Pre-Service Physics Teachers' Self-Assessment of Professional Competence After Following TPE (Teacher Professional Education)

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Abstract. This study aimed to evaluate the effectiveness of the Physics TPE program in improving teacher professionalism by considering the perceptions of its graduates. Data were collected through a self-assessment questionnaire/survey given to Physics TPE graduates regarding their teacher professional competence before and after participating in TPE. A total of 36 physics TPE graduates participated in this study. The results showed significant improvements in various aspects of teacher professionalism. Graduates reported improvements in their mastery of educational foundations, teaching program preparation, teaching program implementation, assessment, and student character building. In particular, the greatest improvement was observed in mastery of educational foundations, likely due to the alignment of the TPE curriculum with the stages of effective teaching. While teaching implementation showed the smallest improvement, it was still positive. Overall, the Physics TPE program was perceived well by its graduates, indicating its potential to contribute to the professional development of physics teachers.

Keywords: Physics Teachers' Self-Assessment, Professional Competence, Teacher Professional Education

INTRODUCTION

Teacher is one of the oldest professions in the world (Johnson, 2016). In line with the mandate of Law Number 14 of 2005 concerning Teachers and Lecturers, a teacher in improving his performance must always try to actively improve his level of professionalism through the continuous development of pedagogical competence. Teacher professionalism is a crucial factor in realizing superior and sustainable education quality (Risdiany, 2021). Previous studies (Anwar & Mubin, 2020; Mardhatillah & Surjanti, 2023; Supriyanto, 2023) have shown that teacher competence, including pedagogical skills and professionalism, has a significant influence on their performance in the classroom. A study (Setiawati, 2024) showed that the use of instrument construction scaffolding can improve the ability of science teachers to construct critical and creative thinking skills tests. These findings indicate that developing the ability of science teachers to construct quality tests is an important aspect in improving their professionalism. Teacher Professional Education (TPE), also known as Pendidikan Profesi Guru (PPG) in Bahasa, is expected to be able to produce graduates who

not only master the subject matter, but also have strong pedagogical skills, as well as a high professional attitude. Professional teachers must master many things in their field, such as professionalism, attitude or personality, the entire teaching process, pedagogy, and their social role in society. So the teacher's professionalism will be gained. Therefore, teacher performance is expected to boost the quality and relevance of education (Murwaningsih, 2024).

Teacher Professional Education (TPE) is a program needed to synergize academic education (S1) with pedagogical and professional teacher competencies (Ningrum, 2016). Teacher professional education is an education that produces professional teachers (Hartatik & Nafiah, 2020). Teachers who have completed this program usually show an increase in content knowledge and pedagogical strategies, which in turn facilitates a more effective teaching and learning environment (Murphy, 2020). Explicitly, there is a common thread of synergy between academic education and TPE in developing professional teacher competencies, including physics/science teachers. However, what is the perception of TPE graduates, especially in the field of physics, regarding the level of professionalism they have after participating in the program? This study aims to explore more deeply the perceptions of physics TPE graduates regarding their own professionalism and how the TPE program has contributed to their professional development. While previous research has examined teacher competence and the impact of teacher professional development programs (Risdiany, 2021), this study specifically focuses on the self-assessment of physics TPE graduates in Indonesia, providing unique insights into the program's effectiveness in this context.

METHOD

This study used a descriptive quantitative method. Quantitative data was obtained from a self-assessment questionnaire distributed to physics teachers who have taken TPE. The questionnaire, a self-assessment survey, used a Likert scale to obtain perceptions from TPE graduates about their professionalism. The instrument's validity was confirmed by 2 experts (physics education lecturers). The instrument validation results are shown in Table 1.

Table 1. Instrument Validation Results

Item Number	Mean content validity	Mean language clarity	Mean item relevance	Overall mean	Validity
1	3.5	4	3.5	3.67	Valid
2	2.5	3	2.5	2.67	Valid enough
3	4	4	4	4	Valid
4	2	3	3	2.67	Valid enough
5	3.5	3	3.5	3.33	Valid
6	3.5	3.5	3.5	3.5	Valid
7	3.5	4	3	3.5	Valid
8	3	3.5	4	3.5	Valid
9	2	3	3	2.67	Valid enough
10	2	3	3	2.67	Valid enough
11	3	3.5	1.5	2.67	Valid enough
12	2.5	3.5	2	2.67	Valid enough
13	2.5	2	3.5	2.67	Valid enough
14	3	2.5	2.5	2.67	Valid enough
15	2.5	3	2.5	2.67	Valid enough
16	3.5	3	3	3.17	Valid enough
17	3	3.5	3.5	3.33	Valid
18	3	4	3	3.33	Valid

19	3	3.5	3	3.17	Valid enough
20	3.5	2.5	3	3	Valid enough
21	3.5	3	3	3.17	Valid enough
22	3.5	2.5	2.5	2.83	Valid enough
23	3	2	3.5	2.83	Valid enough
24	3.5	2.5	3	3	Valid enough

Table 1 shows that out of the 24 items, 8 questionnaire items fall into the valid category, and the rest are in the valid enough category. The validity criteria refer to (Baihaqi et al., 2022). The questionnaire contains 24 questions, which are divided as in Table 2.

Table 2. Distribution of Questions in The Questionnaire

Aspects of Teacher Professionalism	Amount of Questions
Basic of Education	2
Teaching program planning	12
Implementation of teaching	6
Assessment	2
Developing the student's character	2

*Note: The distribution of questions across aspects is not proportional due to the emphasis on teaching program planning, which reflects the comprehensive nature of the curriculum and instructional design within the TPE program.

The questionnaire was completed by 36 Physics TPE graduates. The participants comprised 3 graduates from Universitas Bengkulu, 6 from Universitas Negeri Malang, 3 from Universitas Nusa Cendana, 15 from Universitas Jember, 6 from Universitas PGRI Kanjuruhan, and 3 from Universitas Negeri Semarang. All participants were enrolled in the TPE program around October-November 2022 and graduated in 2023.

Teacher professionalism is how teachers are able to adapt to the changing conditions of students over time (professional knowledge), teachers who have inherent attributes in themselves to develop themselves according to their competencies (professional attributes), and implement knowledge and character at school or when they are dealing directly with students (professional practice) (Rahmawati et al., 2020). Professional teacher competencies include mastery of material, concepts, scientific patterns, mastery of basic subject competencies, development of learning materials, development of professionalism through reflection, and utilization of ICT (Suryadi, 2022). It is further explained that professional teacher competencies are planning teaching and learning programs, implementing and leading or processing teaching and learning, assessing the progress of the teaching and learning process, and mastering learning materials in the sense of mastering the field of study. So that the aspects of teacher professionalism adapted from the two opinions are the foundation of education, planning teaching programs, implementing teaching, assessment, and developing the character of students. The questionnaire answers use a Likert scale of 1-4, which is categorized as in Table 2.

Table 2. Categories of answers

Numbers	Meaning
1	Not able/ very low
2	Less able/low
3	Capable/high
4	Very able/very high

Each question asks for answers to the perception of teachers' professional abilities before and after Teacher Professional Education (TPE). Likert scale analysis is a four-point assessment. Changes in the average

presentation of mastery of abilities before and after TPE are described descriptively. The average increase in each aspect assessed shows an increase in perception of self-professionalism after participating in TPE. In the questionnaire, questions were also given in the form of general opinions about TPE. The data are presented qualitatively.

RESULT AND DISCUSSION

The responses of TPE Physics graduates regarding their perception of professionalism are presented in Graph 1.
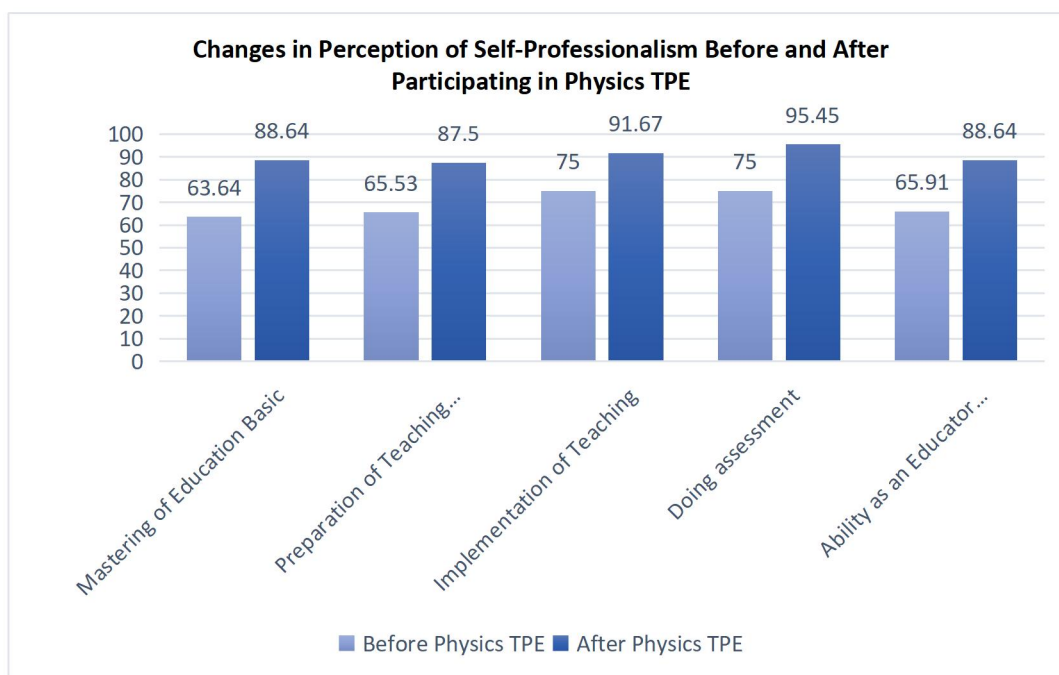
Graph 1. Results of Self-Assessment of Graduates of the Physics Teacher Professional Education Program on Their Professionalism Abilities

The average increase in the doing assessment aspect, not all has the same opinion. A total of 4 teachers felt that they had not improved in the assessment ability aspect. In the questionnaire, a respondent stated, "Because during TPE, only teaching modules. The a need for assessment guidelines that must be applied and followed up. Because the lecturer's focus is only on models/methods/strategies." In fact, TPE aims to produce professional teachers with the main task of educating, teaching, guiding, directing, training, assessing, and evaluating students (Maryani, 2022). From graph 1, the highest increase was in the category of mastery of educational foundations. One respondent stated, "TPE helps in implementing and determining strategies/methods according to the nature of the times. TPE helps to understand and apply Social-Emotional Learning, which is not in the curriculum during undergraduate lectures". Another response stated, "The stages in the implementation of TPE are carried out according to what teachers need to learn and make improvements in carrying out learning activities. These stages are: identifying problems in schools, formulating problems, analyzing problems, compiling problem-solving, designing teaching and learning activities, implementing practice program, evaluation, implementing best practices, and ending with UKMPPG". This means that in this program, their educational foundation skills are honed.

One respondent suggested that TPACK material needs to be reviewed or added during TPE Physics to help improve their professionalism as physics teachers. The TPE curriculum refers to the principle of activity-based curriculum, which is an implementation of the TPACK concept (integration of knowledge about technology, pedagogy, and content in learning) (Maulana et al., 2023).

The evaluation implementation aspect increased by 20.45%. Of course, this is very good. A study shows that it supports the potential for teacher feedback practices to encourage school

identification and student behavioral involvement in order to build a more inclusive school environment and respect student diversity (Monteiro et al., 2021).

Meanwhile, the implementation of teaching experienced the smallest increase, which was around 16.67%. The question in the questionnaire was how confident they were in their ability to teach physics in class and create the right learning climate, and manage physics teaching and learning interactions before and after. The results of the study showed that teacher professional development has an impact on the development of teacher cognition and practice (Krulatz et al., 2024). If examined in their qualitative answers, they expect more in-depth material, not just repeating what they have learned before (during undergraduate studies). In fact, what distinguishes the scope of undergraduate and TPE is that Teacher Professional Education is a program needed to synergize academic education (S1) with pedagogical and professional teacher competencies (Ningrum, 2016). However, beyond that, there are many similar positive responses from TPE graduates, namely feeling that their pedagogical skills are more honed, being helped to determine learning methods/strategies in accordance with current developments, being trained in teacher professionalism with theory and direct practice, gaining new knowledge such as differentiated learning and social emotional learning of students that can help me create enjoyable learning in the classroom. Teacher discipline, pedagogical competence, and performance (as latent variables) scored high in building meaningful learning (Afandi et al., 2023). Positively, many respondents stated that their teacher professionalism skills continued to develop through TPE because there was a lot of practice in schools. Teachers can enrich students' classroom experiences through instructional content (what they teach) and practice (how they teach) to make learning meetings more interesting and, in turn, increase students' access to learning and opportunities to achieve academic success (Franco et al., 2023). Here are some suggestions put forward by respondents for improving the TPE program according to their experiences:

"I hope that the schedule for the performance test will not clash with school holidays or after the end of semester exams."

"The time to prepare learning devices is very limited, we still have to adjust to the opinions of several different lecturers. This, of course, makes us confused. So, there needs to be an agreement between lecturers regarding the technicalities, before TPE begins (this is related to the implementation of TPE with a teaching team from lecturers)."

"Guidance in creating innovative learning media, because during my TPE to create learning media, there was no special guidance from lecturers."

"Pedagogical materials need to be made more in-depth."

Positive things obtained during TPE Physics, they explained

"I am happiest when doing direct practice at school."

"I am happy with the teaching given by lecturers and mentor teachers, and discussions with teachers who are TPE students help me to be able to think from various aspects and points of view. This is useful for me to better understand the characteristics of students and adjust learning according to their needs."

"The positive thing that I got when studying in TPE Prajabatan was meeting many friends from different generations, so that we could collaborate with each other when attending lectures or teaching practice in the field."

"I enjoy participating in all the TPE activities."

"The most enjoyable thing is sharing knowledge with colleagues, lecturers, and related school residents. I understand more about the real learning conditions."

CONCLUSION

Overall, the TPE Physics program has been proven to be felt by its graduates to be able to help improve the professionalism of their teachers. The results of the self-assessment showed an increase in all aspects of teacher professionalism, namely mastery of educational basics, preparation of teaching programs, implementation of teaching programs, assessment, and fostering student character from before TPE and after TPE. Previously, they felt they had mastered the foundation of education as much as 63%, then increased to 88%. Mastery of teaching materials, which was previously 68%,

became 84%. As many as 68% felt they could set learning objectives, after taking TPE, the questionnaire showed a value of 86%. The aspect that experienced the highest increase was the aspect of mastery of educational foundations, which increased by 25%. This is because TPE follows the stages that must be carried out as a teacher in implementing learning. The aspect that experienced the smallest increase was the implementation of teaching. The causal factor is the material that repeats undergraduate material and requires reflection after teaching. In general, TPE Physics graduates are happy with this program.

Several limitations should be considered when interpreting the findings of this study. Firstly, the sample size of 36 Physics TPE graduates, while providing valuable insights, may limit the generalizability of the results to a broader population of pre-service physics teachers in Indonesia. The sample was also drawn from six different universities with potentially varying TPE program structures and curricula, which could have influenced the participants' self-assessment of their professional competence.

Secondly, the study relied solely on self-assessment data collected through a questionnaire. While self-assessment provides a valuable perspective on the participants' perceived competence, it may be subject to biases such as social desirability or overestimation/underestimation of one's abilities. Future research could benefit from incorporating objective measures of competence, such as performance assessments or observations, to provide a more comprehensive evaluation.

Finally, the data were collected from graduates of the TPE program who enrolled around October-November 2022 and graduated in 2023. This specific cohort experienced a particular period of teacher education, and the findings might not be directly applicable to graduates from different cohorts or those who underwent significantly different training experiences.

Despite these limitations, the findings of this study have several important implications for teacher education programs and future research. The self-assessment data provides valuable feedback on the perceived professional competence of pre-service physics teachers after completing the TPE program. This information can be used by the participating universities and other teacher education institutions to evaluate and potentially refine their curricula and pedagogical approaches to better prepare future physics teachers.

The identified areas of strength and areas needing improvement in the participants' self-assessment can inform the development of targeted interventions and support systems for pre-service teachers. For instance, if participants consistently report lower confidence in a specific competency, teacher education programs could consider incorporating more focused training and practical experiences in that area.

Future research could expand on these findings by including a larger and more diverse sample of pre-service physics teachers from various regions and TPE programs in Indonesia. Investigating the correlation between self-assessment and objective measures of competence would also provide a more comprehensive understanding of pre-service teachers' preparedness. Longitudinal studies tracking the professional development of these graduates as they enter the teaching profession could further validate the long-term impact of the TPE program.

REFERENCES

Afandi, M., Wahyuningsih, S., Yustiana, S., Kusumadewi, R. F., & Rachmadtullah, R. (2023). Correlation of Work Discipline and Pedagogical Competence to Teaching Performance in Elementary Teacher. *International Journal of Instruction*, *16*(4), 189–208. https://doi.org/10.29333/iji.2023.16412a

Anwar, A. S., & Mubin, F. (2020). Pengembangan Sikap Profesionalisme Guru Melalui Kinerja Guru Pada Satuan Pendidikan MTS Negeri 1 Serang. *Andragogi: Jurnal Pendidikan Islam Dan Manajemen Pendidikan Islam*, *2*(1), 147–173. https://doi.org/10.36671/andragogi.v2i1.79

Baihaqi, H. K., Purwaningsih, E., Sulur, S., & Sutopo, S. (2022). Development of Physics E-book Based on Technological Pedagogical Content Knowledge (TPACK) on Thermodynamic Laws Topic. *Jurnal Pendidikan Fisika Indonesia*, *18*(1), 67–74.

https://doi.org/10.15294/jpfi.v18i1.28924

Franco, M. P., Bottiani, J. H., & Bradshaw, C. P. (2023). Assessing Teachers' Culturally Responsive Classroom Practice in PK–12 Schools: A Systematic Review of Teacher-, Student-, and Observer-Report Measures. *Review of Educational Research*, *94*(5), 743–798. https://doi.org/10.3102/00346543231208720

Hartatik, S., & Nafiah. (2020). Indonesia Kemampuan Numerasi Mahasiswa Pendidikan Profesi Guru Sekolah Dasar dalam Menyelesaikan Masalah Matematika. *Education and Human Development Journal*, *5*(1), 32–42. https://doi.org/10.33086/ehdj.v5i1.1456

Johnson, B. R. (2016). Teaching as The Oldest Profession. *Journal of Undergraduate Neuroscience Education*, *14*(2), E22–E23. https://pmc.ncbi.nlm.nih.gov/articles/PMC4917353/pdf/june-14-e22.pdf

Krulatz, A., Christison, M. A., Lorenz, E., & Sevinç, Y. (2024). The impact of teacher professional development on teacher cognition and multilingual teaching practices. *International Journal of Multilingualism*, *21*(2), 711–727. https://doi.org/10.1080/14790718.2022.2107648

Mardhatillah, O., & Surjanti, J. (2023). Peningkatan Kompetensi Pedagogik dan Profesionalitas Guru di Indonesia Melalui Pendidikan Profesi Guru (PPG). *Jurnal Pendidikan Ekonomi Undiksha*, *15*(1), 102–111. https://doi.org/10.23887/jjpe.v15i1.65200

Maryani, E. (2022). Pendidikan profesi guru (PPG) sebagai cara untuk menjadikan guru menjadi profesional. *GUAU: Jurnal Pendidikan Profesi Guru Agama Islam*, *2*(4), 171–178. http://202.162.210.184/index.php/guau/article/view/405%0Ahttp://202.162.210.184/index.php/guau/article/download/405/376

Maulana, I., Rahma, N. A., Mahfirah, N. F., Alfarizi, W., & Darlis, A. (2023). Meningkatkan Profesional Guru dengan Program Pendidikan Profesi Guru (PPG). *Journal on Education*, *5*(2), 2158–2167. https://doi.org/10.31004/joe.v5i2.867

Monteiro, V., Carvalho, C., & Santos, N. N. (2021). Creating a Supportive Classroom Environment Through Effective Feedback: Effects on Students' School Identification and Behavioral Engagement. *Frontiers in Education*, *6*(June), 1–14. https://doi.org/10.3389/feduc.2021.661736

Murwaningsih, T. (2024). The Influence of Teacher Professional Attitude, Welfare, Continuous Self-Development, and Job Satisfaction on High School Teachers Performance. *International Journal of Instruction*, *17*(1), 229–252. https://doi.org/10.29333/iji.2024.17113a

Ningrum, E. (2016). Membangun Sinergi Pendidikan Akademik (S1) Dan Pendidikan Profesi Guru (Ppg). *Jurnal Pendidikan Geografi*, *12*(2), 49–55. https://doi.org/10.17509/gea.v12i2.1783

Rahmawati, A., Fauziah, D. R., Leni, & Aliyyah, R. R. (2020). Menjadi Guru Profesional dengan Menciptakan Bahan Ajar yang Kreatif dan Mengevaluasi Pembelajaran. In *Universitas Djuanda Bogor: Vol.* (Issue 1). Universitas Djuanda Bogor.

Risdiany, H. (2021). Pengembangan Profesionalisme Guru Dalam Mewujudkan Kualitas Pendidikan di Indonesia. *Jurnal AL-HIKMAH*, *3*(2), 197–202. https://prosiding.esaunggul.ac.id/index.php/snip/article/viewFile/163/163

Setiawati, I. (2024). Penggunaan Scaffolding Konstruksi Instrumen untuk Meningkatkan Kemampuan Guru IPA dalam Mengonstruksi Tes Keterampilan Berpikir Kritis dan Kreatif pada Kegiatan Diklat Peningkatan Kompetensi Guru. *Wahana Pendidikan Fisika*, *9*(1), 65–74. https://doi.org/10.17509/wapfi.v9i1.66655

Supriyanto, J. (2023). Pengaruh Kompetensi Terhadap Kinerja Guru pada Masa Pandemi Covid-19. *Jurnal Didaktika Pendidikan Dasar*, *7*(2), 661–686. https://doi.org/10.26811/didaktika.v7i2.1035

Suryadi, A. (2022). *Menjadi Guru Profesional dan Beretika* (1st ed., Issue 1). CV Jejak, anggota IKAPI. https://www.researchgate.net/publication/364243109_Ahmad_Suryadi-

Menjadi_Guru_Profesional_dan_Beretika