Accelerating teacher career through improving competence in scientific publications: Physics teacher perspectives

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Abstract. In promotion of teachers career to a higher level are required to write scientific papers. This study aims to describe the physics teacher's perspective on the promotion process they have experienced so far and the obstacles they face. This research is a descriptive research, data collection through questionnaire and information deepening is done through interviews. The sample of this research is 73 physics teachers. Based on the results of data analysis, it can be seen that more than 65% of physics teachers have difficulty in fulfilling scientific publication requirements for promotion, 85% of respondents have done classroom action research (CAR), but only about 44% have published in the form of scientific articles. In general, teachers have experience in conducting CAR, but they still lack experience in writing scientific articles. Most physics teachers expect local schools and education offices to cooperate with universities to organize training and mentoring of scientific publications. This study can be concluded that the main obstacle to the promotion of physics teachers is caused by the low ability to carry out scientific publications. The results of this study are expected to provide consideration to stakeholders in making decisions and actions related to teacher promotion, especially regarding the mandatory requirements for scientific publications.


1. Introduction

The government has enacted Law Number 20 of 2003 concerning the National Education System [1] Law Number 14 of 2005 concerning Teachers and Lecturers [2]. Government Regulation Number 74 of 2008 concerning teachers mandates that teachers must have academic qualifications, competence, and educator certification. In connection with that, the Minister of National Education Regulation (Permendiknas) Number 10 of 2009 was issued concerning Certification for Teachers in Position. The existence of the above regulations has given new hope in the world of education, where the increased teacher income associated with educator certification should be balanced with predetermined academic competencies.

The government has also implemented the Regulation of the Minister for Empowerment of State Apparatus and Bureaucratic Reform No. 16 of 2009 concerning Teacher's Functional Positions and Credit Scores [3]. This regulation contains changes in which promotions and classes of teachers to move up to a higher class must make scientific papers or scientific articles. This requires all teachers, including junior and senior high school teachers, to be able to compile a scientific paper or article. Regarding scientific articles, many junior and senior high school teachers are not accustomed to making scientific articles which are then published in scientific journals [4,5]. The low writing ability of middle and high school teachers is also evident from the rare number of junior and senior high school teachers who participate in seminar activities by becoming accompanying speakers in national or regional seminars. The low ability of physics teachers in writing scientific papers or scientific articles has an impact on delaying the promotion of teachers for years, because one of the requirements is not fulfilled in the element of publication scientific article.

Writing skill for a teacher is a very important competency. Writing ability is closely related to the ability to communicate scientific ideas both theoretically and practically. Writing scientific publications aims to enrich the repertoire of knowledge or get a response from a professional audience to be involved in a scientific phenomenon at hand. In the context of language, writing a scientific work requires its own skills, through mastering the rules required in writing [6]. Writing skill is not a natural skill but a skill that can be trained and learned. This means that a person's skills to express his thoughts through writing can be honed and improved through exercises. The more often someone does write exercises, the better their writing skills will be [4].

One of the main elements assessed in the promotion/position of teachers to a higher level is continuous professional development, namely the development of teacher competencies that is carried out according to needs, gradually, continuously to improve their professionalism. Forms of sustainable development activities include scientific publications [3]. Types of scientific publications/innovative works for each level of position that must be fulfilled by teachers who will apply for promotion/teaching positions are presentations in scientific forums, publication of research results or innovative ideas in the field of formal education, and publication of textbooks, enrichment books and/or teacher guidelines [7].

According to Subarkah, there are three barriers to promotion: first: Cultural Barriers, Second: Administrative Barriers, and Third: Structural Barriers [8].

This study focuses on the obstacles to a promotion stemming from the low knowledge and skills of physics teachers in scientific publications, with five research questions: (1) How do physics teachers respond to the current promotion system? (2) In which promotions and classes do most physics teachers...
experience obstacles and difficulties? (3) In fulfilling the credit score, do physics teachers experience difficulties when they are promoted to rank and class? (4) What is the general description of the physics teacher's understanding of the knowledge and skills of writing scientific papers or scientific articles? (5) What suggestions do physics teachers give to facilitate them in solving problems in promotion (scientific publications)?

2. Method

This research is a descriptive research, data collection through questionnaire [10-12]. The sample of this research is 73 physics teachers. The questionnaires are distributed to physics teachers by asking questions about the promotions they experienced and the obstacles and further about the teacher's obligation to conduct scientific publications for promotion requirements. Questionnaires were distributed online via Google Form with the target respondents being physics teachers who teach at public schools at random from various provinces. The collected data was then analyzed using descriptive statistics by presenting in the form of percentages and inferential statistics. The deepening of information on the data obtained is done by conducting interviews with certain respondents [13-15].

3. Result and Discussion

3.1. Characteristics of Respondents

Based on the data entered, there are 73 respondents of physics teachers with various educational backgrounds. 41 Bachelor's degree (S1) teachers (56%) and 32 Master's degree (S2) teachers (44%), meanwhile based on the place of assignment where teachers teach there are 45 teachers teaching in Senior High School (62%), 22 teachers teach at Junior high school (30%), 4 teachers teach at Vocational School (5%) and 2 teachers teach at Madrasah aliyah (3%) (see Figures 1a and 1b).

3.2. The Perspective of the Physics Teacher of the Promotion System and the obstacles faced

The results of the physics teacher's assessment of the promotion system that is currently being implemented can be seen in Figure 2. where 52% of teachers gave an assessment of "It is good" while 48% of teachers gave an assessment of "Not good". The physics teachers who gave the assessment "Not good" gave several reasons, including (1) the use of information technology was not yet optimal (2) the submission file for rank was not simple and paperless (3) the standard for implementing the rules for promotion was the same between regions (districts and provinces) (4) the validity, objectivity, and transparency of the assessment of promotions are not yet optimal, and (5) the school and the education office have not been optimal in facilitating the resolution of obstacles faced by teachers.

Figure 1 a. Respondent's education level and b. Level of a schoolteacher on duty

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Figure 2. The physics teacher's perspective on the current promotion system.

Based on Figure 3a. and 3b. below, the obstacles faced in the promotion of the largest percentage that exceeds the percentage of the rank of the respondent group occur at the level of groups III B, IIIC and IVB. Based on this data, respondents from Group IIIB are only 6%, but the number of respondents who find it difficult to increase to IIIB is 12%; this is none other than because the increase at this level is the first increase made by the teacher so that they have difficulty because there is no previous experience. The number of respondents in group IIIC is only 12%, but the number of respondents who find it difficult to advance to IIIC is greater, namely 27%, this is because at this level increase, scientific publications that previously did not have these conditions began. Meanwhile, at the rise in the IVB level, the respondents were 30%, but those who had difficulty at this level reached 33%. This was due to the rise in the percentage of credit score requirements in the scientific publication aspect, which increased from 8 credit numbers at the IVA level to 12 credit numbers at the IVB level.

Figure 3 a. Respondent's position level and b. position level that are difficult to achieve according to the physics teacher

The level of difficulty in meeting the requirements for the credit score for promotion based on the physics teacher's perspective on the four aspects of the assessment is presented in Figure 4 below. The level of difficulty in fulfilling the credit score from the highest to the lowest, respectively, is 66% scientific publications, 23% innovative work, 8% self-development, and 3% learning or mentoring. This data is in line with previous data, which shows that with the application of scientific publication
requirements and increasing credit scores on aspects of scientific publications, many physics teachers have difficulty getting promoted.

Figure 4. The level of difficulty in fulfilling credit scores in four aspects of assessment according to the physics teacher's perspective

The experience of physics teachers in carrying out classroom action research (CAR) and writing articles to be published in seminars or scientific journals is shown in Figures 5a and 5b. Based on the data presented in the figure, almost all respondents (85%) have experience doing CAR, but only a small percentage (44%) have published scientific articles. Of course, this needs further investigation to find out the cause of the low experience of scientific publications by physics teachers.

Figure 5 a. Physics teacher experience doing CAR and b. Physics teacher's experience in publishing articles

Based on the results of further research on the low scientific publications of physics teachers, four main reasons were obtained including they did not understand the systematics of writing scientific articles (16%), did not know the steps in publishing articles in scientific journals or seminars (26%), did not have enough time to write scientific articles, compiling scientific articles (44%), and difficulties in analyzing data in compiling scientific articles (14%) (see Figure 6)
Information:
A. Do not understand the systematics of writing scientific articles
B. Do not know the steps in publishing articles in scientific journals or seminars
C. Not having enough time to compile scientific articles
D. Difficulty in analyzing data in compiling scientific articles

Figure 6. Sources of difficulties in writing scientific articles according to the physics teacher's perspective

Based on the perspective of self-assessment conducted by physics teachers on scientific publication material, the results can be seen in Table 1. below. Overall, the physics teacher's understanding of scientific publication material is still very low, with an average score of 2.12 which is included in the "Knowing little" category. Materials that are known in general tend to get higher ratings than materials that are relatively new among physics teachers, such as software for library management and the preparation of a scientific article that has novelty.

| No. | Scientific Publication Material                                           | Physics Teacher's Level of Understanding (%) | Average |
|-----|--------------------------------------------------------------------------|---------------------------------------------|---------|
| 1   | Important aspects that need to be considered in writing scientific articles| 6,85 54,79 36,99 1,37 | 2,33    |
| 2   | The structure of writing in scientific articles                          | 5,48 52,05 41,10 1,37 | 2,38    |
| 3   | Code of ethics for publishing scientific articles                        | 20,55 52,05 27,40 0,00 | 2,07    |
| 4   | Software for citation management in the preparation of scientific articles| 31,51 47,95 20,55 0,00 | 1,89    |
| 5   | Compiling literature review in writing scientific articles               | 12,33 54,79 31,51 1,37 | 2,22    |
| 6   | Writing a scientific article that has novelty                           | 35,62 47,95 16,44 0,00 | 1,81    |
|     | **Average**                                                             | 18,72 51,60 29,00 0,68 | 2,12    |

Description of Assessment Criteria:
1. Very knowing
2. Knowing enough
3. Little to know
4. Don't know

Figure 7. below shows some scientific publication materials that physics teachers really need in training. There are three materials that are highly expected by physics teachers, namely the writing of scientific journal manuscripts (82.2%), important aspects of journal scientific publications (72.6%), and best practice journal scientific publications (60.3%). Based on these three selected scientific publications material, physics teachers tend to choose the material that can be directly practiced in the preparation of scientific articles.
3.3. Suggestions from physics teachers to facilitate them in solving scientific publications problems

Some inputs from teachers aimed at schools and the education office to resolve the obstacles faced in the publication of scientific articles are summarized in Figure 8 below. Based on these inputs, there are three highest inputs given by physics teachers: (1) Schools or local education offices collaborate with universities, (2) MGMP activities to improve knowledge and skills in writing scientific articles, and (3) Schools or local education offices hold training on writing scientific articles that are held regularly.
Meanwhile, suggestions from physics teachers to improve the promotion system are:

1) Need to simplify the promotion process by utilizing information technology whose process can be monitored online. This needs to be done because not all regions have great attention to the application of this information technology. Some areas that have optimized information technology include Surabaya, Bengkulu, Tanah Datar, and Tapin [16-19].
2) It is necessary to simplify the files that will be used as a promotion submission.
3) Application of credit score assessment standards so that they can be carried out in a valid, objective, and transparent manner.
4) For promotion at a certain level, it is necessary to wait for a longer process of submission and assessment.
5) It is necessary to standardize the implementation of the same promotion rules between regions (regencies and provinces) with one nationally.
6) Schools and agencies should facilitate the resolution of obstacles faced by teachers in promotion

Based on the results of research and discussion, the following research findings were obtained:

1) Many physics teachers (44%) have Masters (S2) education
2) Most physics teachers teach in high school (62%) and in junior high school (30%)
3) Physics teachers still give a lot of "Unfavorable" assessments of the current promotion system accompanied by some supporting evidence.
4) The promotion of physics teacher was constrained mainly at the IIIC and IVB levels due to the application of scientific publication requirements and the increase in the number of scientific publication credits. This is in accordance with previous research conducted by Subarkah, 2020 [8], Nizar, 2020 [20], and Dihamri, 2018 [21].
5) The level of difficulty in fulfilling the credit score is the two highest assessment aspects, namely scientific publications (66%) and innovative works (23%)
6) Most of the physics teachers have done CAR, but only a few have compiled their CAR reports into scientific articles.
7) The two main obstacles, according to physics teachers in writing scientific article publications are not having enough time and not knowing the steps in publishing scientific articles.
8) In general, physics teachers' understanding of scientific publications is still very low, with an average score of 2.12 which is included in the "Knowing little" category. Kondisi ini sesuai dengan hasil penelitian Melati, 2020 [22].
9) Three scientific publication materials that physics teachers really expect are the writing of scientific journal manuscripts, important aspects of journal scientific publications, and best practice of journal scientific publications.

4. Conclusion
Based on the results and discussion above, it can be concluded that: (1) Physics teachers still give a lot of "Not Good" assessments of the current promotion system accompanied by some supporting evidence. (2) The promotion of physics teacher position level is mainly constrained at the IIIC and IVB levels, due to the application of scientific publication requirements and the increase in the number of scientific publication credits. (3) The level of difficulty in fulfilling the credit score is the two highest aspects of the assessment promotion, namely scientific publications and innovative works. (4) In general, physics teachers' understanding of scientific publication material is still very low which is included in the "Knowing little" category. (5) The advice given by the physics teacher includes two things, namely suggestions for improving the promotion system and suggestions for the main promotion obstacles experienced by teachers, namely the fulfillment of scientific publications credit scores. In fulfilling the credit score for scientific publications, physics teachers hope that the school and the education office will facilitate more by collaborating with universities and conducting regular training. The findings of
this study are expected to contribute ideas in unraveling the problems of promotion of physics teachers, both from improving the promotion system and unraveling the main problems of physics teachers in fulfilling the requirements for credit scores for scientific publications.

Acknowledgments
This research was supported by Universitas Negeri Surabaya through the scheme PKM Kebijakan FMIPA with contract number 823/UN38/HK/PM/2021.

References
[1] Indonesia R Undang-Undang Republik Indonesia Nomor 20, Tahun 2003, tentang Sistem Pendidikan Nasional
[2] Nasional D P 2005 Undang-undang nomor 14 tahun 2005, tentang guru dan dosen Jakarta: Depdiknas
[3] Indonesia R 2010 Peraturan Menteri Negara Pendayagunaan Aparatur Negara dan Reformasi Birokrasi Nomor 16 Tahun 2009 tentang Jabatan Fungsional Guru dan Angka Kreditnya
[4] Widana I W, Suarta I M and Citrawan I W 2019 JPM (J. Pemberdaya. Masy.) 4 365–75
[5] Saputra D H 2019 J. Kependidikan Penelit. Inov. Pembelajaran 3 291–301
[6] Kellogg R T 2008 J. Writ. Res. 1
[7] Kemdikbud 2016 Pedoman Kegiatan Pengembangan Keprofesian Berkelanjutan Bagi Guru Pembelajar (Jakarta: Kementerian Pendidikan dan Kebudayaan)
[8] Subarkah I 2020 Ar-Rihlah J. Inov. Pengemb. Pendidik. Islam 5 89–98
[9] Wong J L N 2014 Int. J. Educ. Manag.
[10] Gillham B 2008 Developing a questionnaire (A&C Black)
[11] Rowley J 2014 Manag. Res. Rev.
[12] Hunter L 2012 Nurse Res. 20
[13] Stokes D and Bergin R 2006 Qual. Mark. Res. An Int. J.
[14] Griffie D T 2005 J. Dev. Educ. 28 36–7
[15] Gill P, Stewart K, Treasure E and Chadwick B 2008 Br. Dent. J. 204 291–5
[16] Leonardo M C 2020 TA: Rancang Bangun Aplikasi Penilaian Kinerja Guru Berbasis Website pada SMA Gracia Surabaya Menggunakan Metode 360 Derajat (Doctoral dissertation, Universitas Dinamika).
[17] Sapri S 2018 J. Media Infotama 14
[18] Agustina L 2018 Aplikasi Perhitungan Kredit Point untuk Pengajuan Kenaikan Pangkat Guru pada Dinas Pendidikan Kabupaten Tanah Datar Berbasis WEB
[19] Adisetiawan M N 2020 Aplikasi Pengelolaan Berkala Guru pada Dinas Pendidikan Kabupaten Tapin
[20] Nizar U K, Guspatni G and Gazali F 2020 Pelita Eksakta 3 156–9
[21] Dhimiri D, Haimah H and Srifitriani A 2018 J. Pengabdi. Masy. Borneo 2 60–6
[22] Melati I S and Harmanik H 2 Indones. J. Devot. Empower. 2 31–6