Investigating the Effectiveness of the Teacher Professional Training Program (PPG) in Improving Teacher Competences

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Abstract
The comprehensive test is an online and comprehensive assessment of pedagogic theory, and knowledge of the field of study including essential, advance material and meaning (what, why, and how), TPACK and HOTS results of PPG training. The purpose of the study was to determine the mastery of the comprehensive test aspects of teachers who took PPG, the research method used a quantitative approach with a survey method. The sampling technique used was random sampling for elementary school teachers who took part in PPG 360 teachers which was carried out in the teacher professional education study program, Universitas Pendidikan Indonesia. The data collection technique used documentation with the data analysis technique, namely descriptive statistical analysis. The results of the research from the mapping of mastery aspects of the comprehensive test of ppg students are teacher performance before and after attending PPG, mastery of essential subject areas of PPG teacher students in the very good category, mastery of material in the field of advanced materials for PPG teacher students in good category; mastery of pedagogic material with good categories, mastery of HOTS-based materials with good categories; and mastery of TPACK integrated material with very good category. The PPG training program for elementary school teachers is very effective in improving teacher competence.

Keywords: comprehensive test, primary school level teacher, teacher professional training program (PPG)

Introduction
There is a growth of research investigating the relationship between teachers' competence and their professional practice. This is because teacher competence affects many aspects of the teaching and learning process and student-teacher interactions in the classroom. In addition, the teacher's competence also give rise to a "dynamic" feeling which has implications for school changes that emphasize the collegial humanistic system (Gordon, 2020; Rust, 2019; Toropova et al., 2021). Based on these arguments, we consider that teacher competence can change the professional competence of teachers for the better both in the cognitive and affective domains. In other words, it can motivate teachers to improve their knowledge and reflective abilities, and process through representation in the teaching profession. Although teacher emotions are correlated with professional practice, it is also part of teacher identity research which has an independent territory in the field of education (Abu Rahmoun et al., 2021; Baker & Clark, 2017). Most studies highlight how teachers' competence is represented during student-teacher interactions in the classroom. However, it is rare for research to explore the competence of novice teachers during professional teacher programs to broaden their learning practices and to enhance their future careers. This situation is in line with the most of the studies in this area are largely located in the school system; Several studies specifically examine the role competence play in teacher professional development programs. Therefore, this
study involved a novice physics teacher in high school who contributed to the teacher's professional development program to gain his professional competence.

Before PPG students take the PPG student competency test which consists of a knowledge test and a performance test or teaching practice as a prerequisite for obtaining an educator certificate. PPG students are required to complete all online learning activities, one of which is the comprehensive test. The comprehensive test is an online and comprehensive assessment of pedagogic theory, and knowledge of the field of study including essential, advanced material and meaning (what, why, and how) derived from the results of the workshop learning and expanded to aspects of TPACK and HOTS (Henshall et al., 2018; Kay et al., 2021; Korkmazgil & Seferoğlu, 2021). However, the results of a comprehensive test consisting of all assessments on the product of learning practice (videos and learning tools) and deepening (pedagogic and professional) show that the reality is not in line with expectations. In the end, the teacher could not participate in the practical field experience, so he had to re-do the Ukom remedial in accordance with the provisions. Of course, this will have an impact on the readiness and adequacy of PPG student competencies in carrying out field experience practical activities and PPG student competency tests. Based on the description of the problems above, this research will examine matters relating to aspects of the comprehensive teacher test in online learning for PPG students in Makassar State University which includes mastery of fields of study (essential and advanced material) and mastery of material (pedagogics, hots). and TPACK). Based on the description above, the researcher formulates the problem:

1) How effective is the PPG program in improving teacher performance as a whole?
2) How does the PPG program affect mastery of essential study fields, mastery of advanced material studies, mastery of pedagogic materials, mastery of HOTS-based materials?

**Literature Review**

**Teacher Professional Competence**

Before describing the definition of professional competence as a whole, it will be explained first about the notion of competence and professional. Competence etymologically means "skill or ability". While the terminology means knowledge, skills and basic values that are reflected in the habits of thinking and acting. Habits of thinking and acting that consistently and continuously enable a person to become competent in the sense of having the basic knowledge, skills and values to do something". The basic definition of competence is ability or skill. According to Piet and Ida Sahertian, competence is the ability to carry out something that Another definition states that competence is "knowledge, skills and abilities that are mastered by someone who has become part of him, so that he can perform cognitive and psychomotor behaviors as well as possible" (Hadianto et al., 2022; Li et al., 2019; Morales, 2018). While professional comes from the word profession. Profession itself has the meaning of a job that requires an expertise that is obtained through special education or training. So the notion of professionalism is "a view that a certain skill is needed in a job. which expertise is only obtained through special education or special training.

Another opinion states that professionalism is "the notion that teaches that every job must be done by a person who teaches that every job must be done by a professional person". In the Law on Teachers and Lecturers, professionalism is "an attitude born of belief in work that is held as something of high value so that it is consciously loved, and this is seen from continuous and continuous efforts in making continuous improvements" (Aydin et al., 2015; Baker & Clark, 2017; Churchward & Willis, 2019). Based on some of the opinions above, the researcher can conclude that teacher professionalism is an attitude of action possessed by teachers in supporting their work which is realized
by an understanding that teaches that in carrying out a profession, it must be based on professional abilities which include knowledge, expertise and skills that support the profession. pursued.

Based on some of the definitions and descriptions above about competence and professionalism, it can be clarified that professional competence is the ability to master learning materials broadly and deeply which includes concepts, structures, and scientific/technology/art methods that are overshadowing/coherent with teaching materials, teaching materials contained in the curriculum, school curriculum, conceptual relations between related subjects, application of scientific concepts in daily life and daily professional competition and professional competition in a global context while preserving national values and culture. Furthermore, another opinion states that professional competence is having extensive knowledge of the field of study it teaches, choosing and using various teaching methods in the teaching and learning process it organizes. Based on the above opinion, it can be understood that professional competence is the existence of skills, abilities, knowledge and skills possessed by an educator, teacher, mentor of students in the teaching and learning process. Professional competence needs to be possessed by every teacher considering his work is a profession. His work is not only limited to teaching but is also required to have expertise and also great responsibility for the profession.

**Teacher Professional Education (PPG)**

The need for professional teachers not only in developed countries but also in developing countries is an essential aspect to support the learning process. Teachers are a central actor to facilitate and do the learning process in the classroom. To create a professional teacher, the TPD program is frequently formed in several models such as workshops, college-level courses, collaborative work as part of a professional learning community (PLC), independent research, and mentoring and learning from peers. This activity can be defined as the way teachers improve professional knowledge and skills in order to alter student attitudes and achievement.

In the Indonesian context, the TPD program is called as Teacher Certification Program. This program started in 2005 altogether with the emerging of the teachers“ and lecturers” law and its implementation has started since 2007. The purpose of this program is to improve the quality of the educational system specifically to overcome the weakness of teachers“ competency and the lowness of teachers” motivation and salary. There were many models applied in supporting the program and the models have changed from time to time: portfolio, workshop and course (i.e. 90 hours), and college-level courses. From 2007 to 2010, the model used to pass the program is based on the portfolio in which quota was given to senior public teachers(Kay et al., 2021; Korkmazgil & Seferoğlu, 2021). Selected teachers should prepare and submit several portfolios related to professional competency to be evaluated. From 2011 to 2017, the model used is a workshop and course spending 90 hours or 10 days. Before the teachers join this program, they have to pass the selection test. They finished the program with a workshop and course in a public university or private university collaborating with the Indonesian Ministry of Education and Culture (MOEC). From 2018 to date, the model used is a college-level course in which the teachers should pass a pre-test related to the subject they taught in the school. After they passed the selection test, they should take online learning for one month. They should finish and pass several tasks. Finally, they should join the certification program in the university collaborating with the MOEC for three months.

Although the program is always evaluated yearly by MOEC, the research of the effectiveness of the program in altering the quality of the learning process in the classroom was investigated two times in the international context (Abu Rahmoun et al., 2021; Aili & Brante, 2007). The program did not improve the learning outcomes after three years of running. On the other hand, several issues such as teacher’s satisfaction with the income, teachers holding outside jobs, and financial stress could be overcome. Another research conducted investigated whether the certification pro-
gram could lead to better quality teachers or not. The findings of the research showed that there was
tno evidence of the effectiveness of certified teachers on student learning outcomes and teacher per-
formance. In other words, the quality of the certified teachers did not improve so as there is no sig-
ificant alteration on students’ learning outcomes.

Methodology

Participants

This study uses a quantitative approach with a survey method. The participants involved are
elementary school level teachers who are currently participating in a teacher professional education
program at one of the campuses that administer the program. There were 360 teachers who were
sampled with a composition of 40% male and 60% female. Analysis of the test results of the pro-
gram is carried out through qualitative and quantitative analysis. The results of the analysis of the
performance test focused on the teacher's required performance abilities. Statistical analysis used is
descriptive statistics. Descriptive statistical analysis was used to describe the data based on the cen-
tral tendency and dispersion. The central tendency is in the form of mean, median, minimum value,
and maximum value which is processed with the help of statistical calculations or using existing
numbers and is supported by the SPSS Version 22 program for windows.

Instruments and Procedures

The instrument used in this study is an evaluation tool that measures all teacher performance
abilities and a set of questions to explore qualitative data. The initial research stage is a test to de-
termine the initial ability of the teacher's overall performance, mastery of essential study areas, mas-
tery of advanced material studies, mastery of pedagogic material, mastery of HOTS-based material.
Furthermore, in-depth interviews were conducted with students of teacher professional education
who have productive teacher backgrounds and participate in teacher professional education pro-
grams. The purpose of this interview is to explore insights and knowledge related to the learning ex-
perience gained during online learning before the comprehensive test is carried out. The substance
of the questions in this activity is the deepening of the material both from the pedagogical and pro-
fessional aspects. After the PPG program is implemented for 1 semester or 6 months, an evaluation
is carried out to determine the teacher's performance after participating in the PPG program

Data analysis

The data analysis technique uses descriptive statistics which aims to describe the data ob-
tained from the research process. Data in the form of numbers will be processed and presented in the
form of descriptive statistical calculation results in the form of frequency tables and percentages of
research results. Statistical measures used in this study include: (1) looking for central tendency such
as minimum value, maximum value, mean, median, and range and; (2) look for dispersions, such as
standard deviation and variance. Data processing and image creation were carried out using Micro-
soft Excel software with the help of SPSS Version 22 For Windows software.

Results and Discussion

Presentation of data used descriptive statistics with the help of SPSS 20 for windows. Based
on the formulation of the research problem, the presentation of data descriptions includes overall
performance, mastery of essential study areas, mastery of advanced material studies, mastery of pe-
dagogic materials, mastery of HOTS-based materials; and material mastery integrated with TPACK.

Descriptive Statistical Analysis Results

The description of the results of data analysis aims to describe the results of competency
mastery in every aspect of the Productive Teacher PPG student competency test in online learning

Openly accessible at http://www.european-science.com
for teacher professional education which includes, overall teacher performance, mastery of essential fields of study, mastery of advanced material studies, mastery of pedagogic material, mastery of material based on HOTS, and material mastery is integrated with TPACK. Description of research data using descriptive statistical analysis test which is calculated using the average value, median value (median), and mode for the size of data concentration. For the size of the data spread is calculated through the standard deviation. The results of statistical analysis of data descriptions on aspects of the comprehensive exam can be described in the table as follows.

Table 1. Teacher Ability Before and After Participating in the PPG Program

<table>
<thead>
<tr>
<th>Ability Type</th>
<th>Before</th>
<th>After</th>
<th>Ascension (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ability to choose and master teaching materials</td>
<td>50,41</td>
<td>93,54</td>
<td>44,43</td>
</tr>
<tr>
<td>Ability to plan and develop teaching programs</td>
<td>30,22</td>
<td>81,12</td>
<td>50,78</td>
</tr>
<tr>
<td>Ability to actualize PBM</td>
<td>50,50</td>
<td>95,51</td>
<td>45,25</td>
</tr>
<tr>
<td>Productive</td>
<td>50,72</td>
<td>96,45</td>
<td>45,70</td>
</tr>
<tr>
<td>Ability to understand and use learning principles</td>
<td>45,24</td>
<td>97,25</td>
<td>52,70</td>
</tr>
<tr>
<td>Ability to assess student learning processes and outcomes</td>
<td>43,56</td>
<td>93,60</td>
<td>50,35</td>
</tr>
</tbody>
</table>

Table 2. Differences in Teacher Performance Before and After Certification

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Teacher Not Certified</th>
<th>Certified Teacher</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning Management</td>
<td>2.56</td>
<td>5.13</td>
<td>4.89</td>
</tr>
<tr>
<td>Scientific Mastery</td>
<td>2.90</td>
<td>5.35</td>
<td>5.20</td>
</tr>
<tr>
<td>Attitude or Personality</td>
<td>3.98</td>
<td>5.40</td>
<td>4.89</td>
</tr>
<tr>
<td>Social interactions</td>
<td>2.16</td>
<td>4.93</td>
<td>4.70</td>
</tr>
<tr>
<td>Average</td>
<td>2.30</td>
<td>5.20</td>
<td>4.89</td>
</tr>
</tbody>
</table>

Based on tables 1 and 2, there are differences in performance before and after the PPG program is implemented. In addition, there are differences in teacher competencies for those who have participated in the PPG program and those who have not participated in certification through the PPG program. The improvement in teacher abilities can be seen in the ability to manage the teaching and learning process from planning to evaluation and the main teacher competencies, namely classroom management, knowledge, attitudes, and social interaction. This proves that the PPG program is effective in improving overall competence. For more details, the researcher then describes the results of the comprehensive test on the essential; Advanced Materials, Pedagogic Materials, HOTS Material, and Technological Pedagogical Content Knowledge (TPACK).

Table 3. The results of the descriptive analysis of the PPG student comprehensive test

<table>
<thead>
<tr>
<th>Variable (Aspects) of PPG Student Comprehensive Test</th>
<th>Statistic</th>
<th>Essential</th>
<th>Advanced</th>
<th>Pedagogy</th>
<th>HOTS</th>
<th>TPACK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>5.60</td>
<td>5.30</td>
<td>5.31</td>
<td>5.30</td>
<td>5.40</td>
<td></td>
</tr>
<tr>
<td>Median</td>
<td>6.14</td>
<td>5.21</td>
<td>5.50</td>
<td>5.20</td>
<td>5.42</td>
<td></td>
</tr>
<tr>
<td>SD</td>
<td>0.65</td>
<td>0.60</td>
<td>0.70</td>
<td>0.55</td>
<td>0.65</td>
<td></td>
</tr>
<tr>
<td>Max</td>
<td>6.00</td>
<td>6.00</td>
<td>6.00</td>
<td>6.00</td>
<td>6.00</td>
<td></td>
</tr>
<tr>
<td>Min</td>
<td>4.00</td>
<td>4.00</td>
<td>4.00</td>
<td>4.00</td>
<td>4.00</td>
<td></td>
</tr>
</tbody>
</table>
The comprehensive test of teacher professional education is an online and comprehensive assessment of teacher professional education students about pedagogic theory, and knowledge of the field of study including essential, advanced material and meaning (what, why, and how) which is sourced from the results of workshop learning and expanded on TPACK and HOTS aspects. The comprehensive test is intended as a process of assessing PPG students in order to measure the readiness and adequacy of competence. The comprehensive test begins with deepening the learning tools that have been prepared by students and continues with pedagogic deepening including TPACK and fields of study including advanced materials and HOTS.

**Mastery of Essential Study Materials**

Mastery of essential field of study material is one of the assessment indicators that aims to measure the pedagogic competence of PPG students in a comprehensive exam. The results of descriptive data analysis can be presented in the following table.

**Table 4. Results of Descriptive Analysis of Mastery of Essential Fields of Study Materials in Essential Fields of Study**

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid (%)</th>
<th>Cumulative (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretty good</td>
<td>20</td>
<td>5.5</td>
<td>5.5</td>
<td>5.5</td>
</tr>
<tr>
<td>Well</td>
<td>140</td>
<td>38.88</td>
<td>38.88</td>
<td>38.88</td>
</tr>
<tr>
<td>Very good</td>
<td>200</td>
<td>55.55</td>
<td>55.55</td>
<td>55.55</td>
</tr>
<tr>
<td>Total</td>
<td>360</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Based on the data above, it shows that the results of a comprehensive exam on the aspect of mastery of essential subject areas from 360 PPG teacher students revealed that 200 students were in the very good category with a percentage level of 55.55%; 140 students are in the good category with a percentage level of 38.88% and 20 students are in a fairly good category with a percentage level of 5.5%. This shows that PPG students who take comprehensive exams on aspects of the essential field of study have the ability to develop various indicators for each component of the learning device. In this regard, a teacher's step in teaching complex material is to recognize the essential material (Lindqvist et al., 2020; Rust, 2019). Thus, from the research results and findings, it is very supportive of this research, so it can be concluded that the findings of this study indicate that ppg students are able to formulate indicators of achievement of higher order thinking learning that must be possessed by students including attitudes, knowledge, and skills in general. whole (critical, creative, communicative and collaborative) future-oriented (adaptive and flexible) (Aydin et al., 2015; Gordon, 2020).

**Mastery of Materials in Advanced Materials**

**Table 5. Results of Descriptive Analysis of Mastery in Advanced Materials Study Materials**

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid (%)</th>
<th>Cumulative (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretty good</td>
<td>30</td>
<td>8,3</td>
<td>78,3</td>
<td>78,3</td>
</tr>
<tr>
<td>Well</td>
<td>200</td>
<td>55.5</td>
<td>55.5</td>
<td>55.5</td>
</tr>
<tr>
<td>Very good</td>
<td>130</td>
<td>36.1</td>
<td>36.1</td>
<td>36.1</td>
</tr>
<tr>
<td>Total</td>
<td>360</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>
Mastery of Advanced Materials study material is a development of previously existing material, in contrast to essential material which is still in the form of basic, important or principal knowledge in the form of subject matter that students need to understand (Paidi, 2008). The results of descriptive data analysis can be presented in table 5.

Based on the data above, it shows that the results of a comprehensive exam on the aspect of mastery of advanced materials from 360 PPG teacher students revealed that 130 students were in the very good category with a percentage level of 36.1%; 200 students are in the good category with a percentage level of 55.5% and 30 students are in the fairly good category with a percentage level of 8.3%. This shows that PPG students who take comprehensive exams on aspects of the advanced material field of study are dominant in the good category, related to this, the deepening of advanced materials is a form of commitment and loyalty of teachers to their organization, improving self-ability is the value of commitment to work affiliation. The commitment of a teacher in learning remembers the research of teachers make a major contribution to learning achievement by 80% consisting of 33.50% teaching ability, 34.40% mastery of the material and 9.45% teacher attitudes (Baker & Clark, 2017). Thus, from the research results and findings, it is very supportive of this research, so it can be concluded that the findings of this study indicate that ppg students are able to master teaching materials including advance materials in a meaningful way that can explain the "what" (content) aspect, why” (philosophy), and “how” (application) in everyday life.

**Mastery of Pedagogic Materials**

Pedagogic competence is an ability that must be possessed by professional teachers who can substantially provide understanding, design and implementation of learning, evaluation of learning outcomes, and development of students to actualize their various potentials. The results of descriptive data analysis can be presented in the following table.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid (%)</th>
<th>Cumulative (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretty good</td>
<td>40</td>
<td>11.1</td>
<td>11.0</td>
<td>11.0</td>
</tr>
<tr>
<td>Well</td>
<td>220</td>
<td>61.0</td>
<td>61.1</td>
<td>61.1</td>
</tr>
<tr>
<td>Very good</td>
<td>180</td>
<td>50.0</td>
<td>50.0</td>
<td>50.0</td>
</tr>
<tr>
<td>Total</td>
<td>360</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

Based on the data above, it shows that the results of a comprehensive exam on aspects of mastery of pedagogic material from 360 PPG teachers revealed that 180 students were in the very good category with a percentage level of 50.0%; 220 students are in the good category with a percentage level of 61.1% and 40 students are in a fairly good category with a percentage level of 11.1%. This shows that PPG students who take comprehensive exams on aspects of the dominant pedagogical field of study are in the good category, which means that PPG students have the ability to manage learning well which includes understanding the design and implementation of learning, evaluating learning outcomes and developing the potential possessed by participants educate (Hariri et al., 2012; Henshall et al., 2018). In this regard, the teacher is said to be professional if he is able to carry out his duties and roles effectively. Every student has the potential and initial knowledge (experience), then the role of the teacher empowers the role of students so that their potential and knowledge are useful for their lives. Thus, from the research results and findings, it is very supportive of this research, so it can be concluded that the findings of this study indicate that teachers are expected not only to master the material in the curriculum textually, but must know how to teach...
and consider the condition of students. In addition, they can develop themselves continuously as professional teachers through research, self-reflection, search for new information, and innovation (Korkmazgil & Seferoğlu, 2021; Li et al., 2019).

**Mastery of HOTS-Based Materials**

Mastery of HOTS-based materials is an ability that must be possessed by professional teachers, who are able to present high-level skill-oriented learning materials. HOTS learning is learning oriented to higher order thinking skills that invites students to think critically, creatively, collaborate, and communicate (Ariana, 2018). The results of descriptive data analysis can be presented in the following table.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid (%)</th>
<th>Cumulative (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretty good</td>
<td>20</td>
<td>5.5</td>
<td>5.5</td>
<td>5.5</td>
</tr>
<tr>
<td>Well</td>
<td>230</td>
<td>63.8</td>
<td>63.8</td>
<td>63.8</td>
</tr>
<tr>
<td>Very good</td>
<td>110</td>
<td>30.5</td>
<td>30.5</td>
<td>30.5</td>
</tr>
<tr>
<td>Total</td>
<td>360</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

Based on the data above, it shows that the results of a comprehensive exam on the aspect of mastery of the HOTS material from 366 PPG productive teacher students revealed that 110 students were in the very good category with a percentage level of 30.5%; 230 students are in the good category with a percentage level of 63.8% and 20 students are in a fairly good category with a percentage level of 5.5%. This shows that PPG students who take comprehensive exams on the aspect of mastery of HOTS material are dominant in the good category, which means that PPG students are able to orient the concepts of learning materials through higher-order thinking skills. In this regard, higher order thinking skills are categorized into 3 parts, namely as a form of transfer of learning outcomes, as a form of critical thinking, and as a problem solving process (Morales, 2018; Witte & Jansen, 2015). Thus, from the research results and findings, it is very supportive of this study, so it can be concluded that the findings of this study indicate that teachers are able to analyze competencies that are in accordance with the HOTS concept. In addition, being able to carry out educational learning by applying information and communication technology to build attitudes (Indonesian character), knowledge, and skills of students in solving problems critically, humanely, innovatively, creatively, collaboratively, and communicatively, using learning models and learning resources that are supported from research results.

**TPACK Integrated Material Mastery**

One of the demands of 21st century learning experienced by our education world is to design a teacher competency development plan called TPACK or Technological Pedagogical Content Knowledge. TPACK is a comprehensive integration of knowledge and skills in terms of material, and pedagogy that is integrated into technological developments. TPACK is considered a potential framework that can provide new directions for teachers in solving problems related to integrating ICT into teaching and learning activities in the classroom. The results of descriptive data analysis can be presented in the following table.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid (%)</th>
<th>Cumulative (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretty good</td>
<td>30</td>
<td>8.3</td>
<td>8.3</td>
<td>8.3</td>
</tr>
</tbody>
</table>

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Based on the data above, it shows that the results of the comprehensive exam on the aspect of mastery of the material integrated with TPACK from 360 PPG productive teacher students revealed that 200 students were in the very good category with a percentage level of 55.5%; 160 students are in the good category with a percentage level of 44.4% and 30 students are in the fairly good category with a percentage level of 8.3%. This shows that PPG students who take comprehensive exams on aspects of mastery of integrated TPACK material are in the very good category, which means that PPG students are able to integrate and understand the relationship between knowledge about teaching (pedagogical knowledge) and the use of technology (technology knowledge). In TPACK, teacher knowledge to integrate technology in learning makes learning effective and efficient. Technology integration is considered as a closely related component of teaching and is included in PCK (Gutman, 2018; Lindqvist et al., 2020; Toropova et al., 2021). Thus, from the research results and findings, it is very supportive of this research, so it can be concluded that the findings of this study indicate that teachers are able to design learning by applying the principle of combining knowledge of teaching materials, pedagogics, and information and communication technology or Technological Pedagogical and Content Knowledge (TPACK) and other relevant approaches, as well as being able to evaluate inputs, processes, and learning outcomes that include attitudes, knowledge, and skills of students by applying authentic assessments, and utilizing evaluation results to improve the quality of learning.

**Conclusion**

Based on the discussion of the research results that have been described previously, it can be concluded that the performance of elementary school teachers shows an increase in overall performance and also shows an increase in the main abilities, namely mastery of essential fields of study, mastery of advanced material studies, mastery of pedagogic materials, mastery of HOTS-based materials. This shows that the Teacher Professional Education (PPG) program can improve the overall competence of teachers. Teachers who take part in the PPG program are able to integrate and understand the relationship between knowledge about teaching (pedagogical knowledge), and the use of technology (technology knowledge) and are able to evaluate inputs, processes, and learning outcomes that include attitudes, knowledge, and skills of students by applying authentic assessments, and take advantage of the evaluation results to improve the quality of learning. The implication of this research is that stakeholders can see which components are still lacking in the PPG program so that improvements can be made in the implementation of the next teacher professional education program.

**References**


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