

BIBLICAL INTEGRATION IN A MATHEMATICS CLASSROOM: A QUALITATIVE RESEARCH IN A SENIOR HIGH SCHOOL

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ABSTRACT

This article discusses to what extent mathematics teachers do Biblical integration in their class, to explore the challenges that mathematics teachers face when they do or want to do Biblical integration, and to explore the school's expectation of Biblical integration for mathematics teachers with more clarity and intentionality. Research was conducted from September until October 2016. The research subjects were the curriculum coordinator, head of the Department of Mathematics, seven mathematics teachers, and 362 senior high students. The data collection techniques that were used were a semi-structured interview, and a questionnaire. The results of the research show that the school's expectation is that teachers should be able show how mathematics is capable of expressing truths about God's work, God's beauty, and God's regularity because God created mathematics. Then, all of the mathematics teachers modeled Biblical qualities. The challenges and obstacles that mathematics teachers were confronted that they had little time to find the Biblical integration from the material, they did not have enough understanding, they had difficulty doing Biblical integration from the material, and the teachers were afraid that their explanations about Biblical integration would sound forced to students, especially non-Christian students.

Keywords: Biblical integration, mathematics classroom, senior high school

ABSTRAK

Artikel ini membahas sejauh mana guru matematika melakukan integrasi Alkitabiah di kelasnya, tantangan dan hambatan yang dihadapi oleh guru matematika saat mereka melakukan atau ingin melakukan integrasi Alkitabiah, dan untuk mencari tahu ekspektasi sekolah tentang integrasi Alkitabiah untuk guru matematika dengan lebih jelas dan mempunyai maksud. Penelitian ini dilakukan dari September sampai Oktober 2016. Subjek penelitian adalah kordinator kurikulum, kepala departemen matematika, tujuh guru matematika, dan 362 siswa sekolah menengah atas. Teknik pengumpulan data yang digunakan yaitu wawancara terencana-tidak terstruktur dan kuisioner. Hasil dari penelitian menunjukkan bahwa ekspektasi sekolah adalah bagaimana matematika mampu menjadi tempat untuk mengantarkan siswa mengenal kebenaran seperti pekerjaan Tuhan, keindahan Tuhan, keteraturan Tuhan karena Tuhan menciptakan matematika. Kemudian, semua guru matematika menjadi contoh kualitas Alkitabiah. Hambatan dan tantangan yang dihadapi guru matematika adalah kekurangan waktu untuk menemukan integrasi Alkitabiah dari materi, mereka juga tidak mempunyai pemahaman yang cukup, mereka merasa kesulitan dalam melakukan integrasi Alkitabiah, dan guru merasa takut jika penjelasannya tentang integrasi Alkitabiah terdengar memaksa bagi siswa, terkhusus siswa yang beragama lain.

Kata Kunci: Integrasi alkitabiah, kelas matematika, sekolah menengah atas

INTRODUCTION

All people in the world have the right to get an education. Education is a process where people learn knowledge and skill. Many people think that the aim they go to school is just to get job after they finish school, or they just feel ashamed if they do not go to school.

Education is not just for looking for job and prestige. Mochtar Riyadi said that education is an important thing to build the nation (Wiro, 2016). The importance is proven with the Indonesian government that obligates children to go to school for nine years. Christian education makes the Bible as its foundation. Christian education is not just fulfilling the government's task: to make students can pass the exam or they get the knowledge. However, Christian education has the aim more than that, Christian education has aim for eternity, to make students fear the Lord and they can know God. Paul A Kienel, Gibbs Ollie E. and Berry Sharon E as cited in Dr. Khoe Yao Tung (2014) wrote that the purpose of Christian school education is to show children and young people how to face God and then the vision of God in their hearts to face the present world and the world to come (p. 25). As a result, it is so important to make the Bible as source for the other knowledge, like mathematics, physics, and biology. All truth is God's truth, as a result the teachers in Christian school have the task to integrate the Bible with every material that they teach. Biblical integration is looking how the learning topic that is being taught can reveal the character or nature of God, creation, people, morality, and the life purpose. Also, Biblical integration must reveal God's truth and God's plan through every students' life (Tung, 2014, p. 160). As a result, Biblical integration in education must be main factor from the education process.

Mathematics is the subject that must be taught by teacher in the school, and it means that teachers have to integrate it with the Bible. The verse "For by him *all* things were created" (Colossians 1:16, NIV), it means that God created all things or everything even math. Mathematics is also consistent because God consistently holds every part of the universe in its place. **Mathematics is really a testimony to God's faithfulness and power.** Mathematics should continually remind of God's consistency and trustworthiness. It is proven by one plus one always consistently equals two because an awesome, never-changing God created and sustains all things (Perspective, n.d.).

Mathematics subject must be taught in every school, including Senior high school XYZ. Senior high school XYZ is a Christian School that has vision and mission. The vision: True Knowledge, Faith in Christ, Godly Character. Then the mission: Proclaiming the preeminence of Christ and engaging in the redemptive restoration of all things in Him through holistic education. From vision and mission of the school, this school makes the Bible as foundation or Jesus-centered. As a result, the mathematics teachers in this school have to do Biblical integration in every topic or learning material. However, during two months of observation, mathematics teachers are struggling in the process to apply Biblical integration in the teaching and learning process. For they are struggling, mathematics teachers rarely or never use biblical integration in their mathematics classroom. As a result, a qualitative research was needed to explore to what extent mathematics teachers do Biblical integration in their class, to explore the challenges that are faced by mathematics teachers when they do or want to do Biblical integration with more clarity and intentionality, and to explore the school's expectation of Biblical integration for mathematics teacher.

RESEARCH METHODOLOGY

The method used in this research is a qualitative case study research. A qualitative research is known as a postpositivist method because it is based on postpositive philosophy. Postpositive philosophy views social reality as a holistic thing, complex, dynamic, meaningful, and the relationship of reciprocal symptom. The research was conducted on natural object, where the researcher as the key instrument. Data collection technique can be done with triangulation, the data analysis is inductive, and the result of this researcher more emphasizes meaning rather than generalization (Sugiyono, 2012). The researcher chose case study for the research. Creswell as cited in J.R Raco (2013, p. 49) defined that case study is an exploration from bounded system, and this case is so interesting to be researched because this complex case has meaning for other people, and minimal for the researcher. The subjects for this research are seven mathematics teachers who taught mathematics in senior high school XYZ. The researcher determined the subjects through purposive sampling. Purposive sampling is a data sampling technique by certain considerations, like people who are considered to know more about that the expectation of the researcher or maybe they have authority so it can make the researcher explores easily object or social situation that will be researched (Sugiyono, 2012). The researcher deliberately chose mathematics teachers as sample because this research is addressed for mathematics subject. The researcher also chose curriculum coordinator and head of department of mathematics as sample to get information about the teaching and learning process that is implied in the classroom related with biblical integration. Besides that, the researcher got the data from the students who got the mathematics subject from the eight teachers include head of department. The researcher chose the sample randomly. The researcher chose two classes from one teacher, so the researcher got sixteen classes because there were eight mathematics teachers include head of department. As a result, the research subject are 105 students from grade 10, 153 students from grade 11, and 104 from grade 12. Therefore, the total of the students is 362 students, is 1/3 from the total of the students in this school.

The research was conducted in a private Christian school in the Lippo Village, Karawaci, Tangerang. The researcher did the research from the preparation stage starting from September until October 2016. To make the research objectively, the researcher conducted the research by looking at three perspectives: the school curriculum coordinator, mathematics teachers, and students. Those three perspectives had the same focus of the research: the implementation of biblical integration in the mathematics class. For another focus of the research: the school's expectation and challenges and obstacles for mathematics teachers, the researcher conducted the research by looking on three perspectives: the school curriculum coordinator, mathematics teachers, and head of department of mathematics. This research used interviews, that were conducted for the school curriculum coordinator, head of department, and the seven mathematics teachers to see from their perspective and to see students' perspective, the researcher gave the questionnaire to 362 students.

After the researcher got the data, the researcher did data analysis. The researcher used Miles and Huberman interactive model as data analysis. The step of this model are data reduction, data display, and conclusion drawing/verification. From the figure, analysis of qualitative data is a recurring initiative continuously (Emzir, 2010, p. 135). The researcher used triangulation as validity test. William Wiersma as cited in Sugiyono (2012, p. 372) defined triangulation as qualitative cross-validation. It assesses the sufficiency of the data according to converges of multiple data sources or multiple data collection procedures.

ANALYSIS

A. School's Expectation

Based on Knight (2009), because of education is a redemption activity so the students have the greatest need to know Jesus Christ as Lord and Savior. Christian education aims to introduce Christ as the Savior of the world, the source of truth, the source of wisdom and knowledge, so the task is providing teaching in Christian formation and Christian nurturing (Tung, 2014, p. 8). The Christian school as part of Christian education has task to introduce Christ to the students, as a result the school has to provide teaching that makes students know Jesus Christ. School needs to have expectations about Biblical integration in every classroom, including mathematics classroom to make the students know Jesus Christ from every teaching and learning process. When school has expectation for the mathematics teachers, the teachers know what they must do when they teach or interact with the students in the class to reach the expectation. The expectation should introduce Christ as the Savior of the world, the source of truth, the source of wisdom and knowledge in every lesson, including mathematics because the students have the greatest need to know Jesus Christ.

In addition, the first school's expectation that the researcher analyzed is basically about how mathematics is capable of expressing truths, about God's work, God's beauty, and God's regularity because God created mathematics. The expectation is relevant. Based on Gaebelein (2009, p. 60), learning mathematics is studying reality, patterns, and God's regularity and understand and appreciate the beauty of shape, regularity, and the accuracy of God's World. By studying mathematics, students are also expected to know that God is faithful and can be trusted in establishing the world by mathematical regular pattern, laws, and composition that God bears in His creation (Van Brummelen, 2002).

These expectations just want the students to know, not to apply mathematics to solve daily problem. When the students learn mathematics, they should be aware that mathematics can solve daily problem. Van Brummelen stated that students can deepen awareness of mathematics as functional tool to solve daily problem in different background. In the mathematics, the students learn about how to explore the concepts of numbers and space, regulatory laws that cover the concepts, as well as its use in solving daily problems (2002). School needs to have expectations about Biblical integration that explain how to use mathematics to solve daily problems. Then, expectation that just want to accompany the students know truth, like God's work, God's beauty, God's regularity. However, Christian

education has the aim to introduce Jesus Christ as Savior of the world. So the expectation should emphasize Jesus Christ as Savior when the students learn mathematics. When the expectation just to make students know about God's work, God's beauty, God's regularity, it will be just the same with the unbelievers because they also believe that God created everything.

Another point of discussion is that, because of the school has different opinions, there is a gap about the expectation. CC said that the mathematics teachers are also involved in arranging the expectations. When they do the teaching and learning process in class, then learning in this field is observed. From the results of these observations, it became the evaluation for the leadership later. However, the mathematics teachers do not know that they take involvement to arrange expectation. They also do not get the feedback after they are evaluated. Then, the school checks the lesson plan whether these expectations have been undertaken by the mathematics teachers that they submitted to the head of department. However, lesson plan does not have Biblical integration part because the lesson plan is a living document which means that the document used or done must represent all the teaching and learning process. The school emphasizes the big concepts more to the teachers, as a result Biblical integration is not in every lesson plan that the teachers make, but more in big general topic that is related so the spirit of Biblical integration can be felt. However, because of it, all the mathematics teachers just make lesson plan about what they will teach without any stated Biblical integration.

Regarding, HD said that he knew the expectation because the expectation has been embedded in the teacher. That expectation has been implemented as usual. HD had different opinion from where he knew the expectation from CC and the other mathematics teachers. HD generalized that the expectation has been embedded in the teacher. In fact, some mathematics teachers do not know the expectation.

In addition, the school has expectation and most of mathematics teachers know and understand about it. However, this expectation is not to be felt for the students because 34% of students chose that the mathematics teachers are not really important to do Biblical integration. Most of them stated that the mathematics and Christianity do not have relation. The mathematics teachers need to do Biblical integration to make the students realize that the Bible is the foundation of all knowledge include mathematics. They also must realize that they can know God by mathematics.

B. Implementation Of Biblical Integration

From the data, the half of mathematics teachers close class with prayer. Some mathematics teachers do not open and close class with prayer because it can be routines so make the meaning of prayer decreases and the students just think about mathematics not about God. However, it is different when the students do exam because they know that they cannot do without God's help. Every day, people need God's help to face all of activities not they just need God when they have problem. The mathematics teachers need to have prayer as something that is done clarity and intentionally every day, as a result the

students can know that they have to surrender everything that will happen in school to God and in the end, they give thanks to God that already gives strength and help. It can also be good habit for the students if the mathematics teachers ask them to pray. In the end, the students can realize that prayer is important for them.

Another point of discussion is that all mathematics teachers are modeling Biblical qualities. They become image of God in the classroom. They love the students by teaching the students patiently and they guide the students who are less able, but they are also being fair by giving consequence to the students who break the rules. They are like Jesus who loves human by giving air to breathe or food to eat but He still gives consequences when human fall in sin. JW. Taylor had the opinion that the students see Christian teachers in knowledge, especially understanding knowledge of the Christian perspective. They need to get the example from Christian teachers who believe in God's plan and His Word. They can feel that their teachers surrender to God's participation when they confront the problem and their condition (n.d.) Thus, mathematics teachers need to be examples for the students in the classroom. Van Brummelen also stated that teacher can nurture kindness, patience, self-control, humility, and love in their own lives and in the lives of their students because they pray and contemplate biblical passages every time. (2009, pp. 31 - 34). Then, the mathematics teacher must have good relation with God with spiritual discipline such as praying, reading the Bible, praising God every time at first before they want to be example to the students through their acts and words.

In addition, the researcher found that the most of mathematics teachers do not do Biblical integration material directly. They felt it is so hard and forced in some topic such as integral, trigonometry, logarithm, matrix, and statistic. All truth is God's truth, as a result the mathematics teachers have task to integrate the Bible with every material that they teach. The Bible is not just as a package, but it is inseparable from content in explaining every part of lessons (Tung, 2014). The topics above cannot separate from the Bible. George R. Knight as cited in Khoe Yong Tung (2014, p. 84) also said that the teaching of any topic in a Christian school is not a modification of the approach used in non-Christian schools. It is rather a radical reorientation of that topic within the philosophical framework of Christians. If mathematics teachers do not do Biblical integration through material, they are as if are the same as mathematics teachers in non-Christian school. The mathematics teachers in non-Christian school also open and close class with their own prayer, they also give motivation, and they also be example in the classroom like they encourage students who are low and they also give consequence to the students who break the rules. The mathematics teachers have to teach the topic within the philosophical framework of Christians.

Gaebelein defines Biblical integration as the living union of its subject matter, administration, and even its personnel, with the eternal and infinite pattern of God's truth (2009, p. 9). As a result, every topic in the mathematics is eternal and infinite pattern of God's truth. The important thing for mathematics teachers, they realize and know the aim of mathematics is for glory God, and the basic of mathematics is that God is the center of

mathematics. The mathematics teachers have to find the Biblical foundation from every material that they will teach, not just stop in opening and closing class with prayer, giving motivation, and being an example. Biblical integration must go beyond a devotional or an opening prayer, to search for and unveil Christ in every concept, every formula, every proof, and every operation (Zonnefeld, 2015, p. 127). In the end, the mathematics teachers expected to do rebuilding the academics for the glory of God, like the teachers use the biblical metanarrative (creation-fall-redemption-restoration) in teaching mathematics in the classroom.

Besides that, the school's expectation about Biblical integration in the mathematics classroom that the researcher analyzed is basically about how mathematics is capable to be a place that accompanies children to know truth, like God's work, God's beauty, God's regularity because God created mathematics. However, all of the mathematics teachers are just modeling Biblical qualities. They rarely explain God's work, God's beauty, God's regularity to the students through the material. In other words, the mathematics teachers have not done the expectation yet, but they know the school's expectation.

C. Challenges And Obstacles

Most of the mathematics teachers face difficulty to do Biblical integration from the materials directly. Tung (2014) stated that Christian teachers are often stuck in the paradigm of duality, "two story view" between the secular and non-secular. They struggle to show students how the Bible is relevant to the subjects they teach. The mathematics teachers feel difficulty to do Biblical integration in hard topic such as integral, exponent rather than statistic, function. They also feel that these materials as if do not have Biblical integration. Because they feel difficult to get Biblical integration from the material, then the mathematics teachers are afraid if their explanations about Biblical integration force the students. However, when the researcher analyzed the data, the students never said the Biblical integration material force for them. They have not been accustomed to hear or see Biblical integration done by mathematics teachers. Therefore, this can be just an assumption for the teachers that their explanations about Biblical integration force the students.

In addition, the mathematics teachers are afraid and have difficulty in doing Biblical integration for some topics. In UPH Leaders Enrichment Module, everything is started from Christ to know the Triune God to Biblical understanding to Biblical Christian theology of the Bible to Biblical Christian theology from the Bible to Biblical Christian worldview to vision to mission and mission indicators to virtues expressed as values to philosophy of education and pedagogy to curriculum and practices to assessment/evaluation. As a result, mathematics is also started from Christ, so the mathematics teachers should not feel difficult or afraid to do Biblical integration. The mathematics teachers have to ensure that they have the correct foundation. The main foundation is Christ's regularity that is always consistent and He makes everything beautiful. Abraham Kuyper stated that "There is not a square inch in the whole domain of our human existence over which Christ, who is

Sovereign over all, does not cry, Mine!” As a result, Christ is Lord of everything includes mathematics and the topics such as integral, exponent, limit, and function within it. Then, the students also can feel that Christ is the foundation of the mathematics and they do not say that mathematics and God do not have relation.

Another point to discuss is the fact that the mathematics teachers do not have time to find the Biblical integration from material that they will teach and as result, they do not have enough understanding about it, then they feel difficult to do Biblical integration from the material, then because they feel difficult, teachers are afraid if their explanations about Biblical integration force to students, especially non-Christian students. The mathematics teachers need to have enough understanding to do Biblical integration. Van Brummelen (2009) stated that teachers cannot transfer some guidelines directly to today’s classroom because of cultural differences. The Bible also still does not tell teachers how to construct and mark a test. When the teachers have the right understanding, the students can also know that mathematics cannot be separated from the Bible. As a result, the mathematics teachers have to spend their time to find and learn again about Biblical integration in the mathematics topics that they will teach. The school also has resources such as library that has many Christian and mathematics books, 5 religious teachers, and 3 native teachers who come from Christian university board like Corban and Biola University. The mathematics teachers can ask them about Biblical integration in the mathematics subject. It is so important to hold hands together to solve the problem (the mathematics teachers feel difficult to do Biblical integration) between the teachers. This step is so important to do because they will make their students know about Jesus Christ from the material that they teach in the classroom, even the non-Christian students also can know Jesus and they can believe Him.

The role of the Holy Spirit is also needed and important to make them believe in Jesus. The Holy Spirit will work in each student that already have seen or listened Biblical integration that the mathematics teachers do. Tung (2014, p. 11) stated that Christian education must teach the truth of God's Word that reveals God the Father as the creator of human and everything in it, Jesus Christ as the Son of God who came to earth to redeem the sins of human, restores the image and likeness of God that has been damaged by sin, and teach of the Holy Spirit in guiding new born students to accept the Lord Jesus Christ.

CONCLUSION

First, the school’s expectation is basically about how mathematics is capable of expressing truths, about God’s work, God’s beauty, and God’s regularity because God created mathematics and how mathematics teachers become example in the classroom. Second, the implementation of Biblical integration that the teachers done in the mathematics classroom are almost half of mathematics teachers close class with prayer, all mathematics teachers they give motivation Biblically, half of them tells how to apply the material in real life that based on the Bible and shows how to use the material do declare God’s glory, and the last, half of them are also making contextual environment that they

stick Bible verse or quotes on the wall's classroom. Then, all of mathematics teachers are modeling Biblical qualities. Most of mathematics teachers do not do Biblical integration through the material. They felt it is so hard and forced in some topics such as logarithm, integral, exponent, and trigonometry. Third, the challenges and obstacles confronted by the mathematics teachers are they do not have time to find the Biblical integration from material that they will teach, they do not have enough understanding about it. Then, they feel difficult to do Biblical integration from the material and because they feel it is difficult, they are afraid if their explanations about Biblical integration forced on students, especially non-Christian students.

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