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ADJACENT SCHOOLS WITH INFINITE DISTANCE - NARRATIVES FROM NORTH KOREAN MATHEMATICS CLASSROOMS

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This research addresses mathematics education in one of the most closed countries in the world, North Korea. North Korean secondary school mathematics education is examined through review of North Korea's social and educational structures as well as its political and ideological position. In-depth interviews were conducted with dislocated secondary school mathematics teachers and former students to understand their lived experiences in secondary school mathematics in North Korea. Participants responded to questions concerning typical ways teaching and learning were carried out in mathematics classes; the Workers' Party's influence in every aspect of education, from teacher education to curriculum and textbooks issued; and the impact the March of Suffering had on the teaching and learning of mathematics as well as its lingering effects in secondary mathematics education. One of the goals of this research was to provide a more realistic picture and background of secondary school mathematics education in North Korea. The participants came from different parts of North Korea and were interviewed based on their experiences in secondary school mathematics ranging anywhere between three to 25 years ago. Therefore, this collective interview analysis presents a solid viewpoint on secondary school mathematics in North Korea.
Keywords: North Korea, Secondary Mathematics Education, interview

INTRODUCTION

It has been more than 60 years since Korea was divided into two separate countries – the Democratic People's Republic of Korea (North Korea) and the Republic of Korea (South Korea). After the Korean War (1950-1953) these two countries have developed opposing political, social, and educational systems under conflicting ideologies (Cumings, 1997). North Korea developed into a unique form of socialist country whereas South Korea became a democracy. Even after the events of the Berlin Wall and the Soviet Union, North Korea remains one of the most closed-off nations in the world. The separation has resulted in two different Koreas with radically different current status.

In 2010, the nominal Gross Domestic Product (GDP) of South Korea was $1.164 trillion which ranks 15th in the world. In the same year, South Korea was the seventh largest exporter and tenth largest importer in the world. By 2012, North Korea's external debt had grown to an estimated of $20 billion despite Russia allegedly writing off about $8 billion of debt in exchange for participation in natural resources development. To put into perspective, while the GDP of South Korea was the 15th largest in the world, it was estimated that 2.5 million North Koreans died from starvation between 1995 and 1997 (Gwon, 2005).

Reunification of the two Koreas has been an issue for the common good of both countries as well as the rest of the world. Regardless of numerous attempts and negotiations, North and South Korea are still very different on several aspects, although identifying what the actual similarities and differences are is made difficult by the fact that North Korea continues to be closed to the outside world, which, in turn makes it difficult to proceed in reuniting the two countries into one. Rather, a prerequisite for a successful unification may be a better understanding of each other's country (Kang, 1997).

On the educational front, attempts have been made to propose unified mathematics education across the two Koreas. Various researchers (e.g., Shin, 1998; Kang, 1998; Choi, 2000; Park, 2001; Park, 2004) have analysed mathematics textbooks and curriculum of North Korea while others have researched based on interviews with dislocated North Koreans (those who have come to live in South Korea) about the North Korean general education system (see Han, 1998, 2001, 2006; Kim, 2004). Previous research has identified similarities and differences of North and South Korean secondary school mathematics education in an attempt for better understanding of each other. Along with other social and cultural study materials, North and South Korean secondary mathematics textbooks and curricula have been analysed and examined. Facts and conclusions have been disclosed. However, they were largely limited to document comparisons and analysis, such as analysis of North Korea mathematics textbooks used in secondary schools (Shin, 1998; Park, 2001). Notwithstanding all these efforts, large fractions of the North Korean mathematics educational system, including its teachers, students, and dynamics of the actual classrooms, still remain unknown, as North Korea maintains isolation, even from South Korea (Pak, 2004).

In order to capture the true perspectives of those who have experienced the secondary mathematics curriculum in North Korea, the current study interviewed five dislocated North Korean secondary mathematics teachers and 10 former students in addition to an analysis of the North Korean secondary school textbooks and curriculum. Incorporating interviewing North Koreans and examining the textbooks and curriculum allowed for a more realistic and complete understanding of the North Korean secondary mathematics curriculum in terms of the cultural and educational contexts in which it was situated. The experiences of the 15 dislocated teachers and students to be interviewed were not intended to represent the general North Korean population's view of secondary school mathematics in North Korea. Thus, the research questions that guide the study can only be answered from this limited, yet rich, perspective. However, the participants came from different parts of North Korea and were interviewed based on their experiences in secondary school mathematics ranging anywhere between three to 25 years ago. Therefore, this collective interview analysis presents a solid viewpoint on secondary school mathematics in North Korea.

BACKGROUND INFORMATION

From 1910 to 1945, Korea was a Japanese colony and its education system was influenced by the Japanese model. However, the Korean War broke out shortly after the liberation. North Korea was supported by the USSR and China and the Western allies leaded by the United States aided South Korea. As the war ended in 1953, two countries were formed on the Korean Peninsula. North Korea, under the governance of Kim Il Sung, belonged to the so-called socialist bloc. As North Korea gaining autonomy from the neighbouring great

powers, Kim Il Sung declared his country's mission to consist in following its own version of Marxism-Leninism, called "Juche". *Juche* has been variously translated into English as "self-identity" (Kim, I. J., 1975), "national individuality" (Yang & Chee, 1963), and "national identity" or "self-reliance" (Shinn & Reed, 1969). The dictatorial regime of Kim Il Sung, his son Kim Jong Il, and the Workers' Party of Korea, which was under their control, led the country into an extreme poverty, particularly during the so-called "March of Suffering", a prolonged period of economic decline that lasted from 1990 to 1998. It is estimated that 2.5 million people, which is about 10% of total population, died from starvation during this period (Gwon, 2005).

A new system of education took shape and continued to operate to a certain degree even during the most difficult and problematic years. The highlights in the development of this educational system included the establishment of a compulsory nine-year mandatory education in 1966 (four years of elementary and five years of secondary education), and then a 11-year mandatory education in 1975 (one year of kindergarten, four years of elementary, and six years of secondary school), and the publishing of *The Theses of Socialist Education* (Kim, Il Sung, 1977), which summarized and propelled socialist education in North Korea.

LITERATURE ABOUT NORTH KOREAN EDUCATION

Literature about North Korean education is sporadic. Limited information about North Korea reaches to foreign researchers. Even if it does, the information is understandably not very reliable or provable. The unique characteristics of North Korean educational policy make the task of understanding North Korean education problematic. The book *President Kim Il Sung and Development of Education in Korea*, published by Kyowon-Sinmun (Newspaper for Teachers) in Pyongyang, North Korea in 1992, illustrates that significant changes in educational policies have been made by guidelines set by the Workers' Party of Korea (WPK), which is led by North Korea's one and only leader, Kim Il Sung. The book does not specify an author, but this 300-page document describes how Kim Il Sung transformed North Korea into a "model country of socialist education". Published at the height of the "March of Suffering", it was during this time that North Korea needed to reassure its people that Kim Il Sung was still the true leader and would deliver the people to the promised land (Yang, 1999).

At the 14th Plenary Meeting of the Fifth Central Committee of the Party (September 5, 1977), *Theses on Socialist Education* was publicized. The fundamental comprehensive and systematic educational themes and principles were developed and structured for the first time in North Korean education (Yang, 1999). The theses stated four principles of socialist pedagogy:

1. Party control and guidance of education
2. Juche education
3. Revolutionary practice
4. State guarantee and support of education

While *President Kim Il Sung and Development of Education in North Korea* translates issues on North Korean education from a North Korean perspective, *The North and South Korean Political Systems* is highly disapproving of the system (Yang, 1999). The book makes comparisons between the North and South Korean educational systems and claims that the two educational systems are based on an entirely different pedagogic ideology. However it is

difficult, if not impossible, to find a coherent structure suitable to both systems. According to Yang (1999), the North Korean educational system functions as a medium of the ruling party, the Workers' Party of Korea (WPK), where education is used as a device for political mind control of the young and mass public.

Of the works written outside of North Korea, one should mention *Schooling in East Asia* (Thomas, 1983). This book was published at a time when North Korea was in a relatively stable period and offers a somewhat neutral perspective on North Korean education. Quoting directly from Kim Il Sung, the book defines the general goal of the educational system of North Korea as the following:

> In any society, the primary aim of education is to train people to serve the existing social system faithfully….The most important task in education today is to bring up the new generation as worthy successors to the revolution, as worthy successors of builders of communism. —Kim Il Sung

Several research on North Korea education has been conducted by Han (1997, 1998, 2001a, 2001b, 2003, 2006). Han points out that there is a certain limitation in analysing North Korean education solely through a political lens. Political constraint is the single most influential factor in any field in North Korea. However, economic, social, and cultural factors should also be considered such that comprehension of political and economic needs of North Korea is indispensable to understanding the changes in educational policy. Han concludes that the North Korean people generally have a positive view regarding the free compulsory 11-year educational system and *Juche* ideological education, but view their educational methods and achievements negatively.

As for the mathematics education in particular, it has been studied mainly in comparison with the mathematics education in South Korea. One of the most significant studies was conducted by Shin et al. (1998). *A Comparative Analysis of Secondary Mathematics Education in Textbook and Curriculum of South and North Korea* was sponsored by the Ministry of Education in South Korea. Shin et al. (1998) present several cautionary remarks before presenting the comparison and analysis between North and South Korea. First, the textbooks and curriculum of both countries should not be criticized based on a particular ideological preconception. Second, each mathematics curriculum of North and South Korea has logical connection within their own social and cultural system. Third, the comparisons between North and South Korea's mathematics textbooks and curricula must surpass identification of homogeneity and heterogeneity of each system. Fourth, since North Korea is isolated from the outside world, it is extremely difficult to obtain any information concerning mathematics education; however, the resulting unified curriculum should not apply only to South Korea's curriculum.

Park's (2001) comparative study emphasizes the forthcoming need for this type of research during a time when North and South Korea's relationship is rapidly improving. In *A Comparative Study on the Secondary School Mathematics Education of South and North Korea*, Park (2001) examines and compares secondary school mathematics textbooks published between 1994 and 1996 by investigating ideological, cognitive, and methodological bases of secondary mathematics education in North and South Korea. Secondary school mathematics textbooks used in North and South Korea were compared in terms of external format, content, content area quantity, and use of mathematical terms.

Several other researches on secondary school mathematics in North Korea include Lee's (2004) A Comparative Analysis of Mathematics Education in Textbook and Curriculum of South and North Korea, Park's (2002) A Comparative Study of School Mathematics Terminology of South Korea and That of North Korea, Lee's (2001) Comparative Analysis of Mathematical Curriculum in the South and North Korea – Focus on the 7th Mathematics Curriculum, and Choi's (2000) The Study of Comparative Analysis of South-North Korean Junior High School's Educational Process and Text Books in Mathematics. The most shared method to these studies involves analysis and comparison of the mathematics textbooks and curricula of North and South Korea, none of which conducted interviews with dislocated North Korean mathematics teachers or students in examining the reality of secondary school mathematics in North Korea.

METHOLODGY

The present study employs the in-depth qualitative interview as the principal research tool in an attempt to fully understand the reality of secondary school mathematics education in North Korea. Fifteen dislocated North Koreans—five former secondary mathematics teachers and 10 former students—now living in South Korea were interviewed. Teachers and students were asked different sets of interview questions designed to gather personal information and record their unique perspectives about their secondary mathematics educational experiences.

In-depth qualitative interviewing is studied by Taylor and Bogdan (1984) as "repeated face-to-face encounters between the researcher and informants directed toward understanding informants' perspectives on their lives, experiences, or situations as expressed in their own words." Such interviews are modelled after a conversation between equals, rather than as a formal question-and-answer exchange, in order to gather a life history or sociological autobiography; learn about events and activities that cannot be observed directly; or to yield a broad picture of a range of settings, situations, or peoples. In any case, establishing rapport with participants is emphasized through repeated contacts over time for the development of a detailed understanding (Best & Kahn, 1989).

This study employed three-interview series, introduced by Dolbeare and Schuman (1982) and explained by Seidman (1991). A series of three interviews characterizes this style in which the researcher and interviewee meet three separate times in different settings. These multiple meetings allow the researcher and participant to uncover segmented personal experiences and connect them to understand the whole system in a proper context. The first interview was dedicated to an initial acquaintance with the subject, addressing their family and educational background, and so on. The second interview was devoted mainly to collecting information about the subject's experience. The third interview, finally, was devoted to clarifying details that remained vague. The approach not only made it possible to study the subjects' educational experience more deeply, but also enabled the interviewer to establish closer relations with the subjects, thus helping to overcome their apprehensions.

The interviews conducted for this study were semi-structured in nature. They were comprised of rather comprehensive questions concerning the subjects' biographies and educational backgrounds. Questions concerning their experience as teachers or students and the educational system as a whole were also included. For example, the questions posed to the former teachers about their work experience included questions about typical lesson structure,

what the interviewee saw as typical student behavior, the best and worst students that the interviewee remembered, how grades were given and assignments selected, professional development, and so on. At the same time, the interviews evolved rather freely; the conversation followed the stories told by the subjects and sometimes went beyond the limits of the originally prescribed plan. When the collected materials were analyzed, the episodes described by the subjects were juxtaposed and compared, and subsequently encoded and classified into groups (Glaser & Strauss, 1967).

The selection of former North Korean teachers of mathematics for participation in the study was affected by their very small number among dislocated North Koreans. According to the official records (Information Center on North Korea, 2012), there are 22,128 dislocated North Koreans in South Korea and only 458 are classified as professionals such as doctors and teachers. It is safe to assume that a very considerable proportion of dislocated North Korean secondary school mathematics teachers were interviewed. As for dislocated former students, there were naturally larger numbers to choose from. The initial pool of prospective participants was gathered through the student organization of dislocated North Koreans. Subsequently, insofar as this was possible, participants with diverse backgrounds and experience were selected for the interviews; preference was also given to those who voiced a desire to participate in the project.

INTERVIEWS WITH NORTH KOREAN SECONDARY SCHOOL MATHEMATICS TEACHERS

Five dislocated North Korean teachers who are now living in South Korea are introduced in this chapter. All five used to teach mathematics at secondary schools in North Korea, with teaching experience ranging from six to 25 years. In order to protect interviewees' identities, the five teachers are identified as Teacher A, B, C, D, and E. Teacher C who is now working for the Ministry of Unification in South Korea informed me during our interview that there are seven dislocated North Korean secondary school teachers in South Korea as of May 2006, five of them were contacted and interviewed.

Family and Educational Background and Political Orientation

Teacher A is from a well-educated and wealthy family. Her father was a researcher and her mother was a manager of a store. She graduated from one of the most prominent and distinguished teacher's universities in North Korea, "but I usually don't say that I graduated from that university. I feel ashamed…about the fact that I graduated from one of the best universities in North Korea, yet escaped from the country…." Even as a dislocated North Korean now living in South Korea, Teacher A seems to not only remember, but also dwell on the past. Throughout our interviews, she showed deep respect to Kim Il Sung, always referring to him as "the Great Leader, Kim Il Sung." It has been eight years since she taught in North Korea, but she still has portions of "Theses on Socialist Education" memorized verbatim.

As a high school student, Teacher B wanted to attend Kim Il Sung University and major in Journalism. While she qualified academically, she was rejected because of the family background check. To be admitted into the university, a student's entire family, including extended relatives up to third cousins, must have untainted and sound ideological and

political records. Anyone associated with South Korea or anti-communism activities in any form or were bourgeois would not be considered for admission. Since her second cousin lives in South Korea, Teacher B was not admitted and instead, graduated from one of the major teachers universities in North Korea. Just before she left for China, Teacher B was one of the most promising mathematics teachers who was recommended and accepted to teach at the First High School (special school for mathematically and scientifically gifted students) in North Korea. After experiencing the world outside of North Korea, she decided not to return to North Korea:

> I realized how much I can make and how little they (North Korean government) paid me, and I decided not to go back to North Korea. I was used and abused by the North Korean government. I devoted myself and poured out my passion and youth for my country, but they (North Korean government) just used me.

For Teacher B, it was a difficult decision to not return to North Korea since she was accepted to teach at the First High School in her region. It is one of the most admirable and respectable teaching jobs one can achieve as a mathematics teacher in North Korea, which also provided financial security. Not all the teachers interviewed were resentful about North Korean leaders or the government, but Teacher B disliked and disapproved the most out of the five interviewees.

Teacher C attended five years at a teacher's university which specialized in Mathematics, Physics, Chemistry, and Bio-Chemistry. Teacher C was brought up in a well-educated family, a common aspect of the teachers interviewed. Her mother was a principal for 25 years at an elementary school. After her mother graduated with mathematics degree from a teacher's university, she worked as a civil servant for several years before becoming a principal. Her father graduated from Kim Il Sung University, but Teacher C did not disclose her father's occupation. She felt that she should not be in South Korea since she has a well-established family in North Korea.

Throughout the interview, Teacher C did not make many political comments. She made a few politically neutral remarks about the socialist education system. Teacher C finds that it is difficult for foreigners to understand the North Korean educational system:

> When you try to understand the North Korean education, you should not compare it to the South Korean or American value system. If you try to comprehend the North Korean educational system with the American education system in your mind, of course it would make no sense to you. How can you homogenize each individual with different backgrounds and personalities? It seems impossible and incorrect with an American perception, but it would be right and acceptable to the North Korean education.

Teacher D attended a major teacher's university in the early 1980's. Teacher D was particularly proud of the history of her high school. She stated that Kim Il Sung and Kim Jong Il visited her high school in the late 1950's, which made her high school famous. Teacher D still identifies herself as a North Korean even after living in South Korea for the past nine years. She referred to North Korean people as "we," who included herself and she was highly doubtful of any unification between North and South Korea:

> There are obvious cultural differences and they (South Korean people and government) do not acknowledge or approve our qualification as a teacher. I think South Korea wants absorbed unification. I said to myself that North Korean people are not fools. You cannot trick us. The unification that South Korea wants would end up making North Koreans as their slaves.

Teacher D's viewpoints of secondary school mathematics education in North Korea were very tolerant and positive in regard to North Korean society in general. Even when talking about the March of Suffering, she commented that none of the teachers in her school were absent during the year they did not receive salaries.

Teacher E was born and educated in China until secondary school. She moved to North Korea in the late 1950's and started teaching at a middle school. Teacher E did not attend a regular teacher's university, but instead attended a special five-month course in North Korea for teachers. Immediately upon completion of the course, she was certified as a middle school teacher. At the same time she started teaching, she was also attending night classes in physics at a major university. She was forced to drop out as a sophomore when the Workers' Party of North Korea relocated her to work for the Party. After working for the Party for several years, she relocated to another city where she began teaching mathematics at a secondary school.

Unlike the other teachers, she did not learn about Kim Il Sung and Juche ideology in school. As the oldest of the teachers interviewed, she lived through all the changes North Korea has gone through:

> In the 1960's, 1970's and even the early 1980's, we thought that the socialism was the best idea. There were free education and free health services. Everything was provided by the government. All you needed to do was to work hard in your workplace. You really did not need to worry about what to eat or wear. The government distributed even the salt and the soybean paste. But these conditions progressed very differently. They (the government) stopped providing these daily needs and discontinued our salary. In the 1990's, it was the worst. You probably could not even imagine. It was not just you, but all your students in your classes did not have much to eat for several years. I was able to see the empty promises and decided to flee North Korea.

School System and Curriculum

In secondary schools in North Korea, the principal oversees the whole school, especially administrative and financial matters. The vice principal should be a member of the Worker's Party and work as a Secretary of the Workers' Party at his school. The vice principal manages teachers and is responsible for monitoring the educational ideology at the school. The vice principal also observes the curriculum and its implementation (Han, 1998).

Teacher B commented on a conflict that occurred between the principal and other teachers at a school that she taught. The dispute was related to the irrational system of a family background check in terms of the communist ideology:

> Our school principal was the son of a "*muh seum*" (servant or slave-like under the caste system) for the third generation in a row. You see, that is considered to be an ideologically sound family background in North Korea. So, he was somehow admitted into a teachers' university, graduated, and even became a principal. He was not an effective administrator at all, and was clearly under-qualified for his job. Many teachers did not cooperate with the way he administered the school and criticized him publicly during the teachers meetings, while others tried to be on his side for their own good. He (the principal) only promoted those flatterers and disclosed any faults from those who were against him. It was just a big mess. There was no harmony in it.

According to the teachers interviewed, not all schools' upper management level teachers were ineffective and inadequate in their job. For instance, the mathematics department head at Teacher C's school was a male in his fifties and was an excellent teacher and effective

administrator. He was also popular among the students. Teacher A never saw a female department head in a mathematics department even though there were more female mathematics teachers than males.

When Teacher B graduated from the teachers' university, she was well-known for her academic excellence. However, it was still very difficult to teach with no experience. Teacher B possessed the content knowledge, but she was not a seasoned teacher. What helped her overcome this were weekly moot classes where a teacher teaches a section to other mathematics teachers as if they were students. Teacher B was particularly impressed by one of her fellow teacher's pedagogy, where she commented:

> She was in our department and she was not the best in terms of the content knowledge. There were many other teachers who knew more about mathematics. But she was excellent in teaching. She did not try to cover all the materials. You see, a teacher like me who just came out of the university had a lot of content knowledge and tried to teach everything all at once. It was of course ineffective. She also spent a lot of time in the reviewing section. She collected all the basic concepts that was involved in the new concept and explained those basics one by one. She used very plain language that even a kindergarten child could understand. She explained all the words that were involved in these concepts as well. Then, I realized that was the secret for a successful lesson. When Kim was teaching a new concept, it was rather natural and easy. She just had to combine the basic concepts that were well explained and understood. It was an eye-opening experience to watch her teaching.

Despite frequent interactions with her fellow teachers through moot classes and teacher meetings, Teacher C found that she did not really open herself up to them partly because of the social structure in which North Korean teachers generally tend to be individualistic:

> It was hard for me to get to know the other teachers at a personal level. In our socialist society, we were monitoring each other. So, we did not talk about the things that were deep in our minds. Instead, we talked about the light and politically neutral things. We never talked about any political matters at all. They (other teachers) were friendly, but we never got to know each other at a deeper, personal level.

North Korea has a national curriculum that does not give students or the schools any choice. For instance, only one set of national textbooks for all the secondary students is available and the curriculum is strictly controlled by the Workers' Party and represents the educational direction of the Workers' Party (Han, 1997). Teacher D acknowledged:

> There is a curriculum guide for each grade in North Korea. The curriculum guide describes all the chapters and small sections of the textbook. It also tells you the amount of time you are supposed to spend for each small section. So, when you are making a teaching plan, you should follow the suggested time and date. It is possible to have a little variation, but you should keep up with the curriculum guide on a weekly basis. It is safe to assume that all the students in the same grade in North Korea would learn the same chapter and content approximately in the same week.

According to Teacher A, even the details of the date and time of chapter allocations is set and reinforced by the Ministry of Education in The Workers' Party:

> The curriculum guide is forwarded from the Ministry of Education. For example, if you are teaching a chapter on the quadratic equation, there are several sub-sections in the chapter. In the curriculum, it specifies the time we are supposed to spend for each sub-section on which week of the month. It is first delivered to the professional development center for teachers, and they deliver that to each school. Then, we have to make a lesson plan according to this curriculum plan. The lesson plan has to be approved by the department head and the vice-principal on a weekly basis.

As a socialist country, North Korea regards students as a whole rather than as individual students, as observed by Teacher D:

> Generally speaking, students need to know what they are expected to know as a member of the North Korean society. So, the vast majority of the students just need to know up to the secondary school materials, and that is enough for them.

Structure of a Mathematics Class

According to Teacher A, secondary school mathematics classes in North Korea consist of 45 minutes with five mandatory phases--*Dea Sal Li Gi* (Reviewing), *Sook Jea Gum Yule* (Checking Homework), *Dang Jung Chek Wha* (Reinforcing the Policy of the Party), *Sae Ji Sik Ju Gi* (Delivering New Knowledge), and *Da Ji Gi* (Fortifying the Knowledge). There is a 10-minute break between each class and all teachers receive a memorandum from the local board of education on the appropriation of time to each class (Han, 1998). Despite the rigidity of the class schedule, Teacher A found that:

> Forty-five minutes was not enough for me. I spent three minutes on Reviewing and seven minutes for Reinforcing the Policy of the Party. I never skipped the Policy of the Party section. Delivering New Knowledge are recommended for 15 to 22 minutes, however, it seemed rather inadequate to deliver the new content within that time. I always had to rush in the Fortifying the Knowledge section and had to quickly write homework questions on the blackboard.

During the three minutes of the Review section, Teacher A did not ask questions and only explained the main concepts from the previous class. When she asked questions, she usually got frustrated because no student would respond and then was not able to allocate the rest of the class time appropriately.

Dang Jung Chek Wha—Reinforcing the Policy of the Party

Even in the mathematics classes, Juche ideology was imposed in the form of *Dang Jung Chek Wha* (Reinforcing the Policy of the Party). Teacher A recalled:

> When I was a student at a junior high school, my Algebra teacher was really good at Dang Jung Chek Wha (Reinforcing the Policy of the Party), so it was very effective and moving. Many students literally cried with burning patriotism. Then, I was thinking to myself that I would also like to be just like him in teaching the Dang Jung Chek Wha. Back then, I did not even know what it all even meant. However, many of us (students) were strongly motivated by it.

Teacher A identified herself as one who contemplated on the Dang Jung Chek Wha (Reinforcing the Policy of the Party) much more than other teachers. She thought about the most efficient and effective way to incorporate the Policy of the Workers' Party in her mathematics classes. There is no guidebook or teacher's manual for teaching this section, but some materials were provided when she attended the teacher education programs that were held every summer and winter break. Teachers have to come up with how to connect the Policy of the Party with the materials that they present in class. The process of preparation, according to Teacher A, is time-consuming:

> Preparation of a class includes everything. You have to prepare what to review for how many minutes, what to teach as the new knowledge, and what to present as the Reinforcing the Policy of the Party. You have to prepare a full report with detailed description and time allocation plan for each section. This report has to be done and approved on a weekly basis by the mathematics department head, school office manager, and the vice-principal. It was such a time consuming process with a lot of paperwork. Sometime later, I often reused the Reinforcing the Policy of the

> Party from the reports from a few months ago. However, one of the mathematics teachers in my school was really enthusiastic about the Reinforcing the Policy of the Party section. He used to collect articles from the *Rodong Newspaper* (one of the major daily newspapers in North Korea) to use in this section.

In teaching this section, teachers could also use ideas developed by other teachers. Teacher A remarked that, at times, she used ideas that were already documented. Some were not particularly good examples; she stated that in about half of her classes, she used ones that she did not agree with or like. Teacher A also found that some mathematics sections were more challenging than others in their application to Reinforcing the Policy of the Party. Not all teachers were as enthusiastic about this section of class as Teacher A. Teacher E did not mention this section of class much. With more than 20 years of teaching experience, Teacher E remarked that:

> Most of my Reinforcing the Policy of the Party sections was not interesting and it became a routine. It usually started with what Kim, Il Sung or Kim, Jong Il said and how they were such an important and brilliant instructions that can help and improve our lives. Students usually did not pay much attention on this and I often skipped the section or made it really brief. When you do the moot classes (see Appendix A) or if someone observes your class, you pay more attention to the Reinforcing the Policy of the Party section. However, when you teach a class, you hardly have enough time to just cover the contents.

Most of the teachers interviewed were not enthusiastic about teaching the Reinforcing the Policy of the Party section, which was one of the mandatory phases of class time allocated by the Worker's Party of North Korea. By allocating time for the teaching of this section in all classes, students are taught socialistic ideology and the policies of the Workers' Party are promoted and engraved.

What Commonly Happened in Their Mathematics Class

The teachers interviewed explained how they taught their usual mathematics classes. This may not provide a comprehensive and detailed description of all secondary school mathematics classes in North Korea, but may reveal important characteristics that are common to mathematics classes. Many anecdotal evidences are recollected for a better and more realistic understanding of a typical mathematics class in North Korea.

Teacher A stated:

> When I checked the homework, I did not check them by myself. I formed five small groups in the class and selected a student who would be in charge of each group. I also asked my students to have a separate notebook for the homework. The student who was in charge of the group would collect the homework from the group and check it. So, I only have to see five group leaders to check the homework.
>
> As they moved from the second semester of the second grade to the first semester of the third grade, mathematics content becomes more difficult and complex. It usually starts with the introduction of the quadratic equation and its application, especially the word problems. When we were solving the word problems, many of them (students) were not sure about what to set as a variable x. I had to spend more than half of the total class time to explain it. I did not even want all of them to understand. I just wanted eighty precent of my students to understand the material. But, I was always never sure whether they understood the material or not.

According to Teacher A, parents and students in North Korea have a certain preconceived notion about mathematics. If a student is good at *Korean Language*, it would be understood that the students speaks well, but if a student is good in *Mathematics*, it was considered that the student is smart and regarded as a genius. Teacher A emphasized that this prejudice puts extra pressure on students.

Teacher B taught at a rural school and was a very enthusiastic and skilful teacher. On average, rural schools typically send only one or two students from the entire school to college or university, but after just one year of teaching, she managed to send five students to university and four students to technical college. Teacher B recalled:

> When I enter the classroom, the class president says 'Stand Up and Attention.' Then all the students stand and salute to me. Then, I also say hello to them. After that, I ask them to sit down and ask the class president to report the attendance. Then, I must state 'Let us begin our class.' I usually check the homework first. To save time, I appoint a row-head for each row and ask the row-head to check the homework before we start our class. All the homework is already on my desk when I enter the classroom. Then, I select a few students and ask them to redo some of the homework problem on the blackboard. They also have to explain the solution to the rest of the class. Then, I move onto the Dea Sal Li Gi (Reviewing) section. I spend enough time in this section. I have to deliver a well-structured Dea Sal Li Gi (Reviewing) section in order to do be effective at the Se Ji Sik Ju Gi (Delivering New Knowledge) section. I really tried my very best, and students perceived that. None of my students disliked or disobeyed me.

Motivating Students to Study Mathematics

Teacher B who taught at a rural school commented that some rural schools did not even have one student who was admitted to a college or university. Most male students join the military service for 10 years after graduation from secondary school. Teacher E remarked that her son went to the North Korean Army at age 17 and came home at the age of 27. Other males were allocated to a work place after graduation. Therefore, it was not easy to motivate students to learn mathematics. Teacher D stated:

> For those boys who did not want to study mathematics, I used to tell them that they need to study mathematics because one day they might have to answer mathematical questions that their children might ask in the future. I explained that if they were not able to answer those questions, it would be so embarrassing.

I also said to those boys who were planning to join the military service right after their graduation that they need to study mathematics because they would use mathematics even in the army. I said that they might have to calculate degree and range for artillery weapons.

Mathematic Teachers and the March of Suffering

During the March of Suffering, survival of the nation was challenged. It was particularly difficult and painful for Teacher A in describing this period. After Kim Il Sung's death, the economy suffered greatly:

> I remember that after July 1994, it became dramatically more difficult. After the death of our Great Leader Kim Il Sung, there were a lot of economic sanctions from the outside world. The economy of North Korea plunged severely and the government stopped paying our salary. It was very difficult to survive as a teacher.

About the March of Suffering, Teacher A replied that:

> Actually, you could say that it started right after the Korean War in 1953. But, it became noticeable around 1986. Many teachers came to school without having any meals and some of them even fainted during the class. Many of them were carried out to the nearby hospital. Of course, some of these teachers had to take care of their family as well. As a result, some teachers asked for an official leave to find some food. About half of the teachers were out to find food, and it became almost impossible to operate our schools. We had to appeal to the local board of education and they gave 10 days of food instead of the whole month. However, even this was only in 1991 and after that, any support was completely stopped. We did not get any food or money at all. It was even more difficult for elderly and disabled people. They also did not receive anything and most of them died.

Not many of the teachers quit teaching because they did not have any other means of getting food even if they stopped teaching. Teacher A herself thought about quitting, but she was unsure she could get another job. Even during the "March of Suffering," North Korea did not give up on the educational system. The limited resources were concentrated towards gifted students, where Teacher A stated:

> The students who were selected to go to the First High School were usually from a wealthy family. The wealthy had more resource to educate their children, and parents were very determined to send their children to the First High School. So, those who taught at the First High School were getting paid about 50% to 60% of the salary.

Teacher D pointed out that attendance at her school gradually dropped to 70% and recalled that morning classes would operate normally but afternoon classes were often cancelled because the teachers had to go elsewhere to find food. One reason why the North Korean educational system was able to survive during the March of Suffering was because teachers were relatively free from materialism. Teacher B noted that:

> You should always remember that North Korea is a socialist country. The main driving force of the society is not money, but a revolutionary socialistic ideology. In a way, we (North Korean teachers) were protected from materialism. We were educated to work not because we were getting paid, but to participate as a member of the society who would achieve the socialistic revolution. The government may be corrupted and doing all kind of awful things, but the people is still naive and innocent. That may be one of the reasons why the North Korean teachers kept on teaching without any paycheck for all those years.

The entire nation suffered greatly during and after the March of Suffering, when the economy collapsed. People were dying of starvation, yet, North Korea maintained its educational system, focusing on the gifted and special schools such as the First High Schools to preserve the next.

Probability and Statistics Section

The chapter "Probability and Statistics" is relatively new in North Korean secondary mathematics. This chapter was introduced in the sixth grade mathematics textbook published on May 4th, 2002 (Li et al., 2002). Out of 84 content pages, "Probability and Statistics" covers 24 pages. Teacher D learned probability and statistics at her teachers' university, but never had to understand the subject in depth since she did not have to teach the subject:

> I studied the conditional probability and all these statistical tables after I came to South Korea. Even though I learned the probability and statistics when I was in the university in North Korea, I knew that I did not have to teach the subject. So, I did not pay much attention to the subject.

When shown the 2002 publication, Teacher C was surprised to see that probability and statistics were included:

> I did not know they included the probability and statistics section in the textbook. When I was a secondary school student, I did not learn anything about probability and statistics. I learned probability and statistics when I was in the teacher's university. I thought that it was an interesting subject, but the concept itself was a little strange to me.

In a socialist country such as North Korea, neither probability nor statistics was regarded as important concepts. The development of probability was necessary for gambling in a capitalistic society and statistics helped to predict social phenomena closely related to insurance (Park, 2001). Regardless, gambling, casinos, the lotto, stock market, or insurance companies do not exist in North Korea. For instance, in the textbook, the concept of probability is introduced with an example using a die, which is preceded with a physical description of a die since North Korean students do not know what a die looks like (Li et al., 2002).

INTERVIEWS WITH NORTH KOREAN SECONDARY SCHOOL MATHEMATICS STUDENTS

Ten dislocated North Korean students who were former secondary school students in North Korea were interviewed to better understand the reality of North Korean secondary school mathematics. The students have diverse backgrounds in terms of their age, location of their secondary school, and family background. In an attempt to protect their identity yet distinguish their diversity, these 10 students were identified as Students A through J. Students A, B, C, and D are currently working in South Korea. Students E, F, G, H, I, and J are students in South Korean universities. Student A, B, and C graduated from secondary school before the March of Suffering. Student D, E, F, G, H, I, and J graduated from secondary school during the March of Suffering.

Characteristics of the North Korean Education System

One common response from interviews with the dislocated North Korean students is the emphasis of North Korean education on unity of the country and conformity of the group rather than individual development or creativity. Therefore, individual differences were overlooked over uniformity in North Korean education. According to Student C, even school identity was not encouraged in North Korea. Instead of a school song, students learned songs that praised Kim Il Sung and Kim Jong Il. There are no school marks, symbols, or name tags on school uniforms either. According to Student G, only a picture of Kim Il Sung is found on their badges.

As a closed nation, North Korea closely monitors any person or information that crosses the border. However, this is not the only barrier that North Korea has. From interviews with former North Korean students, it was found that these students not only did not know much about the outside world but also did not know much about each other. Limited public transportation between different parts of North Korea and control of communication and media by the Workers' Party of Korea do not allow those in different provinces to have access to information regarding other provinces and cities. Student I never met the other students from different provinces when he lived in North Korea. The fact that North Korea is a closed

society, internationally and nationally, is discouraging for most North Korea students. Many students end up living in the same area they grew up. Student I comments:

> When I was in a secondary school, I knew that I would end up like my parents who were working at a factory. My father graduated from a different secondary school but my mother graduated from the same secondary school that I attended. My mother and I even had the same mathematics teacher. I knew that I had a slim chance to get into a college or university. Even if I graduated from a local college or university, that would not guarantee a better future for me.

The March of Suffering and North Korean Education

The nine consecutive years of negative economic growth in North Korea affected various aspects of education. Students A, B, and C were in college and the other interviewees were in secondary school during the March of Suffering. This period of time affected all of them deeply, with all recalling incidents related to the March of Suffering as students. Student A was in college during the beginning of the March of Suffering and remembers that

> It was extremely difficult time. I was in a dormitory and the meal was just a small bowl of corn and a salted radish soup. You would never see a piece of meat or even a drop of fat or oil. I could not concentrate on studying because I was hungry, especially during the evening hours.

Student H noticed that teachers became distressed and anxious and were regularly absent from school regularly to find food for their family. Each teacher would take a month off during the semester to trade products for food. Oftentimes, teachers would only teach during the morning and then, in the afternoon, were at the market selling. Student H recalled one teacher who made candy and sold it in front of their school. "In the beginning, teachers were still trying to retain their dignity among students. But later on, they even brought goods in class to sell them to their students…Teachers became shameless and gave up all the dignity…"

Reasons Why They Studied Mathematics

Students A, B, C, and D graduated from secondary school and went on to attend universities in North Korea. Student A studied Mathematics in secondary school to prepare for the university entrance exam. The same was true for Student B, who added that his mathematics teachers pushed them to study because if the average exam score dropped, it was the teacher who was blamed. It was possible for teachers to be fired for low student performance, "so they never hesitated to use stick and it worked. We had to study and do our homework in Mathematics; otherwise, we got the punishment."

Student C attended class for academically advanced students and noted that competition among students was highly promoted and intense. "The teacher used to give us one or two difficult questions and asked us to compete with each other to solve them correctly and quickly. I remember that I had to force myself very hard not to get behind in the competition."

Student J's motivation was that the mathematics teacher would reward students with a piece of bread for those who had done the homework. "My mathematics teacher's mother used to sell bread in a market place. It seems so foolish but many of my friends did their mathematics homework just to get the bread."

Student G stated he studied Mathematics in a secondary school because the mathematics teacher would publicly humiliate students with poor grades. While the majority of students would join the military, others found it difficult to motivate them to study mathematics

simply because they were required to. The principal would blame the teachers for students' low performance. " Therefore, our mathematics teachers got really angry at the students with lower grades. They did not hesitate to use stick or verbal abuse to push their students."

Difficulty in Mathematics

Many students who participated in the interview commented that mathematics was a difficult subject for them. Student A found Spatial Figures in the fifth grade textbook particularly difficult chapter for him and his friends. He also notes that "there is not much difference between the sixth grade mathematics and the first year college mathematics." For instance, differentiation and integration are covered in the sixth grade mathematics textbook, where "the level and difficulty of the sixth grade mathematics were fairly difficult."

Student D found mathematics difficult from the fifth grade onward. He would volunteer to solve problems when he was in the fourth grade, but had trouble with Exponential Functions and Logarithmic Functions in the fifth grade and after that, he totally lost interest in Mathematics and did not pay much attention to the subject. Student D also lost interest in mathematics by the fourth grade when learning geometry. "I don't have any structural understanding of mathematics since the few things that I understood did not connect with each other."

Mathematics Class in Secondary School

In terms of class time allocation in secondary school in North Korea, mathematics is allocated the most time, composing of 18.6% of total class hours (Han, 1998). According to the 1996 curriculum guide published by the North Korea Ministry of Education, mathematics is supposed to be taught seven hours per week for the first and second grades. It is also scheduled to be taught six hours per week from the third to sixth. However, Student D states that the actual mathematics hours were between three to four hours per week. Once winter and summer breaks and labour work (Students in North Korea are required to work on a farm or construction site depending on where they live) are excluded, there are not many weeks to learn mathematics. Actual teaching weeks came out to be around 24 to 28 weeks during the school year.

Student G's mathematics teacher in the fifth and sixth grade had a special seating scheme. The best mathematics students sat in the front row in front of the teacher's desk and were referred to as the "first group." The rest of the students sat in the next rows in progressively descending order so that those who did not care much about mathematics sat in the last two rows of class.

Student B was required to memorize all of the formulas in the mathematics textbooks. A common pedagogical approach taken is to memorize not only the basic formulas but also all other formulas derived from these basic formulas. Student B reflects, "I always thought that one should understand the formulas instead of just memorizing the formulas without much understanding, but our mathematics teacher was strictly enforcing us to memorize the formulas." Student E responded that he did not learn much mathematics in secondary school. He commented it was a very difficult time to focus on studying because they were constantly tired and hungry.

Student G recalled mathematics class was a painful experience. His mathematics teacher from fourth through sixth grade would punish students who did not complete homework or could

not solve problems on the blackboard. Student G described how the teacher asked the parents to make some long wooden sticks that were as tall as the teacher and as thick as his wrist. The teacher would then use the stick to punish students. "He usually hit the student in the head with the stick. He did not just pretend to be hitting. He really hit hard and the teacher broke several sticks by hitting his students."

Mathematics Teachers

Student A's sixth grade mathematics teacher was female and he visited the teacher's house after school whenever he needed extra help. Student A described her as "really nice and smart" and was "very enthusiastic about teaching mathematics" and often invited students over for help." Student A took advantage of this particularly when he was studying for his university entrance exam. Student B recalled his fifth grade mathematics teacher as the best. She was single and often stayed late at school teaching and supporting students. Student B described her as very knowledgeable, "very humble," and "eager to teach." "It seemed that she almost lived in school. She was available to the students almost all the time."

Student C had three mathematics teachers during secondary school, but his fifth and sixth grade teacher had the most content knowledge. This teacher had 20 years of teaching experience and was well respected among both teachers and students and later became a vice principal at another school. This teacher focused on those who wanted to learn mathematics but had low tolerance for disruption. Some mathematics teachers were not able to control their classroom. Student D recalled that his fifth grade mathematics teacher would cry in front of class because of students' misbehaviour. It did not help that she was young and had little experience.

CONCLUSIONS

This research attempts to answer a question by interviewing former North Korean secondary school mathematics teachers and students: What are characteristics of secondary school mathematics education in North Korea in terms of its concepts, goals, and structure? One observable characteristic of North Korean secondary school mathematics is the strong ideological and political influence of the Worker's Party. While mathematics is generally viewed as a politically and ideologically neutral subject elsewhere, Juche ideology and the policy of the Party, imposed in the form of *Dang Jung Chek Wha* (Reinforcing the Policy of the Party), are mandatory in every North Korean mathematics class. The section of Reinforcing the Policy of the Party is not always enthusiastically implemented in each mathematics class as it was instructed to be done. Yet, the North Korean government stubbornly emphasizes this section's importance in mathematics classes and in professional development programs, and also strictly imposes observed inspections to make sure this section is being taught. A totalitarian society is totalitarian precisely because its reigning ideology is omnipresent.

Participants are former teachers or students who either taught or studied mathematics in North Korean secondary schools between three to 25 years ago. While they came from schools in different provinces, their experiences in mathematics classes share certain traditional or common ways of teaching and learning. For instance, commonalities were found in the typical proceedings and the structure of mathematics classes.

North Korean secondary school students attend mathematics classes six or seven times per week depending on their grade level. In reality, students have fewer mathematics classes because of the effects of recent economic difficulty. Each class is 45 minutes long and incorporates several phases, such as a teaching section on Reinforcing the Policy of the Party. While there are similarities and differences in teaching methods and styles among the teachers, all agree that specific instructions from the local board of education are required to be observed during mathematics classes. Many teachers and students agree that mathematics teachers are well-respected and have authority. Although it is not permitted officially in school policy, physical punishment in mathematics classes is socially and culturally acceptable among students, parents, and teachers.

The March of Suffering affected every aspect of secondary school mathematics education in North Korea where the teachers as well as the students had to endure extremely devastating economic difficulty. As a result, general secondary school mathematics has been neglected and deserted. Most interviewees agreed that during this time of difficulty, it was impossible to teach or learn mathematics because they were too hungry to concentrate. Teaching hours and mathematics content were compromised as well.

There appears to be a disconnection between equality based on socialistic ideology and reality in North Korean secondary school mathematics. While North Korea emphasizes socialism as its main governing ideology in its promotion of equality for all people, in reality, equal opportunity is not provided or promoted in the context of secondary school mathematics. The lasting effect of the economic difficulty has only widened this gap. For example, because of limited resources, focus turned towards gifted education, such as the First High Schools, in order to educate and produce the next generation leaders and workers. In mathematics, students are situated in the classroom by their mathematical ability and teachers favour the brightest, who sit at the front of the classroom.

In North Korea, there is one set of national textbooks for all secondary students and the Workers' Party of Korea strictly controls the curriculum. The curriculum guide is forwarded from the Ministry of Education in the Workers' Party and contains detailed instructions, including specific time allocation for each topic to be covered. It is clearly apparent that the North Korean government has full control over the mathematics content and curriculum that is being taught.

As a socialist country, North Korea does not have insurance, stock market, and gambling, which discourages the need to teach probability and statistics. Yet, inclusion of the chapter "Probability and Statistics" in the secondary mathematics textbook in 2002 was considered a necessary change to adapt to international circumstances, such as the changes taking place in the Soviet Union and in China. In the end, the chapter "Computer and Programming" was replaced by the chapter "Probability and Statistics" in 2002.

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