

THE IMPACT OF QUANTUM TEACHING STRATEGY ON STUDENT ACADEMIC ACHIEVEMENTS AND SELF-

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ABSTRACT

Purpose – This research was aimed at showing the impact of a teaching strategy called the Quantum Teaching Strategy on students' academic achievements in two school subjects, namely in Bahasa Indonesia and Science, in comparison to that experienced through classes using a conventional teaching strategy. This research also examined the role of self-esteem on the students' academic achievements in both the subjects in inclusive schools in Indonesia.

Methodology – This research was a quasi-experimental study on two intact groups of sixth graders of two different inclusive schools. The sample was assigned through multi-staged cluster sampling from 78 elementary schools in 15 sub-district areas. The data on student academic achievements was collected by means of tests, while the data on self-esteem were obtained through a questionnaire. T-test was used to analyze the different impacts of the Quantum Teaching Strategy and conventional teaching strategy on the academic achievements of students, while ANCOVA was applied to determine whether the students' self-esteem influenced their academic achievements in Bahasa Indonesia and Science.

Findings – The t-test showed that the Quantum Teaching Strategy had a better impact on both Bahasa Indonesia and Science achievements as compared to the conventional teaching strategy.

Significance – Findings of this study can be used as a guide for planning and using Quantum Teaching Strategy in teaching and learning Bahasa Indonesia and Science in inclusive schools.

Keywords: Quantum teaching strategy, academic achievements, self-esteem.

INTRODUCTION

The teacher is a key factor in education performance (Furqon, 2007). A good teacher has the following two attributes: a good personality and a qualification. Kyriacou (2001) found that the most important characteristics of a good teacher were his/her personality and will, intelligence, tact and sympathy, open mindedness, and sense of humor. In addition, a teacher was also required to master pedagogic competence in a wide range of teaching skills or strategies. A good teaching strategy would bring about better learning outcome on the part of the students.

Unfortunately, the evidence shows that most teachers are not able to meet the requirements of the expected profile of a good teacher. Buchori (2007) commented that most teachers taught mainly by transferring the materials listed in the curriculum rather than guiding the students to learn how to learn. Since the conventional model of teaching holds the belief that the teacher is more knowledgeable and should control the students, the resultant instruction does not naturally develop the students' creativity. In this conventional standpoint, it is assumed that students learn when they are taught. For such teachers, learning is merely about gaining knowledge from the teacher. This model of instruction is regrettably, still dominant in classrooms across the world (Watkins, 2003).

Such a strategy of instruction, however, does not assure quality education, particularly in today's classrooms where students are increasingly more diverse. Teachers' dry attention and limited

understanding of their students' individual needs are typical during the instructional process. Sandkull and Heijnen (2005) described the situation whereby many schools did not provide equal education for all students. As a result, many students became maladaptive, were seen as underachievers who experienced low self-esteem, and eventually they dropped-out of schools. A research on the identification of underachievers in Indonesian schools by Mulyono Abdurrahman (2006) showed a surprising prevalence of learning disability; there were 16 percent to 41 percent of students in the elementary schools who suffered from this predicament. In another study, the Badan Pusat Statistik (2005) revealed that every year, the student drop-out percentage was 0.81 percent in elementary schools, 4.33 percent in junior high schools, and 7.62 percent in senior high schools.

The underachievers with learning problems in schools, more often than not, experienced low self-esteem. Many of these students were characterized by poor personal efficacy, which was related to their confidence in the ability to think, consider, choose, and make decisions. In other words, they showed low confidence and self-respect on their own and from other persons' perception as well (Brandon, 1992). Emi Dasiemi and Gunarhadi (2008) carried out a research in an inclusive elementary school where 68 out of 562 children identified as children with special needs were included for educational services. The research found that these children with special needs experienced low self-esteem due to one or the following combined cognitive, motivational, and other handicapping conditions. This was also true in the study by Owens, Stryker, and Goodman (2004) who emphasized that self-efficacy was related to academic role performance. They pointed out that the students with high self-esteem showed higher performance in schools. Conversely, students with low self-esteem showed a low performance in their daily activities and were expected to also show low performance in the future.

These underachieving students showed poor academic achievement because they experienced the conventional way of teaching. The instructional strategy used in teaching Bahasa Indonesia and Science did not fully facilitate the creative development of the students. The reason was that conventional teaching did not develop the experiential, contextual, and collaborative ways of learning

as it was expected in a constructivist teaching strategy (DeVries, Zan, Hildebrandt, Edmiaston, & Sales, 2002). A fixed seating arrangement, a text book approach, and a learning environment where teachers dominate, characterize the conventional way of teaching. Arguably, the academic achievements in these two subject matters in the inclusive schools did not reflect the presence of high level-cognitive processes.

In inclusive schools, children with special needs were placed in classrooms together with the normal students for the same educational services. It would seem strange but nevertheless the reality that Bahasa Indonesia and Science were taught mostly by the lecture method, instead of inquiry or discovery learning methods in the inclusive class. The children with special needs, as can be expected, found it hard to achieve in the same way as the other normal children. Such children were even worried about their poor achievements, since these two subject matters were tested in the national examination. It therefore, was not surprising to find that children with special needs were psychologically depressed. Already overlooking these students', by nature, limited cognitive skills, the traditional method of teaching still expected them to keep up with other students in learning the two important subject matters. Hence, to promote their academic achievement, it is necessary to introduce an innovative teaching strategy. The Quantum Teaching Strategy is one of innovative teaching strategies which can improve their academic achievement and enhance better self-esteem.

Originally, the term Quantum comes from the word "quanta" referring to an indivisible entity of energy. It referred to a quantity or amount (Joseph, David, & Guralni, 1958). It is a term characterizing the excitation of a wave or field connoting fundamental particle like properties such as energy or mass momentum, and angular momentum for this excitation (The World Book Encyclopedia, 1956). The term was first applied to the amount of electricity or energy of magnetic rays that no longer can be parsed, known *as photons*. The photon constitutes the basic ray of particle, is spherical in shape, and is the smallest unit of light. It refers to an indivisible entity of energy. Meanwhile, Max Planck (in Gamow, 1966) states, "*Quantum is the theory of the emission and absorption of light by material bodies in the form of discrete packages.*" (p.2).

In the field of education, the use of the term Quantum referred to the interaction that changed energy into light (DePorter & Hernacki, 2002). They explained that Quantum teaching followed the equation concept of quantum physics, namely, $E = mc^2$. In the context of learning, the E= Energy refers to enthusiasm, learning effectiveness, and vigor; M = Mass refers to all individuals, the learning environment, materials, and physical context; and C = Interaction refers to the relationship between the individual and the environment. From this formula or equation, Quantum learning can be defined as energy conversion of the spirit, enthusiasm skills, talents, or potential of students through interaction with other people and the environment. The spirit and enthusiasm blaze in students' common sense, like a light that can shine and brighten their mood, with a passionate search for knowledge and meaning for themselves and others.

Quantum teaching-learning begins with a strong belief foundation that: all people can learn, people learn differently, and learning is effective when it is joyful, engaging, and challenging (Butzin, 2005). Similar beliefs were found in theories originally adopted from Lozanov (1978) and these were also taken into account in the birth of Quantum teaching and learning. These beliefs include the following: (1). Learning is dual-planned or preconscious. It means learning takes place in both the conscious and subconscious mind, (2). Everything makes a suggestion, either consciously or subconsciously. A student, for instance, may be consciously listening to the teacher, but subconsciously, his mind is aware of peripherals, such as noises in the room, (3). There is no single stimulus. It means everything is perceived in the context, (4). Everything is constantly being processed through reasoning associations, and (5). There is no neutral: only positive or negative. Everything gives impact. It implies that teachers need to make concerted efforts to create as many positive things as possible, and to create a comfortable, safe, and fun learning environment (DePorter, 1992). All these beliefs serve as a foundation to accelerate learning. Such beliefs are assumed to result in students' effective learning. Teachers must demonstrate integrity, high commitment, and wholehearted sense of teaching.

Quantum Model as an Effective Teaching Strategy

Quantum teaching is also described as an effective teaching strategy in Kyriacou (1997). According to DePorter (1992), Quantum

teaching is like conducting a symphony and orchestrating two major elements: *context* and *content*. The *context* element deals with the preparation of the classroom where the learning process will take place. The *content* element, on the other hand, refers to the implementation of a teaching strategy in which the curriculum is presented in the actual learning process.

In the *context* element, the teacher is assigned to orchestrate the atmosphere, foundation, environment, and design of learning (DePorter & Hernacki, 2002). The first is orchestrating the learning atmosphere. This means the creation of a favorable atmosphere, full of intimacy, warmth, humor, but also full of accountability and should generate good communication and a positive emotional bond between teachers and students. Second, orchestrating a strong foundation means that teachers should be committed to creating learning behaviors in accordance with the positive values inherent in the students themselves, it is about the importance of learning throughout life. The third element is orchestrating the learning environment. A Quantum teaching strategy puts emphasis on the importance of managing the learning environment as to make it safe, comfortable, and a place in which it is fun to learn. The fourth element is orchestrating the lesson plan. The importance of design is intended to prepare students to achieve success through various strategies. These strategies include the techniques and other attempts to bridge the gap between the teaching materials and the prior knowledge that the students already possessed. When academic success is achieved, it is believed to be able to promote the learners' motivation and self-esteem accordingly.

The *content* element includes the prime presentation and facilitation of content or material. DePorter (1992) proposes five steps of teaching in this regard. The first step is to "enroll". This kind of lead-in activity is meant to capture the interest, curiosity, and attention of the students. The second step is to "experience". This step of exploration is considered best to stimulate the brain. Through exploration, students could better maintain long-term memory rather than merely reading or listening for information. Such an activity is usually followed by discussion, verification, and finally ends with the labeling concept or discovery they made from the information they should learn. The next step is to "demonstrate". This activity allows the students to show off their capability on the

topic they had learned. To empower the students to process their new content through demonstration, this step of teaching is followed by reflection and repetition. These acts of reflection and repetition are meant to strengthen the nerve connections and help learners to master the content learned. The last step was to “celebrate”. This step is to encourage the whole class to respect and appreciate those who have finished the tasks successfully. Celebration gives the feeling of a happy ending and would help to provide new energy for the upcoming learning occasion.

PURPOSE OF THE STUDY

This research was aimed at showing the impact of a Quantum Teaching Strategy treatment in comparison to the conventional teaching strategy treatment on the academic achievement of students in two school subjects: Bahasa Indonesia and Science. This research was also intended to show the role of self-esteem on the academic achievements of students in the two subjects in inclusive schools.

There have been few research studies on the impact of a Quantum Teaching Strategy on student achievement. A study conducted by Barlas, Campbell, and Week (2002), for instance, concluded that the use of a Quantum Teaching Strategy increased the academic field and confidence. Dien Novita (2004) also investigated the effect of a Quantum Teaching Strategy treatment on student academic achievement. The results in the study indicated that students with good habits of learning improved academically in most subject matters. However, these researches were focused on adolescent students in non-formal institutions where students were motivated to pass their university entrance tests.

This research, therefore, was also meant to reveal the impact of Quantum Teaching Strategy treatment on an important psychological trait, the self-esteem of students in inclusive elementary schools. Due to their low self-esteem, these students were not motivated to learn. In the conventional classroom, such students find both Bahasa Indonesia and Science uninteresting. Through the Quantum Teaching Strategy treatment it was assumed that there was improvement in students' self-esteem, and as expected the students were motivated to learn and improve their general academic achievements in both Bahasa Indonesia and Science.

METHODOLOGY

This study was a quasi-experiment and the design used in this research was “The Posttests only with Experimental and Control Group Design” (Sekaran, 2003). The design is suitable to investigate the causal relationship between two groups in which the independent variable could not be controlled by an extraneous factor. The research compared the effect of the independent variables, namely the Quantum Teaching Strategy and conventional teaching strategy treatments on the students’ academic achievements as the dependent variables, and as intervened by the covariate of Self-esteem. To maintain the internal validity of the effects obtained from the treatment of the experiment, cautions were given on the extraneous variables. The internal threats such as sample selection bias, history, instrumentation, maturity, mortality, and regression were taken for granted.

The sample in this research comprised two different intact groups of 68 students in the sixth grade in two elementary schools in two different sub-districts. By means of a multistage cluster-sampling technique, the sample was generated from 78 inclusive elementary schools spread all over the 15 sub-districts of Boyolali, Cental Java. Each group consisted of 34 students representing the experimental and the control groups. The data on academic achievements was obtained from teacher-made standardized tests for the local summative tests, while the data on self-esteem was obtained through a questionnaire administered by a local psychological test agency. For such an experiment, it was required that the degree of the students’ academic achievement and self-esteem of these two groups be equal.

Prior to the intervention of the Quantum Teaching Strategy treatment, therefore, a t-test was applied to measure the academic level of students’ achievements in Bahasa Indonesia and Science through the local summative test. The t-test was also used to measure the level of psychological trait of the students’ self-esteem. In this way, the equal baseline of these two groups was achieved. The treatment was focused on the integrated themes on language skills through drama for Bahasa Indonesia and natural environment for Science. Since this research used a Repeated-Treatment Design,

treatment for the experiment group was given in several cycles. The accumulated gain scores were measured to see the differences between the baseline score and the final post-test score as a result of treatment. In addition, the final post-test score in the experimental group was also compared with the one in the control group.

Two types of statistical procedures were applied in this research. The first was the T-Test, and the second was ANCOVA. A t-test was devised to measure the differences in the academic achievements of students in Bahasa Indonesia and Science for the experimental and control groups. The analysis of covariance (ANCOVA) was used to see whether or not the Self-esteem variable served as a covariate to influence the result of a Quantum Teaching Strategy treatment on the academic achievements of students in Bahasa Indonesia and Science in both the experimental and control groups.

RESULTS AND DISCUSSION

To measure the different impacts of the Quantum Teaching Strategy and conventional teaching strategy on the students' academic achievements, it was necessary to show the baseline of mean scores of the academic achievements in both the experimental and control groups. Baseline scores were the ones obtained by the students in both groups before undergoing the treatment of Quantum Teaching Strategy in Bahasa Indonesia and Science. The results from the T-Tests are as shown in the following table.

Table 1

T-Test Analyses of Experimental and Control Groups before Quantum Teaching Strategy Treatment

Achievement	Group	N	Mean	SD	t	P
Bhs Ind	Experiment	34	6.17	1.67	-0.87	0.39
	Control	34	6.39	0.63		
Science	Experiment	34	5.86	1.16	1.18	0.25
	Control	34	5.61	0.92		

From Table 1, it can be seen that the achievement of students in Bahasa Indonesia in the Experimental group ($M = 6.17$, $SD = 1.67$) is lower, though not significant, than that in the Control group ($M = 6.39$, $SD = 0.63$), $t(68) = -0.87$, $p = 0.39$ (one-tailed). Similarly, the table also shows that that students' achievement in Science in the Experimental group ($M = 5.86$, $SD = 1.16$) is higher, though not significant, than that in the Control group ($M = 5.61$, $SD = 0.92$), $t(68) = 1.18$, $p = 0.25$ (one-tailed). It can be concluded that there is no significant difference between the experimental and control groups in terms of the academic achievement of students in both Bahasa Indonesia and Science before the treatment of Quantum Teaching Strategy.

Table 2

T-Test Analyses of Experimental and Control Groups after Quantum Teaching Strategy Treatment

Achievement	Group	N	Mean	SD	t	Sign.
Bhs Ind	Experiment	34	8.00	1.17	3.47	0.001
	Control	34	7.14	0.79		
Science	Experiment	34	7.56	0.96	3.57	0.001
	Control	34	6.99	0.73		

Table 2 shows that the achievement of students in Bahasa Indonesia in the Experimental group ($M = 8.00$, $SD = 1.17$) is higher and significant than that in the Control group ($M = 7.114$, $SD = 0.79$), $t(68) = 3.47$, $p = 0.001$ (one-tailed). It can also be seen that the achievement of students in Science in the Experimental group ($M = 7.56$, $SD = 0.96$) is higher and significant than that in the Control group ($M = 6.99$, $SD = 0.73$), $t(68) = 3.57$, $p = 0.001$ (one-tailed). It can be concluded then that there is a significant difference between the experimental and control groups in terms of students' academic achievements in Bahasa Indonesia and Science after the Quantum Teaching Strategy treatment. The role of the self-esteem covariate as an intervening variable on students' academic achievement in Bahasa Indonesia after the Quantum Teaching Strategy (QTS) treatment can be seen in the following ANCOVA analysis in Table 3.

Table 3

The Impact of QTS and Self-esteem on Students' Achievement in Bahasa Indonesia

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	58.47a	2	29.24	21.05	.00	.39
Intercept	242.33	1	242.33	174.39	.	.73
Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Self Esteem	20.82	1	20.82	14.98	.00	.19
Quantum	37.65	1	37.65	27.10	.00	.29
Error	90.33	65	1.39			
Total	3394.56	68				
Corrected Total	148.80	67				

a R Square = .39 (adjusted R Square = .37)

From Table 3, it can be seen that there is a significant difference in students' academic achievement in Bahasa Indonesia ($F = 27.10$, $F_t = 3.99$, and the value of significance is $0.00 < 0.05$). This clearly shows that the Quantum Teaching Strategy treatment affects the students' academic achievement in Bahasa Indonesia. It can also be seen from Table 3 that $F = 14.98$, $F_t > 3.99$, and the value of significance was $0.00 < 0.05$, showing that the covariate self-esteem also significantly influences the students' achievement in Bahasa Indonesia. The different mean scores of achievement in Bahasa Indonesia between the experimental group (8.00) and the control group (7.14) seems to suggest that the Quantum Teaching Strategy has a better impact on students' academic achievement in this subject matter. It also shows that self-esteem plays an important role in enhancing students' academic performance. The high mean scores of 8.00 for the experiment group and 7.14 for the control group show that students are confident of their own abilities in doing well in the subject matter. They are very confident that Bahasa Indonesia would not be difficult for them.

This point is made clear in Plummer (2001), who states that a student's high self-esteem could lead to his/her feeling of capability.

Students with low self-esteem, on the other hand, are likely to experience difficulties in achieving success. Such claims are also asserted by Owens, Stryker and Goodman (2001) and Brandon (1992); these researchers point out that self-esteem is constructed from self-efficacy and is closely related to academic performance. In the present study, the students' high confidence to achieve success in Bahasa Indonesia is established within the learning experience of the language sub skills through experience-based writing, discussion, and presentation during the Quantum Teaching Strategy treatment. In addition, the research by Barlas, Campbell, and Weeks (2002) also confirms the finding that a Quantum Teaching Strategy could increase self-confidence from 35 percent up to 86 percent.

Table 4

Impact of Quantum Teaching Strategy Treatment and Self-esteem on Academic Achievement in Science

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	61.92a	2	30.96	28.83	.00	.47
Intercept	151.69	1	151.69	141.27	.00	.69
Self-Esteem	2.16	1	2.16	2.01	.16	.03
Quantum	59.77	1	59.77	55.70	.000	.46
Error	69.80	65	1.07			
Total	3252.28	68				
Corrected Total	131.72	67				

a R Square = .39 (adjusted R Square = .37)

From Table 4, it can be seen that there is a significant difference in the academic achievement of students in Science ($F = 55.70$, $F_t = 3.99$, and the value of significance is $0.00 < 0.05$). It means that the Quantum Teaching Strategy treatment affects the academic achievement of the students in Science. The improvement of the mean score in Science is due to the effectiveness of the Quantum teaching Strategy treatment. Table 4 shows that $F = 2.00$, $F_t > 3.99$, and the value of significance is $0.16 > 0.05$. These figures show that self-esteem does not significantly influence the students' academic

achievement in Science, as the difference between the mean scores resulted from the different treatments in Quantum Teaching Strategy (7.56) and conventional teaching strategy (6.99). The explanation for the improvement in students' academic achievement through the Quantum Teaching Strategy derives from the belief that all students could learn (Carnell, 2005). Students are regarded as potential thinkers who could utilize their different meta-learning strategies to make sense of their own experience. Additionally, it is believed students learn better when the experience is joyful, engaging, and challenging (Butzin, 2005). This kind of joy of learning could only happen when the material is provided for them in the environment, enhancing the learning interaction to happen. This belief is embodied in the central tenets of the Quantum Teaching Strategy where students' capability flourishes through discovery learning and interaction with the natural and artificial environments provided by the teachers. Evidence for this belief is supported in the research conducted by DePorter and Hernacki (2002). They find that a Quantum Teaching Strategy treatment leads to an increase of 73 percent on general academic values, 84 percent on self-esteem, and 81 percent on self-confidence.

However, in the present study many students with cognitive learning problems complained more about the subject Science than Bahasa Indonesia. It was true that most students had had an adequate score on their formative tests, and the teacher had also convinced these students of the minimum score required for the final test. The teacher had hoped that the students would have a positive attitude towards Science as this would help build up their confidence in the subject, as was pointed out by Pearson (2004), who emphasized that a positive feeling helped the process of learning. Driscoll (2005) also commented that positive expectations served as an incentive, and a negative expectation served as a disincentive. This was also the case in the present study. The students did not believe they could pass the final test examination in Science. They felt pessimistic about their chances of success in this difficult subject. For most of the students, Science was the second most difficult subject matter after Mathematics. They were very anxious about the final test on this subject matter as they were worried about failing. Moreover, the final examination for that year was the first time it was administered in the elementary schools. The students' negative

expectations about passing the examination made them have low self-esteem, and thus, experienced a very low level of confidence in the subject matter.

CONCLUSION

Based on the results of the statistical analyses, the study drew the following two conclusions: (1) it was found that a Quantum Teaching Strategy was more effective compared to the conventional teaching strategy in improving academic achievements of Bahasa Indonesia and Science. A Quantum Teaching Strategy is founded on the belief in learning theory that students learn by developing their potential through social interaction with the environment. By means of exploration, elaboration, and confirmation from a well arranged learning environment, the learning materials are internalized meaningfully by the students, and they were able to improve their academic achievements accordingly. (2). it was found that self-esteem played an important role in improving academic achievements; however, its influence differed in the two subject matters looked into in the study. The findings indicated that students were more adept in their mastery of Bahasa Indonesia than of Science.

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