



Comparative Study of Mathematics Education in Fiji and Japan

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Comparative Study of Mathematics Education in Fiji and Japan

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フィジーと日本の数学教育に関する比較研究

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ABSTRACT

This comparative study on mathematics education in Fiji and Japan highlights the similarities and differences in the education systems used by the Japanese Government's Ministry of Education, Culture, Sports, Science, and Technology (MEXT) and the Fijian Government's Ministry of Education, Heritage, and Arts (MEHA). The two countries have seen educational exchanges over the past centuries. Despite differences in culture, locality, climate, resources, and technology, there are several similarities between Fiji and Japan's education systems. According to the results of the Programme for International Student Assessment (PISA) between 2012 to 2018, Japan was ranked among the top 10 countries. However, there have been concerns regarding mathematics achievements in Fiji. Strong ties between two countries will aid in improving mathematics education in Fiji. There have been numerous reforms and initiatives requiring a pedagogical shift to more learner-centered approaches.

1. Introduction

1. 1. Background

The Ministry of Education, Heritage and Arts (MEHA) is the ministry in Fiji responsible for overseeing the country's education system. The Ministry is tasked with conducting and delivering educational services to all Fijian students. The Ministry has numerous

responsibilities—advising the government, providing administrative and management support, sanctioning policies and acts, and providing learning resources such as textbooks. The Ministry is also tasked with making and distributing external exams to schools all over the country. Primary and high/secondary education in Fiji is compulsory and free for 8 and 5 years, respectively. In Fiji, multicultural

and multiracial schools are under the guidance and administration of numerous religious organizations. The Fijian Ministry of Education subsidizes the educational fees and other related costs and hence makes education affordable for everyone. There are four universities in Fiji: Fiji National University, Fulton College, The University of the South Pacific, and the University of Fiji. Fiji National University is the main university and is comprised of various colleges, namely the colleges of medicine, business, agriculture, humanities, engineering, Fiji's National Productivity Organization, and the Fiji Maritime Academy. Fulton College is a Seventh-day Adventist church institute based in Nadi. The University of the South Pacific is a regional Pacific university, with its head office in Suva and a number of campuses in the Pacific islands. The University of Fiji, based in Lautoka, was set up by a religious group.

The government provides free education to primary and secondary school students, including free textbooks and bus fare. Compulsory education in Fiji is as follows: early childhood (ECE)/kindergarten (1 year) beginning at age 5 for 1 year, primary for 8 years, and high school for 5 years. There are 900 early childhood institutes, 737 primary schools, 173 high schools, 17 specialized schools, and four universities in Fiji. The government owns 13 schools ("Ministry of Education, Heritage and Arts: About us-Statistics," 2020). Others are owned by communities and faith-based organizations. A subsidized bus fare scheme for primary and secondary students for those who come from families with a combined income of less than \$15,000 was also rolled out by the government to ease access to school, and was extended to those traveling by minibus, boats, and carriers.

Education in Japan is governed by MEXT and the current system started after World War II when it began its 6-3-3-4 arrangement (Nuffic, 2020). In the OECD's Programme for International Student Assessment (PISA) aimed at fifteen-year-olds, Japanese students recorded high levels of achievement, particularly in mathematics and science. Educational activities outside of school are also abundant, and programs leading to advanced education have been implemented.

Enrollments in high schools, the second-half of secondary education, have reached over 90%, and enrollments in college are also over 50%. Admission to high schools and colleges is mainly through entrance exams, held from January to March. The level of education in Japan is high, even by world standards (Cave, 2001, p.173).

1. 2. Research Question

What are the similarities and differences between Fiji and Japan in terms of the school system, educational issues, the mathematics curriculum, and mathematics textbooks?

1. 3. Objective of the Research

The purpose of this research is to compare the educational systems in Fiji and Japan. This study will explore the similarities and differences between the educational systems in the two countries in terms of the school system, educational issues, the mathematics curriculum, and mathematics textbooks.

2. Methodology

Methods of data collection are closely associated with the research methodology (Denscombe, 2014). Seven methods were used to collect, interpret, and analyze the data and

information for this research. The methods are as follows:

- Reading collecting/interpreting/analyzing data from the internet, books, and journals.
- Lectures (Fig. 1) led by Professor Hiroshi Ishii and discussions during class helped to gain knowledge about the Japanese education system.
- Preparing presentations for seminars (Fig. 2) helped to establish most of the points that will be discussed in this research.
- Watching videos about Japanese teaching methods and carrying out lesson observations.
- Observing mathematics lessons in Hakodate Elementary School and carrying out lesson

observations.

- A questionnaire comprising of open-ended questions (Johnson & Christensen, 2012) was designed to gather data to send to three Fijian teachers who are currently teaching in Japan.
- Interviewing a senior Fijian teacher who had taught for 28 years in Fiji and has been teaching in the Tochigi Prefecture for the last 10 years because the ultimate goal is to understand individual experiences, with the belief that reality is subjective and constructed by the individual (Lather, 2006).

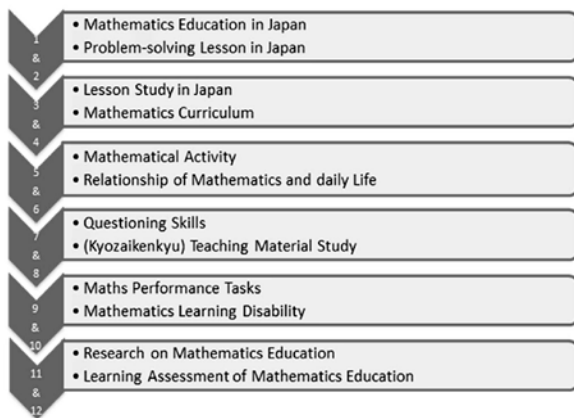


Fig. 1 Lecture Topics

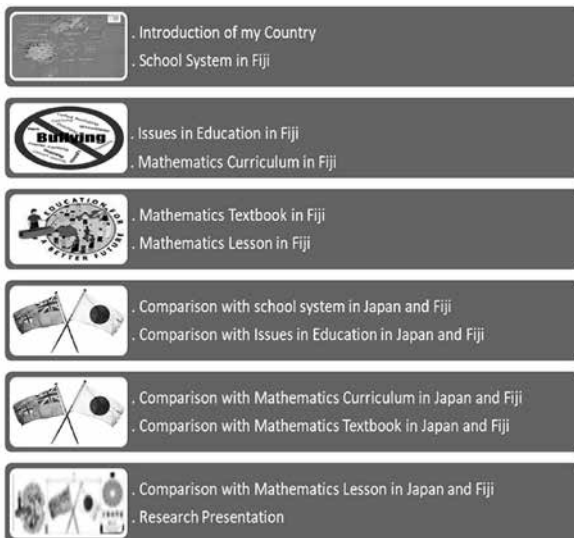


Fig. 2 Seminar Presentation

3. Issues to Be Discussed.

3. 1. School System in Japan and Fiji

The Fijian education system started in 1835 when missionaries started informal education to teach people to read the Bible. The education department was established in 1916, 105 years ago. The formal name for our Ministry of Education is the MEHA. On the other hand, the Japanese education system started during the Edo period when informal education was about teaching life skills. The Ministry of Education was established in 1871, and its formal name is the Ministry of Education, Science and Culture.

Formal education in Fiji starts at kindergarten level at age 5, and it lasts for 1 year, whereas in Japan, the age requirement for entry is 3 years, and it is a 3-year program. Primary school in Fiji and Japan begins at age 6. Primary school in Fiji lasts for 8 years (ages 6-13 years), whereas in Japan, it is 6 years (ages 6-12 years). High or secondary school in Fiji lasts for 5 years (ages 14-18 years); whereas in Japan, there are two high school levels-lower high for 3 years and upper high for 3 years-following the 6-3-3-4 education system.

The tertiary education system in both countries can be seen in the table below:

Table. 1 Years of education at tertiary

FUJI	JAPAN
1. Trade Certificate – 1-2 years	Associate Degree – 2 years
2. Diploma – 2-3 years	2. Certificate or Licence – 2 years
3. Bachelor’s – 3-4 years	3. College of Technology – 6 years
4. MBBS- 7 years	4. Bachelor’s – 4 years
5. Post Graduate- 1 year	5. Specialized Education - 7 years
6. Masters – 2 years	6. Masters – 2 years
7. Doctoral – 2 years(after Masters)	7. Doctoral – 3-4 years(after Masters)

(Fig 3.)

The academic calendar in Fiji and Japan is divided into three terms. In Fiji, it starts and finishes in the same year, whereas in Japan, the academic year finishes in the following calendar year. The first term in Fiji begins in mid-January for 14 weeks, the second term starts after 2 weeks for 14 weeks, and the final third term is 13 weeks. The academic year finishes at the end of November for an eight-week holiday. However, in Japan, the first term begins in the first week of April and finishes in mid-July, the second term begins in early September after the summer holiday and finishes around the 25th of December and schools close for the winter holiday. Term 3 begins in early January and finishes in late March.

The subjects taught in Fiji at primary school are as follows: English, Social Sciences, Mathematics, Basic Science, Physical Education, Music, Art and Craft (PEMAC) Healthy Living, Languages (Hindi, Fijian, Urdu, and Rotuman), Extra Curricular/Clubs (Scouts, Gardening, Girl Guides etc.), Moral Education, and Gardening.

The subjects taught in Japan at primary school are as follows: Japanese, Social Studies, Mathematics, Science, Life Environmental Studies, Music, Manual Art, Physical Education, Moral Education, Foreign Languages, Home Economics, Special Activities, and General

Learning.

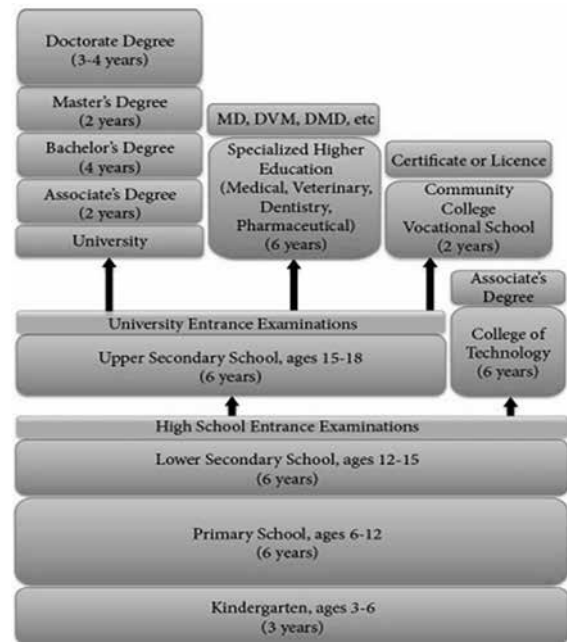


Fig. 3 Schooling years

English is the medium of communication except for language classes (“Ministry of Education, Heritage and Arts: About us,” 2020), whereas in Japan, Japanese (Nihongo, Hiragana, Katakana and Kanji) is the medium of communication (“Ministry of Education, Culture, Sports, Science, and Technology: Education-Overview,” 2021).

3. 2. Issues in Education

3. 2. 1 Medium of Communication

Since English is not the mother tongue of students in Fiji, it is difficult to teach other subjects in English and the language at the same time. Students in lower grades find it difficult to understand concepts taught to them in English as some are still struggling to understand the language, and it becomes a burden to learn a different subject in English. On the other hand, in Japan, all subjects are taught in Nihongo, so it is very easy for students to understand what is being taught. Students understand more when things are

taught in their mother tongue. The teaching of English is now one of the major focal points in the Japanese education system so that students are well equipped for the global world rather than confining them to Japan only (Stevenson, 1991, p.116).

Compared with the Japanese education system, I believe it is better to teach children in their mother tongue rather than using English as a medium of communication (Benson, C., 2005). Yadav, M.K. (2014) also states that students understand better when they learn in their mother tongue. Since students in Fijian schools are multilingual, it would be difficult to implement such an idea. If it was implemented, it would mean segregating Indo Fijian and Fijian, which could then highlight the differences between the two groups of people in the country.

3. 2. 2 Examination

In Fiji, examinations are very important from primary school through to high school. However, in Japan, they are not given that much importance. Students in Fiji do internal examinations every year beginning in Year 1. There are five external examinations for students in Fiji in Years 6, 8, 10, 12, and 13. Year 13 external examination results are used for students to get a placement at university. Even if students fail, they advance to the next grade in both primary school and high school. In comparison, students in Japan do an entrance examination from various universities to obtain a placement. Students find it difficult and can become frustrated because they have not yet experienced a major exam in school.

The Japanese education system should have major external examinations for students so that they can get a feel for examinations while

in school, as Yildirim (2007) and Johnson, & Johnson (1996) have highlighted that only having entrance examinations later on in school puts students under a lot of stress and can cause depression. These exams should not be used to eliminate students but instead should allow them to gain confidence and experience when participating in major examinations.

3. 2. 3 Bullying in Schools

The alarming rate at which cases of school bullying have increased is a concern in both countries. In Fiji, MEHA has organized awareness regarding this issue and set up school counselors for students who are bullied and also the culprits. There are also district and national counselors who deal with cases of national concern. If bullying is not stopped, the students who are bullied will not feel like coming to school and this could lead to higher rates of school drop-outs. Even the Japanese Education Ministry is working hard to put a stop to school bullies. There are rules and policies set up to deal with this issue. I believe these things could be eliminated from the school system if we educate about values in daily school life. We have implemented values education in our schools and have seen positive changes in the behavior of students.

3. 2. 4 Absenteeism

It has also been noted that in both countries, absenteeism is a major issue. There are various reasons for the issues, depending on the country. For example, in Japan, the education system is in a critical condition. For example, a 2019 survey by MEXT found that 110,000 junior high school students were defined as absentees. The reasons that the students in question cited most commonly for not attending school or for

avoiding regular classes were “aversion to the atmosphere of the class as a whole” (44%), “worries about school studies” (36%), “problems with friends” (29%), “worries about relations with teachers” (23%), “experiences of being bullied” (21%), and “inability to adapt to school rules and regulations” (21%). In Fiji, the problems are different, such as parents cannot afford books, clothes, etc., sickness, and truancy.

3. 3. Mathematics Curriculum

3. 3. 1 The Three Levels of Curriculum

The intended curriculum in Japan is prepared at national level in alignment with national policy. The curriculum is different in both countries depending on the year and level. Not all of the intended curriculum can be covered by teachers because of a shortage of time or an inability to teach the topics. Since the implemented curriculum is not covered due to various reasons, students do not attain the intended outcomes as per MEXT’s requirements.

In Fiji, the syllabus is prepared by MEHA in consultation with experts in different subjects. It is later provided to schools for implementation. Teachers make a yearly plan called an UOW/SOW/LTP. Likewise in our country, some of the intended curriculum is not implemented for reasons such as a shortage of teaching time due to factors like school closures because of natural disasters and COVID-19, or at times because of a shortage of teachers. So, in Fiji, since the intended curriculum is not covered due to various factors, students do not master their learning as per MEHA’s requirements.

3. 3. 2 Curriculum Revision and the Learning Pyramid

The last revision of the curriculum in Fiji was done in 2015 whereas in Japan, it was in 2020.

The last time it was reviewed in Fiji is not same as it was done in Japan, the later one has a recent review than Fiji; and also the period by which the review takes place is also not same compared to Japan. Reviews are done in consultation with officials from the ministries, JICA, NZAID, AUSAID, and other delegates from international agencies. As shown by this learning pyramid (Fig 4), students learn more through teaching others. This is the same in our country as we have students in groups and they teach each other in their groups. More learning is taking place through peer teaching (Prakash, H. 2019).

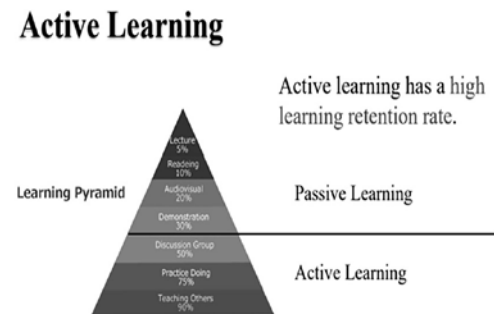


Fig. 4 Learning Pyramid

3. 3. 3 Curriculum Management

In Japan, teachers work in collaboration to create lessons in their different subjects. Also, teachers work with the community to improve school education. We also do that in Fiji, as we believe that all stakeholders such as parents, MEHA, school committees, and other relevant stakeholders are important components in curriculum management. Likewise in Fiji, teachers work together to make UOW/SOW/LTP align with the syllabus provided. They later make workbooks, exam papers, and other resources and share these on a “Fiji Teachers” Facebook platform.

The “Systematic and Abstract” concept to categorize the characteristics of the mathematics

curriculum is used in Japan. This also has an characteristic of the curriculum difficulty level increases each year. The same method is used in Fiji. Each year, the difficulty level also increases, for example, in Year 1, numbers up to 100 are taught (1-3 digit numbers), but as the level increases, the difficulty increases to 4-7 digit numbers (Prakash, H., 2019).

3. 3. 4 Curriculum Content for Primary School

The strands taught in Fiji and Japan at different age levels are also different. The strands taught in Japan (Fig. 5) at various age levels are as follows:

- Grades 1, 2 & 3-Numbers and calculation, Figures, Measurement, and Utilization of Data.
- Grades 4, 5 & 6-Numbers and calculation, Figures, Change and Relation, and Utilization of Data.
- Junior High- Numbers and expression, Figures, Function, and Utilization of Data.

Strands taught in Fiji (Fig. 6) at various age levels are as follows:

- Year 1 & 2-Number, Measurement, Shape and Space, Patterns, and Chance and Data.
- Years 3 & 4- Numbers and Numeration, Algebra, Measurement, Geometry, and Chance and Data.
- Year 7 & 8- Numbers and Numeration, Algebra, Measurement, Geometry, and Chance and Data.

Mathematics Curriculum System in JAPAN

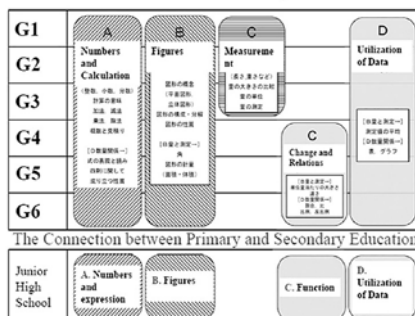


Fig. 5 Mathematics Curriculum in Japan

Mathematics Curriculum for Primary Education

Year Levels	Early Childhood Education	Years 1 & 2	Years 3 & 4	Years 7 & 8
Strands	1. Number	1. Number	1. Numbers and Numeration	1. Numbers and Numeration
	2. Measurement	2. Measurement	2. Algebra	2. Algebra
	3. Shape and Space	3. Shape and Space	3. Measurement	3. Measurement
	4. Patterns	4. Patterns	4. Geometry	4. Geometry
	5. Chance and Data	4. Chance and Data	5. Chance and Data	5. Chance and Data

Fig. 6 Mathematics Curriculum in Fiji

3. 3. 5 Similarities and Differences in Curriculum Content

Some of the similarities and differences in the curriculum content (strands) of the two countries are listed below.

Table. 2 Similarities and differences

Similarities	Differences
Some of the content that is similar in both curriculums is as follows: Numbers Measurement Data	Some of the differences in the content of both the curriculums are as follows: A. Fiji Numeration Shapes Space Algebra Geometry Chance Pattern B. Japan Calculation Figures Change and Relation Utilization of Data

3. 4. Mathematics Textbooks

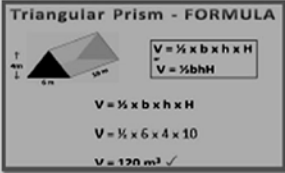
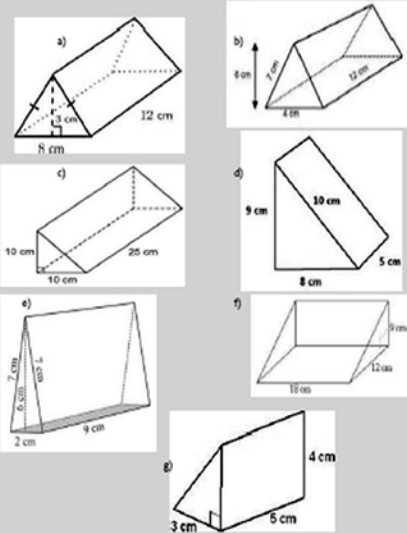
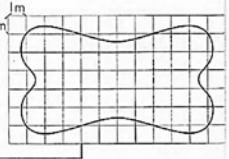
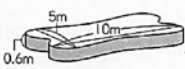
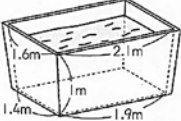

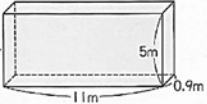
All textbooks in Fiji are prepared by the Curriculum Development Unit (CDU) of the Ministry of Education (MEHA). These are done

in consultation with mathematics teachers in Fiji, CDU mathematics staff, and JICA/AusAid and NZ Aid curriculum advisors. The last curriculum review was carried out in 2015 along with revised versions of the textbooks. Textbooks are to be used only as resource, i.e., teachers should not teach everything exactly as in the textbooks, but they should teach the syllabi. The Educational Resource Center (ERC) then publishes the books and distributes them to all schools in Fiji. The same textbook is used throughout Fiji. Every year, textbooks are issued to students, and teachers ensure that students keep the books in good condition so that they can be used by the next batch of

students. The class teachers send a request to the Head of School for the number of books to be requested from the ERC. The textbooks are distributed by strand and topics/sub-topics. Each sub-topic has its specific notes, examples, and activities. The textbook is written in English. Teachers use the questions from the book as classroom activities and homework. Usually, out of ten questions, six will be used as classroom activities and four as homework.

On the contrary, textbooks in Japan are written and published by private companies. The textbooks vary throughout the country. Different prefectures have different publishers and the textbooks also differ as per the year/

Table. 3 Year 6 Mathematics Textbook in Fiji and Japan

<p>VOLUME OF TRIANGULAR PRISM</p> <p>Triangular Prism - FORMULA</p>  <p>$V = \frac{1}{2} \times b \times h \times l$ $V = \frac{1}{2}bhH$</p> <p>$V = \frac{1}{2} \times 6 \times 4 \times 10$ $V = 120 \text{ m}^3 \checkmark$</p> <p>Exercise 3.2B</p>  <p>72</p>	<p>◎ およその体積</p> <p>① 右のような形をしたプールがあります。プールの深さはどこも0.6mだそうです。プールにはいる水の体積はどれくらいですか。</p>   <p>② 右のような水そうがあります。この水そうを直方体とみて、どれくらいの水がはいるか計算しましょう。</p>  <p>③ 次のような石を直方体とみて、およその体積を求めましょう。</p>  
<p>(Ministry Of Education, 2014)</p> <ul style="list-style-type: none"> ● Textbook is written in English. ● It has the topic at the top. ● Notes, formula, and an example are given for students as a user-friendly book. ● A lot of activities on the topic are also provided. 	<ul style="list-style-type: none"> ● Textbook is written in Nihongo and is easy for students to understand. ● Activities on the topic are also provided, including more word problem types.

grade. Textbooks are given to students in their respective schools and are aligned to the national curriculum set by MEXT. The different publishers design their own books and seek approval for them to be used in schools. Once approval is given to a particular textbook, it is then published and goes to print. The publisher then sells the books to different schools as per their requests. The publisher retains the copyright for that particular textbook. There are two textbooks, whereas in Fiji, all the content is in one book. The textbooks are distributed by topic. There are notes, examples, and activities on each topic. The textbook is written in Nihongo, which makes it easier for the learners to understand. Teachers can use activities from the textbooks and also make their own activities.

4. Conclusion

This comparative study on mathematics education in Fiji and Japan has shown similarities and differences in the education system between the two countries. One of the similarities is that both countries have changed their curriculum and designed strategies to improve the teaching of mathematics. Another similarity is that in both countries, student-centered learning is promoted.

On the other hand, there are a lot of differences between the education systems. The school system is set up in different ways: 6-3-3-4 and 8-5. The curriculum is different in terms of the strands that are taught during different years. The way textbooks are published is also different. However, the education system in Japan is seen as one of the best in the world, hence in Fiji, we should re-align our strategies and pedagogies to enhance the education

system in the country.

References

- Benson, C. (2005). The importance of mother tongue-based schooling for educational quality. Commissioned study for EFA Global Monitoring Report, 24.
- Cave, P. (2001). Educational Reform in Japan in the 1990s: 'Individuality' and Other Uncertainties. *Comparative Education*, 37(2), 173-191. Retrieved from <http://www.jstor.org/stable/3099656>
- Denscombe, M. (2014). Good research guide: For small-scale social research projects. Retrieved from <https://ebookcentral.proquest.com>
- Gainey, P., & Andressen, C. (2002). The Japanese education system: Globalisation and international education. *Japanese Studies*, 22(2), 153-167.
- Gunnarsdóttir, B. (2016). Japan's Educational System. A Few Main Points and Recent Changes in the Educational System (Doctoral dissertation).
- Johnson, B., & Christensen, L. (2012). *Educational research: Quantitative, qualitative, and mixed approaches* (4th ed.). Thousand Oaks, Calif.: SAGE Publications.
- Johnson, M.L., & Johnson, J.R. (1996). Daily life in Japanese high schools. Clearinghouse for Social Studies/Social Science Education, Indiana University.
- Lather, P. (2006). Paradigm proliferation as a good thing to think with: teaching research in education as a wild profusion. *International Journal of Qualitative Studies in Education*, 19(1), 35-57. doi:10.1080/09518390500450144
- Ministry of Education, Heritage and Arts: About us-Statistics. (2020). Retrieved from <http://www.education.gov.fj/statistics/>
- Ministry of Education, Culture, Sports, Science and Technology: Education-Overview. (2021). Retrieved from <https://www.mext.go.jp/en/policy/education/overview/index.htm>
- Ministry of Education. (2014). *Mathematics Year 6*. Suva.
- Nuffic. (2020). Education System in Japan. Retrieved from <https://www.nuffic.nl/sites/default/files/2020-08/education-system-japan.pdf>
- Prakash, H. (2019). Perspectives of Lower Primary Teachers Implementing New Numeracy Strategies in Maritime Schools in Fiji.
- Stevenson, H. (1991). The Elementary school Education. *The Elementary School Journal*, 92(1), 109-120. Retrieved

from: <http://www.jstor.org/stable/1002079>

Yadav, M.K. (2014). Role of mother tongue in second language learning. *International Journal of research*, 1 (1), 572-582.

Yildirim, I. (2007). Depression, Test Anxiety and Social Support among Turkish Students Preparing for the University Entrance Examination. *Eurasian Journal of Educational Research (EJER)*, (29).

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