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The 4th
International Conference On
Educational Research and Innovation

**Research, Education, and Innovation
for Development High Quality and
Humane People**



**CONFERENCE
PROCEEDINGS**

Institute of Research and Community Services Yogyakarta State University
May, 11-12, 2016

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Phone : (0274) 550839.

e-mail : lppm@uny.ac.id

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Edited by

Dr. Slamet Suyanto

Dr. Ing. Satoto Endar Nayono, M.Eng., M.Sc. (Res.Eng)

Retna Hidayah, M.T., Ph.D.

Losina Purnastuti, SE., M.Ec.Dev., Ph.D.

Dr. Sugito, MA.

Prof. Anti Kolonial Prodjosantoso, Grad Dip.Sc., M.Sc., Ph.D.

Adi Cilik Pierewan, Ph.D.

Dr. Margana, M.Hum.

dr. Novita Intan Arovah, MPH

Apri Nuryanto, MT.

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MESSAGE FROM THE RECTOR OF YOGYAKARTA STATE UNIVERSITY

Assalamu'alaikum warahmatullah wabarakatuh.
May peace and God's blessings be upon you all

Welcome to Yogyakarta, Indonesia!

It is a great honor and pleasure for me to welcome you all to the 4th International Conference on Educational Research and Innovation held in Yogyakarta, Indonesia. On behalf of Yogyakarta State University and the committee, let me extend my warmest greetings and appreciation to all speakers and participants who have traveled hundreds or even thousands of miles by various transportation means to come to Yogyakarta to attend this conference. It is my strong belief that your safe journey has been due to the blessings granted by God the Almighty and the Most Merciful to Whom we without any further due have to express our gratitude and praise.

It is indeed a privilege for Yogyakarta State University to have the opportunity to organise this very important conference in which educational researchers and practitioners get together to share ideas, experiences, expectations, and research findings. This conference is held as one of the items in the agenda of Yogyakarta State University to celebrate its 52nd anniversary.

Research is one of the activities among the academic members of a university. It is a systematic effort to solve the problems or answer the questions by collecting data, formulating the generalities based on the data, then finding and developing organized knowledge by scientific method. It is expected that from research activities valuable empirical facts can be obtained to improve and develop the theory and practice to bring a better quality of education.

In line with it, the advancement of science and technology, sport, languages, and art should be dedicated to not only facilitate the human life, but also to educate human beings themselves with values to be high quality beings, good citizens, and more humble people to God. If we produce a gun, it may kill people; if we make insecticide, it may kill insects. However, in the hands of good people, the gun may be used to protect them from a maniac; bioinsecticide can be used to protect crops from harmful insects. The quality of human beings is the key to using or applying the advancement of science, technology, languages, sport, and art.

The fourth International Conference on Educational Research and Innovation (ICERI) aims at bringing together researchers, educators, scientists, engineers, and scholar students to exchange and share their experiences, new ideas, and research findings about all aspects of education, research and innovation, and discuss the practical challenges encountered and the solutions adopted to develop humanity and the quality of human life. In response to this, in this year to support the roles of the Institute of Research and Community Services of Yogyakarta State University in encouraging researchers to conduct high-quality researches, an International Conference on Educational Research and Innovation (ICERI) is held under the umbrella theme of "Research, Education, and Innovation for Developing High Quality and Humane People." It provides teachers/lecturers, education practitioners, college students, and policy makers the opportunity to share their knowledge, experiences, and research findings which are innovative and relevant to develop the educational practices focusing on the process and product.

At the end of my speech, I would like to kindly request the Rector of Yogyakarta State University to officially open the conference.

To conclude, let me wish you a productive discussion and a fruitful conference.
Thank you very much for your attention.

Wassalamu'alaikum warrahmatullah wabarakatuh.
May peace and God's blessings be upon you all

Yogyakarta, 11 May, 2016
Head of Research Institute and Community
Service of Yogyakarta State University

Dr. Suyanta, M.Si.

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BENEFITS MATHEMATICAL MINDSET OF MANAGEMENT EDUCATION

Lusi Rachmiazasi Masduki¹; Eem Kurniasih²

^{1&2}Dosen UPBJJ-Universitas Terbuka Semarang
lusi@ut.ac.id; 2ekurniasih@ut.ac.id

Abstract

The existence of mathematics in schools aim to equip students to be able to think and reason in drawing conclusions. It is also to develop the creative ability to solve problems by using the mindset that a logical, systematic, and effective. This capacity is expected to be the provision sensitizing learners when dealing with various phenomena of life problems. Moreover, as a mathematics teacher should be increasingly sensitive to the cause of the success or failure of the learning that has been done. As a leader who has mathematical abilities are expected to use mathematical mindset that can mengelola education maximally as expected the vision and mission of the institution. For example, employment at all establishments or institutions, usually tailored to the skills of the workforce, so that the expected goals these institutions can be achieved. Workforce skills can be measured, among others, through the evidence of diplomas or training certificates have been followed. Labor or human resources (HR) is a major asset of an organization, so that the necessary maintenance of the assets on a regular basis with a serious handling. But in reality, not all institutions aware of the importance of the maintenance of the asset has been owned.

Through the Ex-post facto research aims to find out what is the cause of many teachers who have been certified lecturers even still less qualified in performing basic tasks and functions (TOR) it. Interviews were conducted with students who come in Distance Learning Program Unit (UPBJJ) Open University (UT) Semarang also as a teacher. Respondents are teachers in elementary, junior high school or equivalent in a variety of areas that are in the area of Semarang. The interview was done in the period of approximately 4 years on each working day, 5 days a week and on average there are 2 to 3 guests consult students about various things about the education being undertaken at UT. The interview was to ensure the participation of teachers in training to career development as enhancing the competence and quality of self. The question asked among other things, what are the needs of teachers can improve their competence and career.

Respondents who have reported to have been involved in training that leads to the career development of teachers, as many as 148 of the 163 teachers, this is equivalent to 91%. This means that only 15 teachers who claimed to have participated in various training, among others, following the introduction of the curriculum in 2013, although in the end in schools where teaching is not used anymore. This statement shows that teachers lack a strong foundation of science keguruannya and requires a lot of preparation to be well qualified. In addition, there is no equalization of training and training programs are planned both for short term and long-term care on career development for teachers.

These findings are evidence that there has been a wrong prediction, whether by simply encourage teachers to continue their studies to a higher level can automatically transform and improve the competence of teachers which is useful for the development of his career. When we use the logical mindset will know the answer, why many teachers especially those who have obtained the certification have not been able to perform optimally tupoksinya. Why have not planned equalization institute training programs that can improve the quality and competence of knowledge, attitudes, and skills of teachers? What exactly is required teachers to improve their competence and her career? Actually, when we were able to take advantage of the use of mathematical reasoning and mindset then we have the sharpness think logically to solve the existing problems. Besides a mathematical mindset is actually very affecting work patterns are expected to achieve the vision and mission of the institution as well as in educational institutions.

Keywords: mathematical mindset, training, education management

1. Preliminary

The existence of mathematics in schools has the purpose of providing supplies to the students to be able to think and reason in drawing a conclusion. It is also to develop the ability to think creatively to solve problems by using the mindset that logical, realistic, systematic and effective. This capacity is expected to be equipped to cultivate learners' sensitivity when dealing with various phenomena of problems that occur in life. Especially when someone served as a mathematics teacher should be increasingly sensitive to the cause of the success or failure of the learning process that has been done. When someone on duty as the leader of the institution that has had the mathematical ability is expected to use his mathematical mindset. Furthermore, it can manage education maximally as expected the vision and mission of the institution. For example, employment at all establishments or institutions, usually tailored to the skills of the workforce so that the desired objectives these institutions can be achieved. Workforce skills can be measured, among others, through the evidence of diplomas or training certificates have been followed. Labor or human resources (HR) is a major asset of an organization, so it is necessary attention and maintenance of the assets on a regular basis with a serious handling. But in reality, not all institutions aware of the importance of the maintenance of the asset has been owned.

Human Resources Management which is often referred to as a personnel management is an acknowledgment of the importance of the human element as a resource of considerable potential and is crucial in an organization or institution, and should be motivated and developed so as to provide maximum contribution to the institution as well as for his personal development.

Currently we are in an era filled with change, and the demands of a highly dynamic environment that is being faced by the management of education. If we are sensitive to this phenomenon it needed a leader who has the education and able to use mathematical mindset. Leaders who are able to provide educational opportunities, training and further study for educators. Educators who have the innovative spirit will be creative and dare to challenge the future. Creative educator can quickly and always ready to deal with the problems that arise despite the very complex.

Keep in mind that the quality of graduates that cannot possibly be achieved without good quality teachers. We all understand that the

environment also affect the educational process include: educators in schools; parents at home; and communities where children grow and develop [1]. Besides an educational institution requires a manager or a leader who acts as policy. The leader is someone who can manage the implementation of the learning process at school, and attaining the objectives that have been defined previously. Leaders of educational institutions should be someone who can plan, organize, organizing clear, to supervise the learning process so accomplished and achieved according to the learning objectives [1].

The fact shows that there are still many educators who have qualified are separated from the leadership oversight. If this is allowed, without direction, without guidance, without training, what happens if the increasingly growing in number. Anyone who currently carry out the mandate became the leader should be able to become a wise leader and responsible for duties.

By utilizing and also based mindset mathematical expected leaders as well as education managers were able to find the cause of the problems of education. In the implications of mathematical logic, there is a compound sentence " $p \Rightarrow q$ " read "if p then q", only the antecedent is false when it is correct and cosequent is wrong. That is the logical thinking, we will be able to distinguish and criticize the events that occurred at this time. Do the events are reasonable and consistent with science or not? Not only that, a learner should also be trained to think critically so that he is capable of processing phenomena that received by the sensory system to be able to bring a variety of questions related and intriguing to look for the answer. Furthermore, the need to think about, whether the mathematical mindset can be utilized for the management of education?

The phenomenon happens, the government has provided a certificate to educators who are lucky to have an impact on the increase in income and welfare. However, it is unfortunate that not all educators are certified educators who are able to demonstrate the quality of performance. Next comes the critical questions such as, what might be causing less qualified educators: 1) what is actually needed by educators? 2) whether further study, sure to be a qualified educator? 3) whether the strong educational foundation can make the qualified teachers? 4) whether the training can be made more qualified educators?

2. Method

Ex post facto research method is used as one type of approach in research and often referred to *after the fact* means this research is done to determine the cause of the events that have occurred. The study also aimed to explore the causal factors that can influence it.

The events that actually occurred "many teachers are less qualified in carrying out performance". *Ex post facto* research is a systematic empirical investigation and investigators do not control the independent variables directly because the realization of these variables has taken place [2]. The independent variable *ex post facto* is a variable that cannot be manipulated as an example of the need educators such as training and development which has been followed and all of it is already happening. *Ex post facto* study methodically tested the hypothesis as well as in experimental research, but did not give specific treatments.

This research is used to reveal what the causes are still many educators who are less qualified in carrying out or performance of their duties and functions as a teacher. How should leaders manage education? Have the leaders associate educator needs with quality performance? If there is already feeling ever hooking, the solution look like?

Data obtained through observations and interviews with teachers who become students of the Open University teachers college who come alone to the office UPBJJ Semarang and is conducting the registration of courses teaching practice.

Excess *Ex Post Facto* research methods will yield useful information about the nature of a phenomenon. Moreover, it can also be used to improve strategies in the management of education. From planning, implementation and evaluation of existing programs [3]. In this research unearthed information about the needs of educators and involvement in training and coaching that leads to the career development of teachers. The subject of research as much as 163 teachers. 148 teachers reported to have been involved in training and coaching aimed at improving the career educator. This is equivalent to 91%, meaning that only 15 teachers or (9%) who claimed to have participated in various training, among

others, following the introduction of the curriculum in 2013, although in the end in schools where teaching is not used anymore. This statement shows that teachers lack a strong foundation of science teachership and requires a lot of preparation to be well qualified. In addition, there is no equalization of training and training programs are planned both for short term and long-term care on career development for educators, especially teachers.

Disadvantages *Ex Post Facto* research methods, there is difficulty in determining the cause of the relevant factors; there is a major weakness of the study design *Ex Post Facto* in the absence of control over the independent variables; difficult to determine cause and effect when the relationship between the two variables have been revealed [3]. Although there are weaknesses in the results, but there are weaknesses that can be exploited for the development of further research.

Through observation and interviews, found a direct answer that "I wanted to be involved to follow the training as a field of study that I teach." When the unmet needs of educators then certainly be a further reduction in the low learning outcomes of learners.

3. Result and Discussion

These findings are evidence that there has been a wrong prediction, policy makers thought to encourage teachers to continue their studies to a higher level can automatically transform and improve the competence of teachers which is useful for the development of his career. The benefits of using such mathematical mindset to think logically and realistically it will know the answer. Many teachers especially those who have obtained the certification has not been able to carry out their duties and functions optimally. Public and private educational institutions have not been many who try to plan a training program, which can improve the quality of coaching competence knowledge, attitudes, and skills of teachers. Actually, it takes teachers are training and coaching programmed and continuously continuous to improve the competence and her career. Actually, when we were able to take advantage of the use of mathematical reasoning and mindset then we have the sharpness think logically to solve the existing problems. Besides a mathematical mindset greatly affect the pattern

of each individual, which is expected to achieve the vision and mission of the institution as well as in educational institutions.

This type of logic must follow the line of reasoning based on experience or reality. That is, if there is no evidence then the conclusion is not necessarily correct or exact. Thus, we are not going to trust a conclusion which is not based on experience or capture reality through the senses.

Based on research and other sources can be concluded that the challenges faced by the manager of Human Resources outline is as follows: (a) economic and technological development; (B) the availability and quality of labor; (C) settlement with the problems; (D) the restructuring of the organization or institution [4]. This means that in every educational institution with the status of educators are human resources that teachers and principals as leaders all require welfare and spiritual birth that makes peaceful and comfortable and not feel outdated or inferior when carrying out tasks profession. In addition, the availability of facilities and infrastructure is expected to support as well as support the work so as to improve the quality of manpower in this case the teachers and principals. Challenges and problems of population often cause movement of workers. In addition, as human resource managers need to pay attention to the organizational structure of the institution in order to clear the duties and obligations of each individual.

Therefore, in managing human resources into something that is crucial for the success of an educational institution. Failure to manage it will have an impact on the difficulties agencies face challenges in the future. When there is a presumption that the moral decline and the low quality of graduates was caused by the poor quality of teachers, then we should be able to open our eyes to the complex problems that exist. Thus the educator in this respect as a teacher and higher again as a lecturer, must understand the ins and outs of education. Qualification is not the main guarantee of the success of teaching but a defining experience, such as the sensitive teacher choose the right method, motivating learners in accordance with the mental development of children, providing feedback in the learning process.



Figure 1. Portrayed of Teachers Condition

Teachers are not qualified

Indeed, not all teachers have not qualified, but all parents to put children to school will definitely choose a quality educational institutions. Parents as representatives of the people always look carefully who heads his school and who will be the teachers who teach at the school. Leaders or principals and teachers who are qualified community expectations. Often an agency only hope as soon as teachers follow further studies and then graduated after that it should be able to teach in a professional manner in order to be a good institution accreditation. None the less, when policymakers or leaders using mathematical logical thought patterns, and realistically it will be realized that the teachers that now there are many that are not generated by the school teacher education equivalent to high school. Why is that, because of school education as a vocational school teacher who is really able to prepare prospective educators have been dissolved since 1990. Whether we realize it or not this is the cause of less powerful foundation as a key condition foster educators. Psychology of child development and pedagogy is not learned from the beginning. Already more than a quarter of a century no one has thought of another school as his successor. Until now, that can be felt is the negative impact that very many of them, 1) among primary school students a lot going on teasing and less tolerance; no exemplary attitude of mutual respect among friends. 2) teachers who are now many backgrounds bachelor's degree, but if traced his high school education does not come from the school of teacher education has an impact on the performance of less qualified.

For teachers whose background is not undergraduate education has been required to take undergraduate education in accordance with the task in order to teach. Let us think together, eg "p" (teachers have a strong foundation) or (teacher training and coaching) or (teacher follow-up studies) and "q" (qualified teacher). The mindset of mathematics would run like this "if the teacher has a strong foundation, so the teacher will be qualified"; "If the teacher training and coaching so teacher will be qualified"; "If

teachers follow-up studies, so the teacher will be qualified".

What would happen if the teachers lack strong foundations have never received training and coaching as well as not have the opportunity to participate in further studies. Moreover, not all educational institutions aware of the importance of programming training for teachers to become "qualified teacher" or "professional teacher".

It is expected to meet the needs of the standard form of training certified educators will produce a quality performance. If you want a quality institution continuously, there is no other way to be able to improve the management of human resources as well as continuous investment. Training will be successful when the needs of resource management. Why do not many institutions that implement training programs, because they thought with further studies teachers can automatically Pinter himself. Though necessary perception to fit the expected goals of the institution. In addition, many institutions think teacher training is a waste of money, so it is considered unnecessary.

Math Logic

Before we understand the logic of mathematics, we need to know in advance the definition of that logic. Logic is derived from the ancient Greek word *λόγος* (logos) which means that the results of consideration of the mind is expressed through words and expressed in language. Logic has several benefits, among others [5]:

- 1) Help everyone who studied logic to think rationally, critically, straight, consistent, orderly, and coherent.
- 2) Improving the ability to think abstractly, accurately, and objectively.
- 3) Add intelligence and improve thinking skills sharp and independent.
- 4) Compel and encourage people to think for themselves by using the principles systematically.
- 5) Increasing love for the truth and avoid mistakes in the way of thinking.
- 6) Able to perform analysis of an event.
- 7) When it is able to think rationally, critically, straight, and analytical as mentioned in the first point it will increase a person's self-image and potential.

Now that we know about our logic will be easier to study mathematical logic. Here are the things that concerns the mathematical logic.

Mathematical Logic will provide a foundation on how we draw conclusions. When we study the mathematical logic will then have

the ability to take and determine which conclusions are right or wrong. In mathematical logic there are implications organize our mindset.

4. Implication

The implication is a mathematical logic to the concept of suitability. Both statements will be connected using the symbol (\Rightarrow) with the meaning of "if p then q" it means "p" as the cause (antecedent) and "q" as a result (consequent). For more details will be explained in the following table [6]:

P	q	$p \Rightarrow q$	Logika matematika
B	B	B	If the cause is TRUE then the result is TRUE conclusion is considered TRUE
B	S	S	If the cause is TRUE then the result is WRONG conclusion is considered WRONG
S	B	B	If the cause is FALSE then the result is TRUE conclusion is considered TRUE
S	S	B	If the cause is FALSE then the result is FALSE conclusion is considered TRUE

Logic as withdrawal conclusion

In the mathematical logic there are some legitimate conclusion, among others [6]:

1. Modus ponens inference,
Statement 1: $p \Rightarrow q$: true
Statement 2: p : true
Conclusion : q : true
2. Mode tollens inference,
Statement 1: $p \Rightarrow q$: true
Statement 2: $\sim q$: true
Conclusion : $\sim p$: true
3. Syllogism inference,
Statement 1: $p \Rightarrow q$: true
Statement 2: $q \Rightarrow r$: true
Conclusion : $p \Rightarrow r$: true

Mathematical mindset based on mathematical logic is to train the sensitivity of thinking. Let us use the sensitivity of this thinking in the management of education in our place of duty. Critical thinking is a deepening awareness and intelligence comparing of several problems that are and will happen so as to

produce a conclusion and the idea to solve the problem. Everyone has a different mindset. However, if everyone is able to think critically, problem they face would be more simple and easy solution.

5. Conclusion

Reforming mindset is a provision for decision-making and action in solving the problem wisely. Utilization of mathematical mindset to train sensitivity to various phenomena, especially in the management of education. If you dare to look at the development of countries that have developed, the leaders there are very concerned about education. When policy holders in this country is able to care for improving the competence of teachers and educators is also a lecturer, it can be guaranteed that our country must have soon lunched forward beyond the state that has developed. In essence, each individual is a leader. A wise leader is a leader who is able to understand and meet the needs of the people being led as an investment and a form of responsibility in the world and the hereafter.

As a suggestion, for educators should you keep the spirit and not easily give up to reach the expectations that is to educate students. If you as a leader should be able to meet the needs of co-workers around you. Besides able to sharpen directions for all the people being led. If expect educators of quality, there should be a training and education program planning continuous and sustained as a provision for carrying out the duties and functions of educators as they should. Each program shall be implemented and evaluated in order to know the value of successes and failures of programs that have been compiled. More importantly, the need to build a strong and solid foundation for educators through similar vocational school teacher education in high school, because it was 26 years ago the school was closed and no one has thought instead.

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