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Video-Based Interaction through Teacher Working Group Forum to Increase Elementary School Teachers' Professionalism

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Abstract

Video-Based Interaction (VBI) for teachers does not have any meaning without the presence of an instructor and a process of interaction. This study aimed to analyze the effectiveness of VBI in Teacher Working Group (TWG) forums to improve teachers' professionalism in science learning in elementary schools. This study involved 36 teachers in rural and city areas by using a one group pretest - posttest design. N-gain was used to analyze the effectiveness of VBI in TWG forums to improve teachers' teaching skills. The study showed that VBI significantly increases teacher professionalism to reach professional levels. The results were also consistent with the N-gain category of teacher professionalism in planning, implementation, and relations components.

Keywords: *inquiry, teacher professionalism, teacher working group forum, video-based interaction*

Introduction

Teachers are responsible for the next generation of a nation. Therefore, it is important to continually improve teachers' teaching competence. Teaching which involves the active role of students can cognitively present comprehensive learning in accordance with teacher professionalism (Strouse, Nyhout, & Ganea, 2018). The professional teacher needs to meet requirements for core competence, social

responsibility, and esprit de corps. A previous study (Dragoş & Mih, 2015) showed that professional teachers were able to produce effective teaching and better educational outcomes. Professional teachers are able to teach using learning models which promote lesson and student development. Younger students have limited ability in expressing verbally information they are processing about science concepts. Constructivism in the inquiry process makes learning meaningful (Erlina, Susantini, Wasis, Wicaksono, & Pandiangan, 2018).

Guided inquiry is suitable for teaching at elementary level. The facts show that 22.65% of science teachers still use teacher-centered learning for teaching science. Teachers tend not to have enough courage to play the role of facilitators of learning (Erlina, Susantini, & Wasis, 2018). An interesting fact was found. When 10 teachers who were asked about their perspectives on inquiry there were 10 different answers. Even researchers have difficulty assessing inquiry because it can look very different from one classroom to another (Harlen, 2013). It was shown that the teachers' ability to implement inquiry in learning was still weak.

One of the ways to maintain teacher professionalism is a Teacher Working Group (TWG). The TWG is a forum that can be used by elementary school teachers to foster and improve their abilities after completing formal education. Reflection on students' pre-concept in learning is important as a form of dissatisfaction of beginner teachers with the traditional learning process. Teacher preparation can be considered as a process of conceptual change and teachers' background (Shannag, Tairab, Dodeen, & Abdel-Fattah, 2013). TWG forum does not play a role as the goals achieved.

In teaching the students, teachers need to play a role in designing instructional experiences which are suitable for students in the 21st century. Training and debriefing enable teachers to adapt to the information society, the learning society, and transformation in technology (Aksakalli, 2018). Government support in the form of the Industrial Revolution 4.0 Road Map still needs to be improved specifically to build teacher professionalism. Furthermore, educational videos can be observed anytime and anywhere with the time and space needed (Sherin & Van, 2005). Learning can be done observing others. This means that the teacher can observe a video and learn how to teach according to these observations (Slavin, 2009).

Teacher observation of teaching through educational videos can help them learn how to develop and improve teaching skills over time. Evaluation of results indicated that the use of technology in the form of videos could provide live coaching to improve teacher professionalism (Funderburk, Chaffin, Bard, Shanley, Bard, & Berliner, 2015). However, educational videos still have some weaknesses

for users (Agommuoh & Nzewi, 2003).In rural areas teachers may have limited access for watching videos (Davis III, Brestan-Knight, Gillis, & Travis, 2018). The use of video as a pedagogical tutorial instrument for groups of teachers has some weaknesses, such as the fact that the video cannot be paused and analyzed. The video presents important material but it does not make for training purpose.

The development of a Video-Based Interaction (VBI) tutorial model to improve teacher professionalism was conducted by involving the interaction process as an understanding elaboration process involving the role of TWG forum. The stages of the VBI tutorial model are (1) analyzing videos; (2) determining topics in the curriculum; (3) preparing lesson plans according to the topic; (4) discussing the draft of lesson plan in the TWG group; (5) simulating enactment of the lesson plan draft in the form of peer teaching; (6) reflecting on the peer teaching; (7) implementation in each teacher's class and (8) evaluating the improvements.

Research Problem

This study was conducted in response to the results of a preliminary study made to improve teacher professionalism using tutorials on videos which showed that watching the video needed to be followed up in the form of an interaction process to overcome misconceptions and ambiguities in interpretation of the video (Budiastra, 2007). This study was conducted to see the continuity of the teachers' professional capacity building program through the TWG-based Teacher Qualification program using a distance learning system.

Research Focus

This study focused on the analysis of the effectiveness of VBI in the TWG forum in the context of distance learning leading towards teacher professionalism in terms of their teaching abilities. The research questions include: (1) Is there any (statistically) significant effect on teacher professionalism before and after the tutorial process using VBI; (2) What is the category of teachers' teaching ability after the VBI implementation; and (3) Are there any differences in teacher professionalism in teaching science on 2 testing topics.

Methodology of Research

General Background of Research

The scope of this study was the application of VBI in improving teacher professionalism. The study focused on the ability of teachers to teach using inquiry

models in science subjects in elementary school, especially the topic of Simple Electricity and Water. Teacher professionalism was analyzed to determine whether there was any difference in the pre-test and post-test scores. The N-gain calculation used to categorize teacher professionalism based on the high, moderate, or low criteria in 2 test groups. This study was conducted for 10 months in Tabanan, Bali (G1) and East Belitung, Bangka Belitung (G2) Indonesia.

Sample of Research

A total of 36 science teachers in elementary schools were divided into two test groups involved in the tutorial which was the subject of this research. The samples were selected using purposive sampling where samples involved had specific requirements according to the objectives of this study (Annan, Adarkwah, Abaka-Yawson, Sarpong, & Santiago, 2019). Teachers who followed the tutorial were required to be a member of the TWG forum.

Instrument and Procedures

This study employed pre-test and post-test with replication design namely O(Pre-Test) x (Treatment) O(Post-Test), (Fraenkel, Wallen, & Hyun, 2012). Replication involved 2 TWG groups. The pre-test was conducted with teachers before the tutorial and post-test was carried out after the implementation of the VBI by tutors who had been well-trained. Teachers watched and studied the videos about examples of inquiry-based learning scenarios independently before VBI implementation. The implementation of VBI needed planning, video-based pedagogic material, and teacher worksheets. The learning process as a VBI application by the teacher to students used a syllabus, lesson plans, and inquiry-based student worksheets. The steps for implementing VBI consists of (1) analyzing the video; (2) determining topics in the curriculum; (3) preparing lesson plans according to the topic; (4) discussing the lesson plan draft in the TWG group; (5) simulating lesson plan draft in the form of peer teaching; (6) reflecting on peer teaching; (7) implementing the lesson plan in each class; and (8) evaluating the improvements. VBI integrated the stages of innovation tutorial with TWG in the context of distance learning (DL). The VBI mechanism is presented in Figure 1.

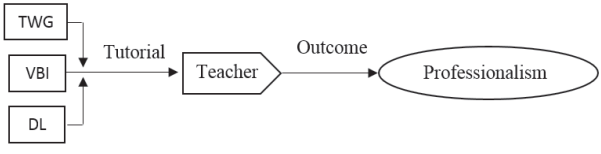

Figure 1. The Implementation of VBI

The components of evaluation of teacher professionalism consisted of (1) planning, the ability to prepare the lesson plan; (2) implementation, the ability to conduct the learning process; and (3) relations, which related to teacher organization of the learning (Qadeer, Tahir, & Chishti, 2018). Planning was evaluated through written assignments while observations were conducted to evaluate the implementation and relations.

The teachers' professionalism score for each component is described as follows. A score of 5 means all indicators were met properly. A score of 4 means most indicators were fulfilled well. A score of 3 means all indicators were met but not well. A score of 2 means most indicators were fulfilled but not well . A score of 1 means a small number of indicators were met but not well. The teacher reaches the professional level if each component obtained at least 4.

Data Analysis

The percentage of score ranges for each stage was interpreted as follows: (1) professional: if the score percentage is >66.67%; (2) quite professional: if the percentage score is <66.67% and ≥ 33.33%; and (3) unprofessional: if the score is < 33.33%. Teacher professionalism can be said to be improving according to the N-gain (post-test score – pre-test score) / (100 – pre-test score) (Hake, 1998). Therefore, the criteria were set as follows: (1) if N-gain ≥ .7 (high), (2) if N-gain is > .3 and < .7 (moderate), and (3) if N-gain is ≤ .3 (low).

The effect of the VBI application through the working group forum in the context of DL to improve elementary school teachers' professionalism was analyzed using the scores obtained in the pre-test and post-test by using a Sign Test statistic to check whether the scores met the requirements for data normality or were non-parametric. The statistical analysis software used in this study was IBM SPSS 22.

Results of Research

The results of this study present the supporting data on the effectiveness of the VBI as a whole as follows: (1) pre-test and post-test teacher professionalism; (2) N-gain professionalism of teachers; and (3) statistical analysis of the effectiveness of VBI. Figure 2 shows the percentage of N-gain criteria for the components of teacher professionalism in the 2 test groups. The percentage of N-gain teachers who got high criteria on the implementation and relation components was higher than on the planning component. Table 1 presents the N-gain value of each component of teacher professionalism. N-gain values of the professionalism

components of planning, implementation, and relation were respectively medium, high, and high..

Table 1 visualizes the average professionalism of each teacher obtained after the implementation of various teaching strategies as a general inquiry routine in the 2 test groups. The initial professionalism test of the teachers showed that they were unprofessional and most indicators were fulfilled but not satisfactory. The mean results in the TWG in Table 1 of the test of teacher professionalism in each group after VBI implementation showed that most indicators were well met.

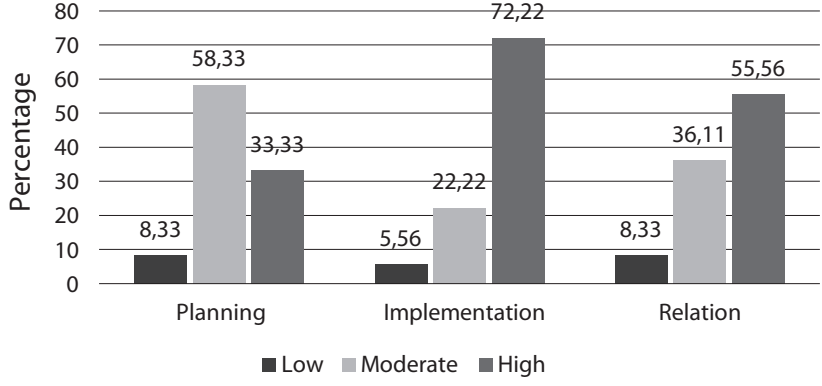

Figure 2. Percentage of N-gain Components Criteria for Teacher Professionalism in Both Testing Groups

Table 1. Average Scores of pre-test, post-test, and teacher professionalism N-gain in both testing groups

Group	Component	Pre-test average score	Professionalism	Post-test average score	Professionalism	N-gain	N-gain level
G1	Planning	42.31	Adequate	78.85	Yes	.6	Moderate
	Implementation	21.15	No	87.18	Yes	.8	High
	Relation	45.51	Adequate	90.38	Yes	.8	High
G2	Planning	26.67	No	78.33	Yes	.7	High
	Implementation	23.33	No	86.67	Yes	.8	High
	Relation	55.00	Adequate	91.67	Yes	.8	High

Statistical analysis of teacher professionalism is presented in Table 2. Teacher professionalism in each component of professionalism in all groups showed the

same results using Sign Test statistics, namely that all 2-tailed asymptotic results were significant ($p < .05$) also in the non-parametric test applied. Table 2 concludes that VBI had a significant influence on teacher professionalism with a significance level of 5%.

Table 2. Statistical results from the sign test on teacher professionalism in both test groups

Group	Components	*N*	Differences		Ties	*P*
			Negative	Positive		
G1	Planning	26	0	26	0	< .05
	Implementation		0	26	0	< .05
	Relation		0	26	0	< .05
G2	Planning	10	0	10	0	< .05
	Implementation		0	10	0	< .05
	Relation		0	10	0	< .05

Table 3 presents statistical analysis of teacher professionalism N-gain. A Sign Test was used in the distribution of N-gain data on the topic of Simple Electricity, Water or other science topics based on non-parametric data.

Table 3. Statistical results from sign test on teacher professionalism N-gain in both test topics

Group	Components	N	Differences		Ties	P
			Negative	Positive		
Teacher	Planning	36	0	5	31	> .05
	Implementation		0	5	31	> .05
	Relation		0	3	33	> .05

Table 3 concludes that there was no significant difference in the level of N-gain in the implementation of VBI in TWG in the context of distance learning towards building the professionalism of elementary school science teachers. The significance level of 5% was attained in each component of teacher professionalism.

Discussion

From the results of the pre-test and post-test, it can be inferred that VBI successfully helped in increasing the professionalism of elementary school teachers in TWG. Table 1 provides information on the initial teacher professionalism

obtained in both test groups before the implementation of VBI in the TWG. The initial professionalism of the teacher was categorized as low because a small or large number of indicators were fulfilled but not implemented well. A weakness in elementary teacher science education is the fact that scientific concepts and how to teach them are two separate subjects. Most lectures in teacher education mostly given by lecturers who had no experience of teaching science in elementary school. Moreover, the lectures run over a relatively short period of time (Hinduan, 2001). This condition leads to the domination of lectures in science teaching in elementary school. Teachers were less able to activate students' thinking process and the lessons provided were not related to students' daily lives (Budiastra, 2007). The TWG was an available source of information. However, the teachers did not participate in it.

The implementation of VBI produced a professional level with average results of professionalism scores in each test group, indicating that most indicators were well met. As far as the application of video is concerned, it was found that videos are not meaningful to the teacher without the presence of an instructor as support for the interaction process. The application of VBI was not only video-based but also involved the teachers' high-level ability to analyze videos. Analysis activity encouraged thinking and elaboration (Erlina, Susantini, Wasis, Wicaksono, & Pandiangan, 2018). VBI implementation encouraged teachers to interact in the form of discussion after watching the learning process in the video. The purpose of the discussion stage for teachers was to get an interaction process between colleagues or people with ability in the relevant fields and forums. The interaction was focused as an elaboration of the video analysis phase presented in the initial stages of VBI. The VBI was not only limited to provision of theories but to how these can be implemented in the classroom.

Planning

The implementation of VBI with elementary school science teachers produced a moderate N-gain on the planning component. The results of the teacher professionalism test at least indicate that most indicators were well met. The planning component showed teachers' ability to design learning improvements. Teachers who had gone through the VBI tutorial were at least able to determine the learning objectives, organize the materials and the learning process, and evaluate the learning scenarios. The moderate N-gain on the planning component indicates that the wealth of knowledge that had been acquired through routine information and experience can produce good science learning planning (Ward & Haigh, 2017). Some teachers, for example in the G1 group, initially had sufficient planning skills,

which may have given them enough information access support for them to learn independently. The N-gain category achieved was supported by the role of TWG in implementing VBI. Teachers were also involved in determining topics and designing science learning scenarios based on relevant contexts through information and communications technology (Rojek, & Leek, 2019).

Implementation

Table 1 and Figure 1 provide information that the N-gain of the implementation component was high and the highest number of teachers received a high- N-gain in this category. Video footage in the early stages of VBI could help elementary school teachers to describe the steps or phases of teaching in a more realistic and interesting way than verbal descriptions. Teachers could observe the video and learn how to teach according to the observation (Slavin, 2009). In the implementation phase in the classroom, the teachers were able to help students understand the importance of the material to be taught and so optimize the achievement of student learning outcomes (Ediger, 2018). The integration of VBI with a distance learning program at the Open University also involved the teacher in the independence of teaching and using learning materials before the tutorial model was conducted. The VBI stage required teachers to implement a lesson plan that had been discussed through peer teaching. The VBI stage ended with an evaluation to achieve compressive teacher knowledge. Then, improvement of teacher professionalism was carried out by the teacher independently. Teachers took the initiative with their resources and activities, independently utilizing the facilities available (Pandiangan, Sanjaya, Gusti, & Jatmiko, 2017). Students do not only think in the learning process but also develop an emotional link to their own classroom (Sántha, 2019).

Relation

The implementation of VBI in TWG in the context of distance learning produced high N-gains in the relations component. The teachers' ability in the relation component at least indicated that most indicators were well met. The pre-test scores in the G1 group were weaker because the social conditions in this area were more heterogeneous and the communication system was more developed. G1 and G2 were both inhabited by a pluralistic population, while G2 had the condition in which the region was dominated by indigenous people. Thus, the initial relation in G2 was stronger. Several VBI stages facilitated teachers in discussion. Discussion activities could construct feedback that comprehensively supported knowledge (Harlen, 2013). In order to improve the quality of human resources, collaboration

can be realized by developing a colleague network through ways such as a distance learning program. Distance learning and virtual learning programs were investigated, developed, and expanded based on the latest technological capabilities even though face-to-face learning still exists (Wicaksono, Matlazim, & Wasis, 2017). The implementation of VBI was a follow up from the Open University which separated universities and teachers to train teacher professionalism as a whole in the TWG forum. Table 1 shows that the G2 group had weaker planning ability than G1. The integration of distance learning in the VBI implementation made the tutorial process easier for widely distributed for teachers in a rural area who had limited ability to increase their knowledge (Davis III, Brestan-Knight, Gillis, & Travis, 2018).

The effectiveness of teacher professionalism in the 2 groups in the components of planning, implementation, and relation showed similar results. Table 2 shows there were differences in teacher professionalism before and after VBI implementation. VBI had a significant effect on teacher professionalism in the G1 and G2 groups with a significance level of 5%. The results of this study are relevant to the results of teacher professional development on an inquiry model. In the short term, professional development training was effective in increasing teacher confidence ($t = -6.57$; $p = .00$), self-efficacy ($t = -5.80$; $p = .00$), and process skill ($t = -5.76$; $p = .00$) (Sağlam & Şahin, 2017). There was no significant difference caused by the implementation of VBI to the teacher professionalism components on the 2 test topics ata significance level of 5%. Table 3 shows the consistency of teacher professionalism using VBI. Table 2 and Table 3 conclude that teachers needed systematic intervention to stimulate their thinking and teaching skills (Jatmiko, Prahani, Supardi, Wicaksono, Erlina, Pandiangan, & Althaf, 2018). The learning model plays a role in controlling cognitive and learning process (Cekić-Jovanović, Đorđević, & Đorđević, 2019).

Conclusions

The results of this study show a way to support the growth of teacher professionalism. The VBI implementation effectively enhanced teacher professionalism in inquiry-based science learning in elementary schools through TWG in the context of distance learning. VBI had the effect of a significant increase between teacher professionalism test scores before and after a tutorial with a 2-tail asymptotic significance of $p < .05$. Teacher professionalism achieved professional criteria consistently on two test topics. The presentation of audio-visual learning models

and information sources through discussion with colleagues was able to improve teacher planning skills in teaching, to implement learning models relevant to the context, and to build relationships that support the pedagogical quality of the teachers.

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