostering cooperation, in which the professional development opportunities play a key role in encouraging stronger collaboration among teachers, parents, and other family members. This outcome confirms the study of León del Barco et al., (2018), which found a very high rate of positive correlation between responsibility and cooperation among university students working in learning teams, demonstrating the significant impact of structured collaboration on student engagement.

Educational Technology. As assessed by respondents, it has a very high category mean of 4.59, with mean ratings ranging from 4.57 to 4.63. The items *connecting with parents and colleagues, using electronic tools such as email, and facilitating learning by using educational technology and appropriate methods* have the same mean rating of 4.57. On the other hand, the item *understanding that in order to teach better, the teacher uses appropriate teaching aids* reflects a mean of 4.63. This implies that teachers view professional development programs as highly effective in enhancing their use of educational technology, suggesting that these findings highlight the effectiveness of professional development initiatives in integrating educational technology into teaching practices, thereby enhancing communication and the learning experience. This finding is consistent with a study by Thannimalai & Raman (2018), which found a very high impact of principals' technology leadership on teachers' integration of educational technologies. Likewise, Maala & Lagos (2022) reported a very high level of technological leadership among school heads in the Philippines, which positively influences teachers' technology integration. As supported by Lidolf & Pasco (2020), teacher professional development in educational technology is essential to ensuring proper application in the classroom. Research suggests that ETPD can be adopted in three postures: a learner, a designer, or a researcher.

Research Base. The mean rating for the items ranged from 4.15 to 4.35, with a category mean of 4.24, and was described as very high. The item *spending lots of times on investigation and research* reflects a mean rating of 4.15, while the item *the becoming aware of student learning out of school and trying to use their experiences in classroom learning* shows a mean rating of 4.35. This finding highlights the importance of professional development in encouraging teachers to engage with research and with students' experiences outside the classroom. It suggests that effective professional development not only enhances teachers' subject knowledge but also helps them better understand and utilize students' diverse learning experiences to improve classroom

instruction. This is in line with the research carried out by Escopete & Garcia (2023) in the Gubat South District, Division of Sorsogon, Philippines, involving 130 public elementary school teachers. The research found a very high level of teacher engagement in action research, attributed to school initiatives such as capacity-building workshops, mentoring, and the provision of action research templates.

Educational Planning. As assessed by respondents, it has a very high category mean of 4.57, with mean ratings ranging from 4.51 to 4.60. The item *designing lesson plans based on the needs and issues of the student* has a mean rating of 4.51. On the other hand, the item *improving educational planning according to the knowledge and information of students* reflects a mean of 4.60. This implies that the teachers perceive the professional development programs as highly effective in enhancing their educational planning skills. This finding indicates that professional development is highly valued by teachers for improving their ability to create more personalized and effective lesson plans that align with their students' learning needs and strengths. This outcome is consonant with a study by González, Villafañe-Cepeda & Hernández-Rodríguez (2023), which reported a very high level of engagement among prospective teachers as they collaboratively planned and implemented technology-based lessons through lesson study participation. Moreover, a study by Aquino and Bautista (2023) revealed a very high level of teacher engagement in lesson study practices, which significantly enhanced their teaching strategies and instructional effectiveness in the Quirino school district.

Evaluation. As assessed by respondents, it has a very high category mean of 4.58, with mean ratings ranging from 4.52 to 4.64. The items *coordinating with the school principals and the teacher in presenting the result of their evaluation to parents* have a mean rating of 4.52. On the other hand, the item *improving the learning process, using the result of evaluation as a factor to enforce changes* reflects a mean of 4.64. This implies that the teachers view the professional development programs as highly effective in improving the school's evaluation processes, indicating that the professional development initiatives are successfully supporting teachers in using evaluation results not only for communication with parents but also to drive meaningful changes in their teaching practices. This finding is consistent with Fernandes's (2023) research, which reported a very high impact when educational leaders employed data-driven decision-making, leading to informed strategies that improved student outcomes and instructional quality. Moreover, the study of Marlina et al.,

(2023) revealed a very high level of effectiveness in using differentiated learning assessment models, which significantly increased the involvement of special needs students in inclusive schools.

Development of Human Resource. As assessed by respondents, it has a very high category mean of 4.64, with mean ratings ranging from 4.57 to 4.68. The item *setting a high expectation for learning* has a mean rating of 4.57. On the other hand, the item *becoming aware of students' cognitive, social, emotional differences in learning* reflects a mean of 4.68. This implies that the teachers perceive the professional development programs as highly effective in enhancing the development of human resources within the school, meaning these programs help teachers set high expectations for student learning while increasing their awareness of students' diverse needs. This finding indicates that the professional development initiatives are successfully fostering a more inclusive and effective learning environment by helping teachers set higher learning expectations while being more attuned to the diverse characteristics of their students. This result concurs with research by Xu & Cooper (2020) in China, which revealed a very high level of teacher consciousness and engagement in addressing student differences in inclusive education settings.

Significance of the Relationship of Instructional Leadership, Technological Leadership Behavior, and Professional Development

The correlation of the variables is presented in Table 4. Instructional leadership shows a strong positive relationship with professional development ($R = .71$; $p = .00$), which falls short of the alpha set at .05, two-tailed, supporting a significant relationship. It means that as the level of instructional leadership increases, the level of professional development significantly increases.

In a similar manner, technological leadership behavior shows a significant positive relationship with professional development ($r = .67$, $p < .05$). This suggests that as technological leadership behavior increases, so does professional development. It suggests that as principals or school leaders demonstrate greater technological leadership behaviors, there is a substantial improvement in teachers' professional development. The positive correlation with $r = .67$ indicates that as school leaders themselves use and encourage the use of technology, it directly and to a great extent influences the quality and availability of professional development programs for teachers. This implies that principals who become more proactive in mentoring, facilitating, and directing technological endeavors can create a climate in which teachers are more likely to

gain from improved professional development, especially in topics pertaining to classroom technology integration.

Table 4
Significance of Relationship of Instructional Leadership, Technological Leadership Behavior and Professional Development

	r	p-value	Remarks
Instructional Leadership and Professional Development	.71	.00	Significant
Technological Leadership Behavior and Professional Development	.67	.00	Significant

This finding is parallel to the study of Afshari et al., (2016) in Malaysian secondary schools, where they established that there is a very strong relationship between instructional leadership, technological leadership behavior, and professional growth. Their research found that instructional and technological leaders are key drivers of teachers' professional growth by facilitating technology integration, guiding instructional improvement, and fostering innovative teaching. This significant connection, observed in Malaysia, underscores the pivotal role of school heads in spearheading continuous professional learning and improving the impact of teaching.

Significance of the Influence of Instructional Leadership, and Technological Leadership Behavior on Professional Development

Table 5 presents the results of the multiple regression analysis. The independent variable, instructional leadership, shows a p-value of 0.00 (2-tailed), indicating significance, and a positive standardized beta of 0.49. It shows that instructional leadership is a significant predictor of professional development. It means that for every unit increase in the level of instructional leadership, there is a corresponding significant increase of 0.49 in the level of professional development.

Table 5
Significance of the Influence of Instructional Leadership and Technological Leadership Behavior on Professional Development

Professional Development				
Singular Influence of the Predictors	Standardized Coefficients	t	p-value	Remarks
Instructional Development	0.49	4.67	.00	Significant
Technological Leadership Behavior	0.25	2.37	.02	Significant
Combined Influence of the Predictors				
R	.72			
R ²	.52			

F	84.03	
p	.00	Significant

Likewise, the independent variable, technological leadership behavior, shows a positive standardized beta of 0.25 and a p-value of .02, which is less than the .05 level of significance (2-tailed). It means that technological leadership behavior is a significant predictor of professional development. This means that for every unit increase in the level of technological leadership behavior, there is a corresponding increase of 0.25 in the level of professional development.

In addition, the combined influence of the two independent variables, instructional leadership, and technological leadership behavior on the professional development of teachers is significant ($p < .05$). Meanwhile, the model explains 52 percent of the variance of the professional development of teachers based on the independent variables included in this study as indicated by $R^2 = .52$. This means that 47 percent of the variance in the professional development of teachers can be attributed to other factors aside from instructional leadership and technological leadership behavior.

Instructional leadership is a school leadership model that promotes school principals working with teachers to develop teaching practices in ways that improve student achievement (Brolund, 2016). This strategy includes setting specific targets and providing support through coaching, mentoring, professional development, and other methods (Brolund, 2016). Research consistently demonstrates a positive relationship between principals' instructional leadership and teachers' professional development.

The notion of technological leadership encompasses a range of constructs, namely visionary leadership, a culture of learning in the digital age, excellence in professional practice, improvement on a system-wide basis, and citizenship in the digital world (Gulpan & Baja, 2020). The technology leadership of principals significantly influences teachers' professional development and integration of technology in schools. Studies show a positive link between the principals' technology leadership and the teachers' technology integration (Thannimalai & Raman, 2018). Moreover, how teachers take part in professional development will affect the relationship between principals' technology leadership and teachers' technology integration (Thannimalai & Raman, 2018).

In conclusion, these findings underscore the importance of both instructional and technological leadership in fostering teacher professional development, but they also point to the need for further research to identify other factors contributing to this development. Finally, the results of the study support the theories underpinning this study: the Constructivist theory and the Path-Goal Theory.

Path-Goal Theory can be applied to understand how the combined influence of instructional and technological leadership behaviors predicts teachers' professional development. Instructional leadership through instructional resource providers, maintaining a visible presence, teacher professional development, maximizing instructional time, monitoring students' progress, providing feedback on teaching and learning, and curriculum implementation reflect directive and achievement-oriented styles that guide and structure teacher growth. These behaviors align with Path-Goal Theory by providing clear direction, setting structured goals, and removing barriers to instructional success, thereby enhancing teacher motivation and commitment to professional improvement. Technological leadership through motivation, orientation, precaution, and support embodies supportive and participative styles, fostering innovation and confidence in using technology. Together, these leadership behaviors enhance teacher motivation, clarify development paths, and create a supportive environment that makes professional growth more accessible, relevant, and effective.

Constructivist Theory, as proposed by Piaget, can be applied to understand how teachers grow professionally through active engagement, reflection, and meaningful experiences. This theory views learning as a process in which individuals build new knowledge from their existing understanding, emphasizing the importance of context, exploration, and personal involvement. In the context of professional development, this means that teachers learn best when they are actively involved in their own learning, rather than passive recipients of information. Constructivist-based professional development encourages teachers to engage in hands-on activities, reflect on their practices, and collaborate with peers to construct deeper understanding. Aligned with Piaget's principles, such approaches promote autonomy, critical thinking, and continuous learning. As a result, professional development grounded in constructivist theory supports long-term growth by fostering self-directed, motivated, and reflective educators.

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