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# Increasing learning innovation through developing teachers' basic abilities in professional development supervision

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**ABSTRACT**

Learning innovation is always related to teacher abilities, emphasizing the design and implementation of innovative teaching and learning. This study aimed to assess the effects of professional development-supervised teacher basic abilities on learning innovation. A total of 409 teachers were engaged as participants. In this case, supervision experience was obtained with a teacher basic ability development approach (commitment and abstraction), as data were analyzed using the partial least square structural equation model (PLS-SEM). The results showed that teacher basic abilities significantly affected the success of professional development supervision and learning innovation. This indicated that the influential levels of the basic abilities on learning innovation and professional development supervision emphasized the t-statistics/p-values of 37.535≥1.96/0.000 and 39.492≥1.96/0.000, respectively. The effects of professional development supervision on learning innovation were also characterized by the t-statistics and p-value of 39.492≥1.96 and 0.000, respectively. Meanwhile, the teacher basic abilities significantly impacted the combined activities of professional development supervision and learning innovation through the t-statistic and p-value of 8.283≥1.96 and 0.000, respectively. These results recommended that principals and supervisors should consider teachers basic abilities as a target in the supervision of professional development, to realize sustainable learning innovations.



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## 1. INTRODUCTION

Innovation is a form of adaptation carried out by humans or organizations due to a change occurring as developments in technology, information, science, methods, or accompanying policies. This change has dynamics that are expected to produce new needs and demands for the actors toward the prevalence of a sustainable existence. In this case, the occurrence of a social transition or new demand leads to the consideration of education as a strategic sector responsible for problem resolution [1]. Massive technological developments as well as sociocultural and environmental changes are also the dimensions causing big challenges for every sector of life. However, education is the most strategic dimension due to its preparation of human skills and competencies as impacted subjects or change originators. Education system needs to adapt to the shifting trends, to remain competitive and relevant during future challenges [2], [3].

Based on developing countries, such as Indonesia, the consideration of education is part of the big national development agenda continuously pursued consistently and sustainably. This is because teachers are human resources capable of encouraging innovation to adapt and compete with the effects of change [4].

In this context, the development of teacher competency is mainly emphasized toward appropriate preparation. This challenge is expected to be addressed through the acquisition of new competencies, enabling teachers to generate innovative ideas, methods, or tools for practical problem-solving within their daily lives or professional responsibilities [4], [5]. Moreover, professional teachers are always innovative during learning processes [5] emphasizing the patterns by which students physically and mentally integrate with their academic performances, as well as develop basic understanding for optimal education-based exploration. For these teachers, breaking class monotony is always a big consideration, as the performance of new and innovative teaching methods was expected to highly energize students. This is related to the pedagogy prioritizing teaching principles and practices, including the methods and strategies used to facilitate learning. The pedagogy also emphasizes the analyses of effective teaching, student learning, and structuring academic experiences for the promotion of meaningful, enjoyable, and durable education [6], [7].

The improvement of teacher's basic abilities is subsequently expected to be earnestly programmed to strengthen independent and sustainable professional development. However, several challenges were observed in the supervision of professional development in Indonesia, at the administrative and school levels. This supervision often introduces teachers to new curricula and learning systems or programs, although the modern "Independent Curriculum" requires the exhibition of creativity with innovation in autonomous teaching processes. Various previous reports also extensively investigated the challenges and preparedness of teachers in adopting the new curriculum. These analyses emphasized the issues related to the availability of educators in implementing the innovative syllabus, specifically concerning pedagogical and professional aspects within their respective fields [8]–[10]. In implementing educational technology, several weaknesses are still very prevalent among teachers. These include challenges in establishing creative learning innovation ideas and exploring students potential through meaningful academic experiences. A significant number of teachers also lack a comprehensive understanding of curriculum structure and its practical implementation. This problem consistently reoccurs when new curricula and learning innovations are introduced [11]–[13].

In learning, the innovation skill of teachers subsequently requires the basic abilities capable of independently and continuously enabling the update of teaching practices. These abilities are determined by the factors related to mentality, namely commitment and thinking skills (abstraction). From this context, commitment is defined as a behavioral condition emphasizing a person responsibility due to personal beliefs. The condition is also commonly observed in the teachers devotion to work, prioritizing their philosophy toward education. This indicates that the individuals highly committed to learning are capable of significantly motivating students [14]. A conducive school environment also helps in developing three types of teacher commitments, namely organizational, as well as greater and future professional dedication. Confidence and better integration of socio-emotional learning are subsequently developed through two types of commitment, including professional and more significant organizational dedication [15]–[17]. Meanwhile, abstraction is defined as the quality of handling observed ideas than events, representing the general capability of a person. According to an intellectual perspective, one function of cognitive competence is the individual ability to understand a situation, task, problem, opportunity, or body of knowledge. These functions are reflected in the individual maturity when interacting with other people and carrying out their tasks. The cognitive abilities of teachers are also capable of determining their level of effectiveness.

The supervision of the educational system is a controlling function and a process used to facilitate teachers professional growth [18], [19]. In this context, the preparation of teachers to adopt scientific development demands requires supervision, which needs to be primarily focused on enhancing the basic ability of the profession. As subjects expected to acquire supervision, teachers also need to be considered the people having two basic competencies related to commitment and abstract thinking ability. This is because the abilities are interpreted as the essential indicators of supervision. In the future, teachers need to adopt and overcome various challenges affecting their professional responsibilities. Furthermore, the target of the services emphasizes the modification of the teachers' moral actions, causing the appropriate responsibility for various professional growth efforts and the development of commitment toward teaching performances. The improvement of commitment and abstraction is also highly adequate for the principal-supervisor. When these two basic abilities are developed, the teachers are expected to carry out independent exploration through several learning processes [18], [19]. Supervision approaches and the teachers-principals relationship quality are also the primary variables of the services effectiveness. During the implementation phase, clear guidelines and the establishment of appropriate procedures and mechanisms are subsequently required to resolve any difficulties experienced by teachers. Based on a previous report, learning success, commitment level, and abstraction were key factors determining teachers engagement in school activities and professional development while implementing innovative approaches to their task [20], [21].

In several developed and developing countries, the improvement of the entire educational system is emphasized. This indicates that the working mechanism of supervision starts from identifying and analyzing the various problems affecting the effectiveness and efficiency of the educational sector, as well as its

problem-solving processes. According to the development of a scientific analysis, the varying humanistic efforts improving teachers professionalism were more effective than programmatic approaches, such as training, technical guidance, or workshops [22]. The improvement of the modern educational organizations quality also emphasizes the implementation of effective leadership and provides assistance to teachers in enhancing learning values through professional collaboration [23].

The resilience of teachers is required in present and future educational challenges, toward the adaptation to change. This is because teachers are always challenged to innovate or implement specific innovations emphasizing teaching duties. In this context, a regular training program is likely less efficient due to the requirement for continuous implementation, potentially disrupting existing learning systems during the establishment of new demands for change. Professional development supervision should also strengthen teacher independence, facilitating growth in their personal and moral duties, pedagogical practices, and careers. Therefore, this study suggests that professional development supervision should prioritize the enhancement of teachers basic abilities, specifically their commitment and abstraction. This is because the identification of the abilities is capable of significantly influencing the implementation and improvement of learning innovations.

The study framework is built from theoretical context and empirical analyses of teacher basic abilities, containing commitment and abstraction, professional development supervision, as well as learning innovation. In this context, the underlying analytical assumption stated that the identification of the basic abilities need to be carried out and considered a target in the implementation and improvement of professional development supervision and learning innovation, respectively. Therefore, this study aimed to investigate the effects of teacher basic abilities on professional development supervision and learning innovation. This research proves whether teachers' basic abilities are able to have a significant influence on teachers' ability to implement and develop learning innovations. Figure 1 visualizes the study framework.

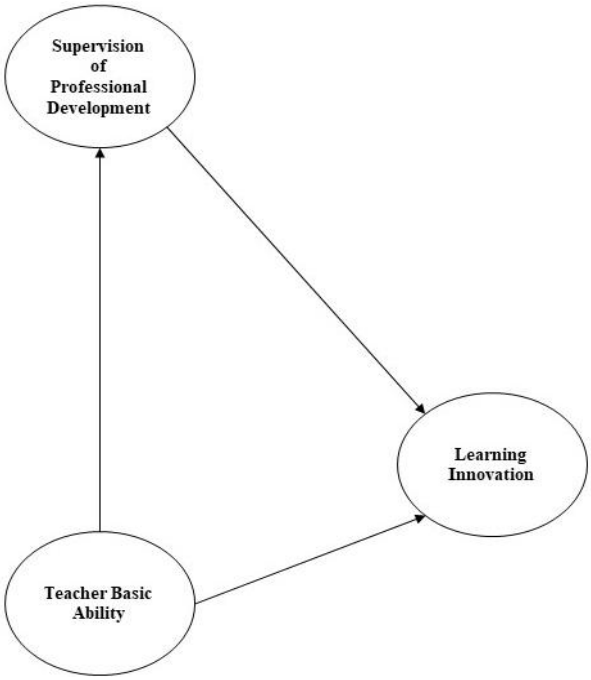


Figure 1. Conceptual model

The significance of this study is observed from two perspectives. First, new ideas are conceptually provided for supervising teacher professional development. This indicated that the development supervision services should emphasize key aspects of teacher professional abilities, namely, commitment and abstraction. Supervision is also responsible for primarily focusing on curriculum implementation, accompanied by the important development of the basic abilities in evolving learning demands and competencies. This explains that teachers are expected to possess the capability to independently adapt and enhance their competencies. Second, developing teacher basic abilities in professional development supervision can practically increase learning innovation. The results obtained are also beneficial to the prevalent and future analyses in the field of learning and teacher professional development.

## 2. METHOD

### 2.1. Participant

Sampling was selecting using proportional random sampling technique. The experimental participants were the teachers belonging to the junior and actual superintendent functional positions. These positions were the functional levels assigned to teachers with civil servant status in Indonesia. The junior superintendent levels emphasized the individuals obtaining the rank of echelon III/a and III/b, with a working period of ±1-5 years. Meanwhile, those in the actual superintendent position acquired echelon III/c and III/d ranks, with a working period of ±5-12 years. A total of 409 teachers from 40 elementary schools in 7 districts within West Sumatra Province, Indonesia, were engaged as participants. These participants acquired supervision experience with a teacher basic ability development approach (commitment and abstraction). Table 1 presents the profile of the experimental subjects.

Table 1. Profile of participant

| District | Number of schools | Functional/teacher's grade | | Number of respondents |
|---|---|---|---|---|
| | | Junior superintendent | Superintendent | |
| Pariaman | 5 | 32 | 22 | 54 |
| Padang | 7 | 38 | 35 | 73 |
| Pasaman Barat | 5 | 28 | 28 | 56 |
| Sawahlunto | 5 | 32 | 24 | 56 |
| Payakumbuh | 6 | 34 | 25 | 59 |
| Bukittinggi | 6 | 28 | 23 | 51 |
| Pesisir Selatan | 6 | 32 | 28 | 60 |
| Total | 40 | | | 409 |

Years of supervised experience with teacher basic ability approaches (in average) ±3 years

### 2.2. Data and instruments scales

Primary data were obtained in the form of teacher responses from the questionnaires distributed. These quantitative data were highly available for analysis through multivariate statistics. The development of the questionnaire was also adapted to the experimental requirements, namely the expected teacher skill enhancement after the supervision of professional development. However, the question items emphasized the theoretical studies focusing on commitment, abstraction, professional development, and learning innovation practices. To reduce the possibility of ambiguity in the factors and statements within the questionnaire, various experts were also adopted to read and provide considerations toward increasing validity and reliability. Additional analyses were subsequently conducted with several professionals in educational management, psychology, curriculum, and educational technology, to evaluate, determine, or eliminate items on the final experimental instrument.

The questionnaire was also presented in a structure consisting of two parts: i) The general participant data related to the district, school name, grade teachers, and years of supervised experience; and ii) The statement items requiring responses from the participants. This closed instrument used a score scale with five alternative answers, namely 5=excellent, 4=good, 3=average, 2=poor, and 1=very poor. The five scale ranges also assessed teachers' perceptions as participants, regarding their ability to implement learning innovations. This assessment focused on their basic teaching abilities, which were obtained from the professional development supervision conducted by the school principal. Table 2 illustrates the implemented variables and questionnaires.

### 2.3. Procedure

#### 2.3.1. Step 1

A collaborative process was conducted with several elementary school principals (Table 1), to implement professional development supervision using a teacher basic ability enhancement approach. This step showed that the school principal previously acquired socialization on the implementation of treatment supervision, to enhance teacher independence in job execution. In this case, the principal should prioritize the improvement of teacher commitment and abstraction, as part of the teacher basic ability development. The factors influencing the commitment and abstraction variables (Table 2) were also the target of success in implementing supervision. Furthermore, the experimental team and the principals were analytically coordinated, with the implementation of supervision, changes in attitudes, and teacher performance becoming the areas of observation. In this context, the teachers, principals, and the experimental team understood that the study goal was to develop basic teaching skills. This emphasized the exhibition of honesty in the provision of personal assessments and supervisory duties, which were the primary commitment established.

#### 2.3.1. Step 2

The patterns by which teacher basic abilities linearly improved learning innovation were identified. The data collection process was also carried out directly by visiting the participating teachers in elementary schools. Moreover, data collection was carried out by the experimental team in stages at each school in the analyzed district. This indicated that teachers were welcomed to fill out the proposed questionnaire. The teachers acquainted with the experimental team also established an agreement to respond to each questionnaire item regarding their actual teaching situations.

Table 2. Study variables and questionnaire

| Variable | | Factor | Questionnaire items | Abbreviation |
|---|---|---|---|---|
| Teacher basic ability | Commitment | Task oriented | 1 | TA1 |
| | | Loyalty | 2 | TA2 |
| | | Responsibility | 3 | TA3 |
| | | Self-discipline | 4 | TA4 |
| | | Responsive to change | 5 | TA5 |
| | | self-improvement | 6 | TA6 |
| | Abstraction | Problem solving | 7 | TA7 |
| | | Critical analysis | 8 | TA8 |
| | | Metacognition | 9 | TA9 |
| | | Systematic analysis | 10 | TA10 |
| | | Creativity | 11 | TA11 |
| Supervision of professional development | Professional development | Personal development | 12 | SoPD1 |
| | | Moral development | 13 | SoPD2 |
| | | Pedagogical development | 14 | SoPD3 |
| | | Career development | 15 | SoPD4 |
| Learning innovation | Innovative teaching materials | ICT literacy | 16 | LI1 |
| | | Content knowledge | 17 | LI2 |
| | | Local wisdom | 18 | LI3 |
| | | Humanity | 19 | LI4 |
| | | global citizenship | 20 | LI5 |
| | Technology for learning | Blended learning | 21 | LI6 |
| | | Learning management system | 22 | LI7 |
| | | Multimedia integrated | 23 | LI8 |
| | | Difference learning platforms | 24 | LI9 |
| | Learning scenario setting | Stretching all student | 25 | LI10 |
| | | Social nature of learning | 26 | LI11 |
| | | Emotion integrated to learning | 27 | LI12 |
| | | Recognition individual references | 28 | LI13 |
| | | Authentic assessment | 29 | LI14 |
| | | Building horizontal connection | 30 | LI15 |
| | | Building critical thinking and problem solving | 31 | LI16 |
| | | Project based learning | 32 | LI17 |

### 2.4. Data analysis

Data analysis was quantitatively carried out using structural equation modeling (SEM) approach through SmartPLS version 4.0.0 software, to statistically analyze information. This analytical stage started with the validity test of the questionnaire, which was conducted to determine convergent and discriminant validities. From this context, the convergent validity test was performed through the measurement of the outer model. The loading factor implemented as the standard for determining the validity of each indicator was also ≥0.50 on the target variable [24]. Meanwhile, discriminant validity was conducted to prove that the answers of the participants to relevant questions were not influenced by statements from other latent variables. In this case, the discriminant variable was met when the average variance extract (AVE) was higher than the correlation emphasizing the latent determinant [25]. This was accompanied by the reliability test, which was conducted through the determination of the composite reliance level. The criteria for each latent variable were also determined based on composite reliability (CR) values ≥0.8 and ≥6, indicating high and sufficient reliabilities, respectively. Therefore, any value below the above threshold emphasized low reliability and were often greater than the Cronbach alpha [26]. The significance of the relationship between variables was also detected through the resulting t-statistic value, which was continuously compared with the t-table coefficient. Based on the analytical processes, the partial least square (PLS) output was considered an estimate of the latent variable, emphasizing a linear aggregate of the indicators. The analysis of the relationship between these variables was performed at a significance level of 0.05, using a two-tailed approach. An association between variables and factors was also significant when the t-statistic value exceeded 1.96. [27].

### 2.5. Measurement model

The acceptability of the implemented scales verified through measurement standards. The determination of the implemented measurement scale reliability was also considered the opinion [24], [28], whose minimum value was 0.7 for Cronbach's alpha and CR. According to Table 3, Cronbach alpha values for all variables were ≥0.7, prioritizing strong reliability in the assessments of the three study variables. The internal consistency for all tested factors also met the recommended CR value of ≥0.7 [24]. In addition, the CR for all variables exceeded the limit value of 0.7 at 0.887-0.988, emphasizing strong consistency.

Validity testing was also determined by the outer loadings value, which should adhere to the standard cut-off score of ≥0.7 [24]. Based on Table 3, all factors in each indicator met the good criteria, as observed from 0.743 to 0.863. Convergent validity was also determined by the AVE value, with a standard cut-off score of ≥0.5 [29]. Subsequently, Table 3 shows that all constructs met a good criteria, as evidenced from 0.512 to 0.790, prioritizing an optimal convergent validity [27].

Discriminant validity was conducted to identify the extent to which the latent construct was different from other variables. This indicated that a high discriminant validity value emphasized a construct uniqueness and its ability to explain the measured phenomenon. In this case, a construct was considered valid by comparing the root value of AVE with the correlation score among latent variables. Therefore, the root AVE value should exceed the correlation between latent variables [27]. In Table 4, the AVE for all constructs was greater than the squared correlation between any pair of variables. This proved that a construct did not share significant information with other variables. Table 2 confirmed that the criteria by Hair *et al.* [24] were met, with discriminant validity established at the concept level. Based on the results, the analyzed model empirically had an adequate level of item reliability and concept viability, meeting the requirements for discriminant validity. Table 3 displays comprehensive data regarding the study measurement scale items.

Table 3. Outer loadings, standard deviations, and construct reliability

| Variables | Dimension | Factors | Outer loadings | Cronbach's alpha | Standard deviation | CR | AVE |
|---|---|---|---|---|---|---|---|
| Teacher basic ability | Commitment | Task oriented | 0.814 | 0.936 | 0.730 | 0.926 | 0.714 |
| | | Loyalty | 0.813 | | 0.689 | | |
| | | Responsibility | 0.826 | | 0.716 | | |
| | | Self-discipline | 0.770 | | 0.753 | | |
| | | Responsive to change | 0.766 | | 0.741 | | |
| | | Self-improvement | 0.823 | | 0.748 | | |
| | Abstraction | Problem solving | 0.863 | | 0.738 | 0.916 | 0.644 |
| | | Critical analysis | 0.842 | | 0.711 | | |
| | | Metacognition | 0.871 | | 0.717 | | |
| | | Systematic analysis | 0.830 | | 0.769 | | |
| | | Creativity | 0.816 | | 0.733 | | |
| Supervision of professional development | | Personal development | 0.821 | 0.835 | 0.769 | 0.923 | 0.726 |
| | | Moral development | 0.803 | | 0.740 | 0.988 | 0.790 |
| | | Pedagogical development | 0.829 | | 0.750 | 0.887 | 0.754 |
| | | Career development | 0.818 | | 0.766 | 0.912 | 0.779 |
| Learning innovation | Innovative teaching materials | ICT literacy | 0.842 | 0.941 | 0.748 | 0.912 | 0.674 |
| | | Content knowledge | 0.824 | | 0.771 | | |
| | | Local wisdom | 0. 844 | | 0.725 | | |
| | | Humanity | 0.805 | | 0.750 | | |
| | | Global citizenship | 0.787 | | 0.699 | | |
| | Technology for learning | Blended learning | 0.769 | | 0.735 | 0.947 | 0.512 |
| | | Learning management system | 0.847 | | 0.768 | | |
| | | Multimedia integrated | 0.818 | | 0.777 | | |
| | | Difference learning platforms | 0.784 | | 0.673 | | |
| | Learning scenario setting | Stretching all student | 0.787 | | 0.736 | 0.907 | 0.551 |
| | | Social nature of learning | 0.743 | | 0.772 | | |
| | | Emotion integrated to learning | 0.820 | | 0.698 | | |
| | | Recognition individual references | 0.778 | | 0.775 | | |
| | | Authentic assessment | 0.787 | | 0.790 | | |
| | | Building horizontal connection | 0.763 | | 0.683 | | |
| | | Building critical thinking and problem solving | 0.773 | | 0.718 | | |
| | | Project based learning | 0.773 | | 0.835 | | |

Table 4. Discriminant validity

| Dimension | A | C | ITM | LI | LSS | MrD | PdD | PsD | PfD | SoPD | TBA | TfL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Abstraction | 0.845 | | | | | | | | | | | |
| Commitment | 0.812 | 0.802 | | | | | | | | | | |
| Innovation teaching materials | 0.760 | 0.742 | 0.821 | | | | | | | | | |
| Learning innovation | 0.753 | 0.740 | 0.890 | 0.715 | | | | | | | | |
| Learning scenario setting | 0.665 | 0.659 | 0.709 | 0.935 | 0.742 | | | | | | | |
| Moral development | 0.597 | 0.523 | 0.604 | 0.618 | 0.544 | 1.000 | | | | | | |
| Pedagogical development | 0.603 | 0.571 | 0.662 | 0.612 | 0.507 | 0.566 | 1.000 | | | | | |
| Personal development | 0.751 | 0.640 | 0.677 | 0.660 | 0.566 | 0.546 | 0.566 | 1.000 | | | | |
| Professional development | 0.652 | 0.562 | 0.648 | 0.656 | 0.570 | 0.605 | 0.506 | 0.563 | 1.000 | | | |
| Supervision of professional development | 0.797 | 0.702 | 0.792 | 0.778 | 0.669 | 0.829 | 0.803 | 0.821 | 0.818 | 0.818 | | |
| Teacher ability | 0.950 | 0.954 | 0.789 | 0.785 | 0.696 | 0.589 | 0.618 | 0.731 | 0.638 | 0.788 | 0.782 | |
| Technology for learning | 0.634 | 0.620 | 0.749 | 0.911 | 0.799 | 0.547 | 0.513 | 0.569 | 0.585 | 0.677 | 0.660 | 0.812 |

## 3. RESULTS AND DISCUSSION

### 3.1. Structural model

Structural modeling was performed to predict relationships between latent variables through substantive theory. This model analysis provided information to experimentally determine the coefficient of determination/R-square (R2) and model of fit (MoF). In this case, R2 was implemented to assess the extent to which the dependent variable was explained by the independent construct [29]. It was also obtained from the PLS algorithm calculation in the SmartPLS software. The R2 value criteria were subsequently grouped into three, where 0.67, 0.33, and 0.19 emphasized the strong, moderate, and weak categories, respectively [24]. According to the results, the R2 values for the professional development supervision and learning innovation variable were in the strong category at ≥0.67. This indicated a score of 0.852 for professional development supervision, exhibiting an 86.2% influence by teacher basic ability, with the remainder influenced by other variables. The R2 value for learning innovation was also 0.738, emphasizing a 73.8% impact from teacher basic ability and professional development supervision, with the remaining scores affected by external variables. Based on the results, the model developed was in line with the established criteria for goodness.

The structural models were subsequently assessed using MoF analysis. This explained that MoF was a statistical design measuring the accuracy of a model during data interpretation. According to the results, the standardized root mean square residual (SRMR) value for evaluating the fit among observed relationship correlations was determined. This concluded that the structural model was well-fitted with a value of 0.083, due to falling below the threshold of 0.10 [28]. The normal fit index (NFI) value also exhibited a value close to 1, namely 0.820, emphasizing a good fitness level for the developed model. Figure 2 displays a structural model that explains the relationship between the variables of teacher basic ability, supervision of professional development and learning innovation.

The analysis of the relationship between all variables was also set at a significance level of 0.05, using a two-tailed approach. In this case, a relationship between variables and factors was considered significant when the t-statistic value was greater than 1.96 [24], [28], [29]. Based on Table 5, the direct and indirect effect values of the experimental variables and factors were observed, with the four obtained relationships represented by bold texts. This proved that the influential levels of the teacher basic abilities on learning innovation and professional development supervision emphasized the t-statistics/p-values of 37.535≥1.96/0.000 and 39.492≥1.96/0.000, respectively. The effects of professional development supervision on learning innovation was also characterized by the t-statistics and p-value of 39.492≥1.96 and 0.000, respectively. Meanwhile, the teacher basic abilities significantly impacted the combined activities of professional development supervision and learning innovation through the t-statistic and p-value of 8.283≥1.96 and 0.000, respectively. These results stated that all the analyzed variables significantly influenced one another. In this context, teacher basic abilities impacted the successful implementation of professional development supervision and ultimately increased learning innovation. Table 5 also confirmed the significant relationship between the variables and their respective factors, exhibiting strong statistical explanatory power on all levels.

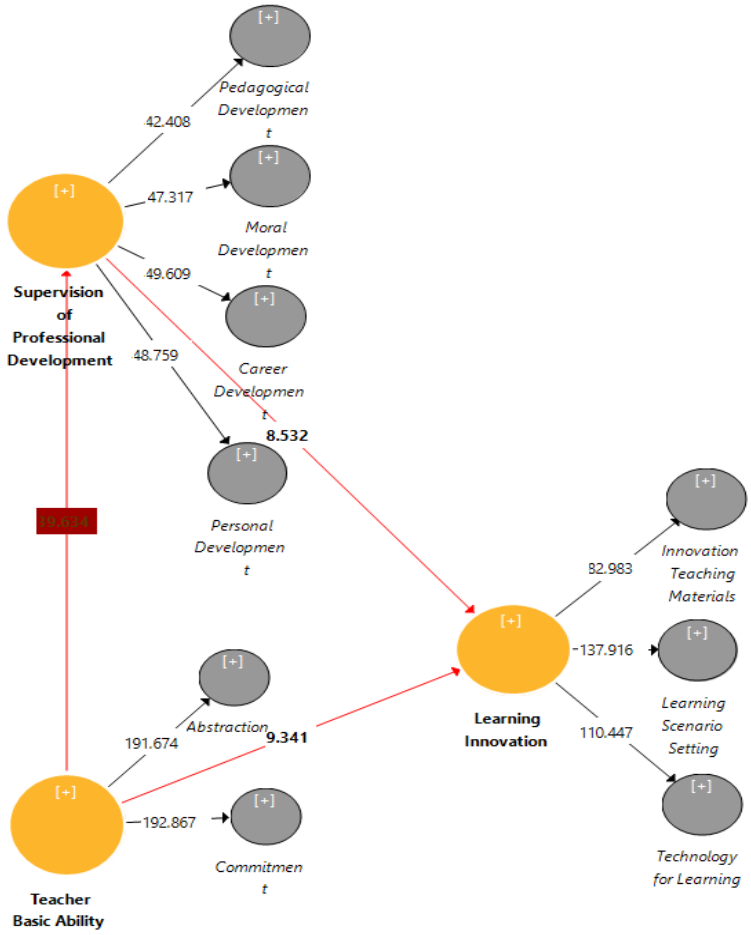


Figure 2. Structural model results

Table 5. Direct and indirect effect values and result

| Effect | Original sample (O) | Sample mean (M) | Standard deviation (STDEV) | T statistics (\|O/STDEV\|) | P values |
|---|---|---|---|---|---|
| Teacher basic ability → learning innovation | 0.785 | 0.787 | 0.021 | 37.535 | 0.000* |
| Teacher basic ability → abstraction | 0.950 | 0.950 | 0.005 | 200.060 | 0.008* |
| Teacher basic ability → commitment | 0.954 | 0.954 | 0.005 | 192.683 | 0.000* |
| Teacher basic ability → supervision of professional development | 0.788 | 0.788 | 0.020 | 39.492 | 0.000* |
| Supervision of professional development → moral development | 0.829 | 0.829 | 0.017 | 48.881 | 0.000* |
| Supervision of professional development → pedagogical development | 0.803 | 0.803 | 0.019 | 42.482 | 0.000* |
| Supervision of professional development → personal development | 0.821 | 0.822 | 0.017 | 47.999 | 0.000* |
| Supervision of professional development → career development | 0.818 | 0.819 | 0.015 | 54.444 | 0.001* |
| Supervision of professional development → learning innovation | 0.421 | 0.420 | 0.052 | 8.071 | 0.000* |
| Learning innovation → innovation teaching materials | 0.890 | 0.891 | 0.010 | 88.700 | 0.000* |
| Learning innovation → learning scenario setting | 0.935 | 0.935 | 0.007 | 130.854 | 0.003* |
| Learning Innovation → technology for learning | 0.911 | 0.912 | 0.008 | 117.621 | 0.000* |
| Teacher basic ability → supervision of professional development → learning innovation | 0.331 | 0.331 | 0.040 | 8.283 | 0.000* |

Notes: *significance <0.05

### 3.2. Discussion

#### 3.2.1. Teacher basic ability identification on supervision of professional development

The preparation of teachers to adapt to learning development demands was in need of a coaching primarily emphasizing the independent enhancement of their basic professional abilities [30]–[32]. This showed that only pedagogical knowledge was unable to represent teacher capabilities. In this case, various internal and external factors affecting teacher performance and professionalism should be considered, with commitment and abstraction being highly fundamental variables [33]–[35]. The identification of teacher basic abilities was also the appropriate initial step in preparing a professional development program. Furthermore, the acquisition of an overview of basic competencies was very important for principals or supervisors. This process focused on the systematic, sustainable, and long-term development of individual and collective coaching programs. Teacher independence was also ultimately strengthened toward the development of professional personnel.

Based on the results, teacher basic abilities significantly affected the supervision of professional development and learning innovation. This indicated that the identification of the abilities increased the success of the professional development supervision program; which was accompanied by personal, moral, pedagogical, and career improvements for teachers. Commitments and abstractions also described the psychological conditions influencing teachers cognitive, emotional, and behavioral aspects during the execution of the duties related to student learning. This description significantly contributed to the achievement of school objectives and strengthened professional development. In this case, commitment proved that teachers established personal agreements to enhance their performances and endeavors through maximum efforts [15], [36]. Meanwhile, abstraction was a teacher cognitive potential strengthened and developed through various learning experiences [37]–[39]. This explained that the commitment and abstraction of teacher's internal potential were realized through supervision, to nurture strong capacity for independent development. According to several previous reports, both theoretical and empirical educational transformation were required to commence with individual capacity enhancement. This enabled teachers to actively participate in designing transformative learning futures and a new 21st-century paradigm for educational institutions [40], [41].

The results also proved that teachers' commitments were observed from their behaviors. These behaviors exhibited loyalty, responsibility, self-discipline, responsive to change, and self-improvement. The awareness of the teachers with their personal, students, and institutional responsibilities also encouraged the motivation to participate in professional development programs [42]. This was because highly self-aware educators consistently provided optimal performances through continuous self-improvement and competency development. Based on previous reports, the teacher participation in proficient learning was a significant factor in explaining the effectiveness of continuous professional development programs [10], [15], [43]. The teacher capacity to carry out duties was also not supported by the commitment aspect only, emphasizing the need for basic skills, namely the ability to think abstractly. Therefore, several aspects were significant in identifying abstraction, including problem-solving abilities, critical and systematic analyses, metacognition, and creativity. This was because abstraction reflected the teacher capacity to understand complex situations within a comprehensive thought process for optimal problem-solving. In this case, teachers engaged in critical analysis, applied metacognition, conducted systematic assessments, and strengthened creativity.

As an essential skill, abstraction played a pivotal role in pedagogical approaches and content expertise. This was in line with a previous report, which explained the role of constructivist learning in enhancing teachers analytical abilities and metacognitive attitudes during their professional development [8], [44], [45]. Moreover, the influence of abstraction on improving pedagogical practices was emphasized, accompanied by the enhancement of teachers knowledge or students learning outcomes [46], [47]. Regarding the results, professional development supervision should be initiated by identifying basic teaching skills and implementing relevant supervisory measures for appropriate improvement. This enabled teachers to independently advance in their personal, ethical, pedagogical, and career growth.

#### 3.2.2. Enhancing learning innovation: growing teacher's basic ability through the supervision of professional development

Teacher basic ability was the initial variable to be identified and targeted for supervision of professional development. This was in line with the analytical outcomes obtained, where the basic abilities significantly and linearly affected the success of the professional development supervision, leading to increased learning innovation. In this case, learning innovations emphasized the implementation of educational technology and were comprehensively described as teacher-led adaptations designed to student, school, and environmental characteristics. It also prioritized advancements in academic materials, technology integration, and effective educational process structure. Furthermore, the professional development supervision primarily focused on enhancing teachers' basic abilities. This was evidenced in the analytical reports obtained, where commitment and abstraction were considered the elements of core competencies,

significantly influencing learning innovation. Several previous analyses also explored dimensions of educational innovativeness, such as learning materials and scenario design. Training subsequently equipped teachers with the necessary knowledge and skills for learning innovation, through blended education approaches. In addition, the positive impact of enhancing teachers capacity for innovative teaching on their professional development was prioritized [48], [49].

According to the results, the factors significantly impacting the increased teacher-led learning innovation were emphasized. Firstly, teachers innovated learning materials by incorporating content knowledge from the curriculum, integrating local wisdom, addressing humanity issues, and promoting global citizenship. These innovations reinforced both regional and universal values as essential soft skills required by students for present and future endeavors. The integration of local wisdom, humanity issues, and global citizenship into curriculum content also represented an important aspect of the innovative approaches adopted by teachers [50]–[52]. Furthermore, local wisdom was one of the selected strategic issues in Indonesian education, which emphasized native values as the national identity integrated into learning content [50]–[53]. Humanity and global citizenship were also another innovative focus for teachers, which required integration into curriculum content and learning processes. In this context, global citizenship education (GCE) emphasized a strategic concern, igniting the significant assessments related to pedagogical practices [54]–[57]. This strategy was implemented to empower students to play active roles in overcoming global challenges and developing a safe, peaceful, tolerant, inclusive, and anti-extremism world [57], [58].

In implementing GCE, a holistic and transformative approach was also selected [59]. Moreover, educational humility was not a new concept due to being a long-term philosophical basis for education. The issue of humanity is also presently evolving toward recognizing and appreciating the diversity of individual human nature. This was because the humanist values instilled in schools prioritized freedom, responsibility, cooperation, tolerance, honesty, democracy, patience, politeness, and active participation. Previous reports subsequently explored the extent to which humanistic competencies were integrated into the curriculum [60]. In addition, humanitarian values played important roles in students' entire development, encouraging independent and public understanding regarding location, time, beliefs, identity, and culture. This improved empathy and cultivated thoughtful and critical citizenship. Teachers should also implement their innovative creativity in content and pedagogical approaches, for effective incorporation of relevant values into the curriculum [61], [62].

Secondly, teachers were responsible for implementing technological innovation in education. This condition emphasized the following: i) using blended education through a learning management system; ii) integrating multimedia for various academic experiences to enhance student engagement; and iii) implementing several platforms capable of providing resources and supporting independent educational processes. The realm of learning technology innovation empowers teachers to harness technology as a tool to enhance the effectiveness and efficiency of student learning [63]. For innovative teachers, information technology was also the most important tool for exploring learning content toward improving professional competence. Moreover, technology, as part of educational innovation, was able to increase learning success [64]. The teachers also selected integrated multimedia and various academic platforms to enhance learning, catering to and increasing individual student differences and interests [65]–[67].

Thirdly, the learning scenario setting emphasized the patterns by which teachers developed a comprehensive educational process. This process emphasized the following: i) strengthening all students; ii) improving the social aspect of learning; iii) cultivating emotional engagement with education; iv) acknowledging individual references; v) conducting authentic assessments; vi) establishing horizontal connections among students; vii) promoting critical thinking and problem-solving; and viii) implementing subject-based academic activities. Innovations in learning scenario settings also represented the teacher-led innovativeness holistically managing the educational process, prioritizing physical and psychological aspects. These innovations facilitated the development of the above learning situations. Previous extensive studies subsequently validated the positive impact of the social learning nature, emotional integration, and the establishment of horizontal connections on enhancing students humanity [68].

Furthermore, critical thinking and the ability to solve problems were important skills teachers need to develop as important competencies for modern students. This indicated that teachers were capable of innovating in academic and assessment strategies. Several previous reports also stated that the educational process was a period for educators to develop the values used as objectives in the curriculum. In this case, learning innovation process was the teacher ability to develop the educational situations supporting goal achievements. Therefore, academic situations were established through learning scenario settings, to achieve curriculum objectives.

## 4. CONCLUSION

In conclusion, learning innovation was expected to be prepared by increasing the teacher basic abilities related to aspects of commitment and abstraction. Coaching should also strengthen teacher independence, enabling the effective resolution of practical challenges in their professional roles and career growth. Professional development supervision was also an important service for enhancing and repairing teacher basic abilities. Furthermore, the improvement of the abilities enhanced learning innovation through professional development supervision. This indicated that the prioritization of the supervision process emphasizing the enhancement of student basic skills was very important, to promote sustainable educational innovativeness. The results obtained were also used as references for school principals and supervisors in preparing teacher professional development programs, to ultimately achieve successful student learning and institution development.

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| Name of Author | C | M | So | Va | Fo | I | R | D | O | E | Vi | Su | P | Fu |
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C : **C**onceptualization
M : **M**ethodology
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E : Writing - Review & **E**diting
Vi : **Vi**sualization
Su : **Su**pervision
P : **P**roject administration
Fu : **Fu**nding acquisition

## CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

## INFORMED CONSENT

All participants in this study were provided with information about the research objectives and procedures and gave their consent before participating in the study.

## DATA AVAILABILITY

The data used in this study is available upon request from the corresponding author [R] and will be provided in accordance with the applicable data access policies.

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