

Characteristics of Effective Mathematics Teachers in Rural Areas

Sumiati^{1, a)} and Jailani^{2, b)}

^{1,2}*Postgraduate Mathematics Education Study Program, Yogyakarta State University, Indonesia*

^{a)} Corresponding author: umisumia@gmail.com

^{b)} jailani@uny.ac.id

Abstract. The aim of this study is to describe the effective of mathematics teachers in rural areas. This description is related to characteristics of mathematics teachers in rural areas, and the teaching skills that mathematics teachers must possess in rural areas. The study is conducted in Central Lombok Regency, West Nusa Tenggara Province in Senior High School, this research consists of qualitative case study type on the characteristics of effective mathematics teachers in rural areas. This qualitative method of the case study is used because the main purpose of this study is to gain an understanding of the characteristics of effective mathematics teachers in rural areas. This study is based on primary data and also secondary data. Primary data is obtained from the field that is by observation, semi-structured interviews, and documentation. Secondary data is drawn from various documents such as teacher data (length of teaching), teacher certification, teacher's competency test scores, achievement is achieved by teachers. The researcher visits the school within a month. The first visiting is consisted of a trip to assess the location, and the researcher make a presentation to the school staff to introduce the research. Subsequent visiting is related to data collection. The findings of this study reveal that the characteristics of effective mathematics teachers in rural areas are the content knowledge and pedagogy (know their subject and how to teach it), loving to work together and life-long learning, having the ability to relate to feedback and reinforcement, good prior academic performance, communication skills, professional competence, learning management strategy, discipline, caring for others, and student evaluation and assessment.

INTRODUCTION

Education is considered as the basis for the development of society. Education has become a necessity in the change of the world now days. The level of education has tremendously gone high mostly in urban areas whereas rural areas is still facing the problem of uneducation [1]. Education is one of the most powerful instruments known for reducing poverty and inequality and for laying the basis for sustained economic growth. It raises the productivity and efficiency of individuals and produces the skilled workforce that is capable of leading economic development [2]. Education is a conscious and well-planned effort to create an atmosphere of learning and learning process so that learners actively develop their potential to have spiritual power, self-control, personality, intelligence, noble character, as well as skills needed by him, society, nation, and state [3].

For many, rural is a subjective concept. People may not be able to define rural, but they claim to know rural when they see it. Rural is often associated with country life, small communities, and restricted access to resources [4]. In line with [5] stated that rural area is, a universally accepted definition does not exist. Different countries have different perceptions of what rural means. [6] stated that "rural places are inhabited by people and are not just spaces mapped for descriptive convenience" (p. 766). In rural villages where literacy rates are still low, and most residents have not progressed because the level of education is only primary school, there is widespread recognition that education represents the only means for their children to access this brighter future [1]. It has been recognized that investment in child schooling is an effective pathway to breaking the vicious circle of poverty over generations. This is true not only in urban areas but also in rural areas, where land has traditionally played a decisive role in

income generation [7]. Indonesia is one such country, especially in Central Lombok regency, Province of West Nusa Tenggara is 3T areas (outermost, leading, and left) [8]. Disadvantaged areas are districts whose areas and society are less developed than other regions on a national scale. An area is designated as a Disadvantaged Area based on criteria: (a) the community economy; (b) human resources; (c) facilities and infrastructure; (d) regional financial capacity; (e) accessibility; and (f) regional characteristics [9].

This is the duty of education which is one of the main instruments of human resource development, so the teacher has the responsibility for carrying out the duty. This is shown in [8] on Protection for Educators and Education Personnel Article 3 paragraph 3 letter (a) that is providing resources. Effective teachers are very urgent in the development of human resources. As set forth in [10], Chapter I, paragraph 1, defines that the teachers are professional educators with the primary duty of educating, teaching, guiding, directing, training, assessing and evaluating learners in early childhood education pathways formal education, primary education, and secondary education.

In a similar vein the purpose of the Teacher Competency Exam (TCE) to strengthen the role of teachers in education implementing [11]. So that teachers are able to provide and improve the quality of education in Indonesia. TCE also be used to map the objective conditions of each teacher so it can be used as important information for the government when it would take the policy relating to the material as well as a strategy to provide the training needed by teachers. However, the reality on the ground results the Teacher Competency Exam (TCE) some Provinces have not reached the Minimum Competency Standards (MCS). West Nusa Tenggara Province is an area that has not reached the Minimum Competency Standards (MCS) that is by mapping the value of the Teacher Competency Exam (TCE) 49.26. From the results of the Teacher Competency Exam (TCE), NTB Province has not fulfilled the purpose of the implementation of the Teacher Competency Exam is to strengthen the role of teachers in implementing education. In addition, change of curriculum in Indonesia brings significant change to the educational aspect of Indonesia. Curriculum Change 2006 (KTSP) to Curriculum 2013 which has been discussed in the last few years, related to the pros and cons of its implementation to the lack of adequate and very short training to the academy practitioners in schools. This curriculum change is also strongly felt by schools. This is evidenced by the results of research conducted by [12] with the title "Implementation of the Curriculum 2013 in State Senior High School 2 Magelang" that the difficulties faced by the teachers in the implementation of Curriculum 2013 related to media, packaging of learning, assessment of student learning outcomes and provide learning resources, while the difficulty in student is to find the source of learning in completing the task. To confirm this study, [13] conducted a study titled "Readiness of Teachers in the Implementation of Curriculum 2013" proves that entering the new academic year 2014/2015, the implementation of this curriculum still faces a major obstacle that must be addressed immediately, namely the issue of teacher readiness as the key to the successful implementation. Some preparation programs have been done by the government, but there are still some obstacles that not all teachers have sufficient competence to implement the Curriculum 2013.

Good teachers understand what students everywhere can confirm: teaching is not just talking, and learning is not just listening. Effective teachers are able to figure out not only what they want to teach, but also how to do so way that students can understand and use the new information and skills [14]. [15] revealed that an effective teacher will always think to look for a better way of teaching. For example, when the level of noise in a classroom interferes with learning, some teachers respond by trying to shout over the noise. Although this is a common response, it seldom works. Effective teachers are willing to explore different approaches. For example, instead of raising their voices, these teachers may pause, using eye contact to quiet their class. [16] stated that, "Teachers who effectively adjust their teaching activities to the level of their students' progress and then gradually lead them to a higher level of mastery. This involves the introduction and improvement of deficiencies in the student skill stage (p. 2)".

[17] that, "effective teachers must spend considerable time and energy planning the activities, materials, and evaluation element associated with teaching the content (p. 12-13)". [18] identified ten essential characteristics of effective teacher good prior academic performance, communication skills, creativity, professionalism, pedagogical knowledge, thorough and appropriate student evaluation and assessment, self-development or life-long learning, personality, talent or content area knowledge, and the ability to model concepts in their content area. Teaching skills are also very important to develop. In line with [19] stated that the characteristics of a teacher were found among the teachers who tended to be good managers, use systematic instruction techniques, have high expectations of students and themselves, believe in their own efficacy, vary teaching strategies, handle discipline through prevention, are caring, are demographic in their approach, are task oriented, are concerned with perceptual meanings rather than with facts and events, are comfortable interacting with others, have a strong grasp of subject matter, are accessible to students outside of class, tailor teaching to student needs, are flexible and imaginative.

[20] identifying nine discrete 'teaching skill' required of an effective teacher: "(1) high expectations; (2) planning; (3) methods and strategies; (4) pupil management; (5) time and resource management; (6) time on task; (7) lesson flow; (8) assessment; (9) setting appropriate and challenging homework (p. 40)". In line with [17] stated that, "Effective teachers (a) engage in quality planning and preparation, (b) prepare a positive classroom environment, (c) use proved instructional techniques, and (d) exhibit professional behavior (p. 12)".

There are seven characteristics of effective human habits that are (1) proactive thinking, (2) having clear goals, (3) good at making and determining priority scale, (4) think win-win), (5) happy to cooperate, (6) pay attention to others, and (7) always learn all the time [21]. Of the seven characteristics of effective human, can be drawn equivalence as effective teacher traits. However, the opinion is not in accordance with the data of the National Exam results of students Senior High School in Central Lombok Regency the last 3 years decreased that is 62.08, 41.32, and 32.18. It shows that in practicing mathematics teacher still cannot be told effective in teaching, so it needs to be studied more seriously. For that researcher will explore the effective High School mathematics teacher in rural areas. Given that effective teachers are very influential on the success of students in learning.

METHODOLOGY

The study conducted in Central Lombok Regency, West Nusa Tenggara Province in Senior High School, this research used qualitative research method with case study type [22]. This method was chosen because the problem studied was about the things which are going on in daily life. In addition, the use of case study in this research was to find out more in depth the existing events in the field about the characteristics of effective mathematics teachers in rural areas. The sampling technique used in determining the data source in this research was purposive sampling technique that is sampling of data source with certain consideration. With certain considerations, the person is considered the most knowledgeable about what was expected by the researcher and is the ruler so it will be easier for the researcher to explore the object / social situation under study [23].

This research is based on primary data and also secondary data. Primary data obtained from the field that is by observation, semi-structured interviews, and documentation. Data collected through classroom observations and interviews with the subject. Secondary data is drawn from various documents such as teacher data (length of teaching), teacher certification, teacher's competency test scores, achievements achieved by teachers. The researcher visited the school within a month. The first visit consisted of a trip to assess the location, and the researcher made a presentation to the school staff to introduce my research. Subsequent visits related to data collection. The researcher interviewed Senior High School mathematics teacher in Central Lombok, West Nusa Tenggara, i.e, IP (mathematics teacher) has a bachelor degree and 12 years of teaching experience in Senior High School. The research data in the form of dialogue transcription of mathematics teacher and the researcher when the interview took place. The recorded pieces of conversation are transcribed for data analysis.

General information about the characteristics of effective mathematics teachers in this research is presented in Table 1.

TABEL 1 GENERAL INFORMATION ABOUT CHARACRETISTICS OF EFFECTIVE MATHEMATICS TEACHERS IN RURAL AREA

The Characteristics of Effective Mathematics Teachers	
1. Pedagogic Competences	
a.	The ability to understand the students
b.	The ability in making lesson plan
c.	The ability to carry out the educational and dialogical learning
d.	The ability to evaluate learning outcomes
e.	The ability in developing learners to actualize the various potentials they have
2. Professional Competences	
a.	Understanding the teaching materials that exist in the school curriculum
b.	Being able to understand the concepts/ scheme of mathematics subjects.
c.	Implement all the concepts that exist in everyday life.
3. Social Competences	
a.	Having good communication skills

b. Being glad to cooperate and interact with others
c. Discipline in doing work
4. Good Qualification Academic
a. Have a minimum level of education that must be fill: 1) Diploma four (D-IV) or bachelor (S-1) 2) Being Higher education background with educational programs that match the subjects taught 3) Professional certificate of teacher for SMA/MA
b. Attended the training / workshop of mathematics teacher
c. Having a long teaching experience

In this research, the data validity was done by through extension of observation and triangulation. With the technique of extension of observation means the researcher returns to the field, make observations, interview with the research informants who had met before and with new informants. According to [24], the research using triangulation techniques in checking through the source means to compare or re-check the degree of confidence of information obtained through different times and tools.

RESULT AND DISCUSSION

The data was collected through interviews, the researcher analyzed verbal data which was a narrative observation. In the interview session, all the teachers gave the answer as the researcher expected, and the researcher has learned many things from them about an effective teacher in leading the class and improving the students' skills in the classroom, the researcher has tried to focus on the characteristics of effective math teachers and they provide excellent and detailed answers.

The finding which is from interviews is a school should implement life-long learning initiatives that require teachers to plan, carry out, and summarize and review their professional development. The learning must be adapted to the entire pupils so that everyone receives something tangible that can be applied in their own unique teaching situations. This progression of life-long learning can become a part of teacher evaluations and an expected component of continued employment. The same thing can be said for the field of mathematics education. Although professional growth seems to be a required component of the mathematics teachers' professional life cycle, not much research has shown an association between professional development and students' mathematics achievement. Teacher preparation programs should focus on theories of mathematics education and how to plan the lessons and the teaching should be appropriate for their lesson plans. Effective mathematics teachers require communication skills as a means of conveying information effectively, yet current teacher programs require usually only one introductory course in psychology and communication.

In an effort to produce more effective mathematics teachers, some difficulties are encountered. Some teachers claim that many students at the secondary level have a weak foundation of basic Mathematics skills. Some teachers also stated that students' interest in learning Mathematics is a major problem. A teacher even sternly states that many students hate Math. Some teachers mention the importance of having the good professional competence and good academic performance. Knowledge of content and pedagogy (know their subject and how to teach it), along with good planning, clear goals, and communication skills, learning management strategies and have the ability to relate to feedback and strengthening, evaluate and assess students, and consistently high expectations and realistic with students is an important factor to be an effective teacher in teaching Mathematics. The findings of this study indicate that the teaching experience of teachers is very influential in making positive changes in teaching practice. It is clear from the study that effectiveness of classroom instruction originates from the teacher. Mathematics teachers have to be well-prepared, well-versed, and thoroughly supported for changes in the curriculum and instructional strategies to occur.

The teachers are central to effective mathematics teaching and indicate that there are also factors influencing teachers' effectiveness in teaching Mathematics in rural areas related to the competencies they possess and must be developed continuously. Effective Mathematics Teaching Factors presented by [25] is the most important factor contributing to the teaching of mathematics teachers derived from mathematics teachers themselves, whereas the school context or school administration seems to affect the effectiveness of teaching to a minimal degree. In other words, effective mathematics teaching should be accompanied by in-depth teacher knowledge of the subject

matter, their understanding of what optimizes student learning, and the practice of classroom learning. So the teacher's teaching skills include knowledge of the content of materials and pedagogy, planning, methods and strategies, students' evaluation skills, critical thinking, and communication. In addition, the mathematics teaching factor comes from the teacher's knowledge of the subject matter and the learning practice.

Based on the observation result in the classroom, the effective mathematics teacher in delivering the mathematics material has characteristic personality trait and personal style that is good sense of humor and able to communicate well so that learners feel happy to learn. In addition, math teachers have knowledge of pedagogy (understanding the material and know how to teach it). In line with [26] stated that "Dimensions of effective teachers are 1) academic qualification and publication, 2) preparedness and subject knowledge, 3) personality trait and personal style, 4) connectedness with students, 5) motivation and enthusiasm, and 6) classroom operation" (p. 113). The researchers also found that mathematics teachers were able to carry out learning that was educational and dialogical in terms of learning management strategies, mathematics teachers have been able to design effective learning by using instructional media. Preparedness and subject knowledge have been well-prepared and well-organized. Teachers are able to open the lesson well and able to evaluate and evaluate the students.

Effective teachers have good academic qualifications. Academic qualification is a requirement for teachers which must be owned. The qualification in question is the minimum level of education that must be met by an educator, evidenced by a relevant diploma or certificate of expertise in accordance with applicable legislation [27]. As according to [28], academic qualification is the level of formal education that has been achieved, including degree education (S-1, S-2, or S-3) or non-degree education (D-I, D-II, D-III, D-IV or Post Graduate Diploma) can be obtained either local or abroad. Based on the opinion above, the researcher compiled a list of documents that could prove the academic qualification of effective mathematics teachers in rural areas. The researcher took 3 standards of academic qualifications and teacher competencies that educators should have: a) a minimum education qualification of Diploma Four (D-IV) or Bachelor (S-1); b) High education background with the educational programs that are appropriate to the subject which is being taught; and c) The teacher professional certificate for Senior High School/ Islamic Senior High School. Thus, the researcher obtained the data in the form of a diploma (S-1), educator certificate. The researcher also obtained the data in the form of a training certificate that had been followed by a mathematics teacher during his/ her teaching experience as the teacher.

The last data retrieval technique is to conduct interviews. This technique is done to complete the data of observation and documentation. The findings data obtained from interviews with mathematics teachers related to pedagogical and professional competence are:

"Usually I do the preparation of learning since the beginning of the semester, then do the development of learning media to support the learner activities, provide feedback and strengthening and conduct evaluation and assessment. In order for learning to be conducive, before the start of learning, we first set the bench in such a way we adjust the conditions and methods of learning, for example, if we arrange the discussion of the location of the bench so that students comfortable discussing with their respective groups"

"To enforce discipline, I get used to entering the class on time so it can be imitated by learners. In the learning process, I provide a material stimulus to students. After that, I give the examples of problems discussed together. This is done to instill communicative value, respect, responsibility, critical thinking, hard work, creative and curiosity. I give a conclusion to the material that has been studied. Then provide motivation to students who are less active in order to study diligently"

"I think the evaluation is very necessary to be held for example by holding a daily test or assignment, both individual and group tasks. I rate students' work by way of swapping it around. This is done to instill the value of honesty and responsibility. I do evaluations at all times and continuously not only in the classroom but also outside the classroom/ outside the school environment. I monitor how it works when doing group work, tolerance to other students or to good teachers or not, student behavior during breaks and when school comes home. I often reward even if only in the form of applause and motivate to be more enhanced"

In this study have some limitations. First, this study only just looks at pedagogic competence and professional competence. Second, the issues raised in this study are only the characteristics of effective teachers. Therefore, future research can be done by raising exactly the same problem and more research subjects (if possible). But it will not be easy to do because to find an effective mathematics teacher is not easy job in rural areas.

CONCLUSION

To conclude, to be an effective teacher is not easy duty. The fact, it is a complex process. It is not only concerned with success in short-term, but also the success of long-term achievement. Effective teachers in rural areas need to have a good professional competence and good prior academic performance. A knowledge of content and pedagogy (know their subject and how to teach it), together with good planning, clear goals, and communication skills, learning management strategy and having the ability to relate to feedback and reinforcement, student evaluation and assessment, and consistently high and realistic expectations with the students are essential factors to be effective teachers. Besides, they need to feel responsible for the students learning the process, regardless the students' aptitude to learn. Effective teachers in rural areas should discipline and be caring for others as well as having effective personal and professional skills especially for organizing class and developing students personalities and serve as an example of life-long learners. Each of these characteristics is a valuable tool for effective mathematics teachers and can help him or her to create the healthy, excited, and motivated classroom. Furthermore, as a change in the real world is inevitable, it is therefore vital for Mathematics teachers to constantly learn and update their instructional practices so as to promote and equip students with the required mathematical understanding to meet the challenges of the 21st century.

ACKNOWLEDGMENTS

The researcher praises gratefully to Allah, the Almighty who has given a great blessing to me so that the researcher can finish this paper. The researcher realizes that this paper is far from being perfect. Then, I would like to express my greatest gratitude to my advisor, Dr. Jailani, M. Pd. who always guide and give his valuable advice and suggestion. I would like to give my greatest gratitude to Senior High School in Central Lombok Regency, West Nusa Tenggara Province that have helped the researcher to conduct the research and collect the data and my beloved parent, my beloved husband who helped the researcher finish this paper. The researcher wishes that the result of the research could give contribution to the reader, so the researcher expects some suggestions and critics of this paper for the better result.

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