

RESEARCH REPORT

INTEGRATED MATHEMATICS AND ENGLISH IN COUNTING SONGS: A WAY TO BOOST YOUNG LEARNERS' INTEREST IN LEARNING NUMERACY



IAIN PEKALONGAN

DEWI PUSPITASARI

CHUSNA MAULIDA

LEMBAGA PENELITIAN DAN PENGABDIAN KEPADA
MASYARAKAT (LP2M)
INSTITUT AGAMA ISLAM NEGERI (IAIN) PEKALONGAN
TAHUN 2019

CHAPTER I

INTRODUCTION

1.1. General description of the areas of concern

A current research about new science evidence of the brain and mathematics learning in the United Kingdom is reported showing the incredible potential of the brain to change and grow. This means that there are no limits for any child to learn math as a dogma that learning math usually requires a math gift or brain to learn the subject. Incorrect values and negative attitudes towards mathematics have had a devastating impact on the teaching and learning of mathematics in our society. Intense negative emotions surrounding mathematics are not uncommon and are known as 'math trauma' or 'math panic.' Mathematics, more than any other subject, has the power to crush students' spirits, and many adults do not step away from school mathematics if they are negative (Boaler, 2015). This research promotes an understanding that learning mathematics can be fun, especially if it is integrated along with music. Some research imply that music is a good medium of learning, that learners enjoy song to verbal presentation (Calvert & Tart, 1993), hence there is positive support for music in the mathematics learning (Southgate & Roschino, 2009). This is to counteract the misunderstanding even in the USA, as stated by Lee & Ginsburgh (2018), that young children are not ready to study mathematics. Mathematics, in some of them, is important for bright kids with the genes of mathematics. Based on the conception of the conflict between mathematics and other subjects, in this case language (e.g. English as a medium)–from the experience in these current years, most students in Indonesia have dichotomized the two. To support this, based on an interview with students in English Department of IAIN Pekalongan exposed that most were afraid to mathematics when they were in elementary schools and it continued to now hence they choose English Department program. This is an irony as there is a correlation among the two – that “the language a child speaks affects the rate at which they learn number words, and hearing number words in natural conversation – not just in counting routines – is a critical part of learning the meaning of numbers”. This is supported by the fact that language and mathematics should not taught inclusively, especially for young learners. Harper & Jong (2004) mentioned that through the skillful use of adjusted talk, realia, graphics and role play, teachers can make even very complex

information accessible to ESL pupils. It is teachers' responsibilities to plan both conceptual and linguistic development for students in order to meet grade level standards for all students. They must therefore develop the skills to integrate language and content instruction. In short, teachers need to be able to identify language needed to learn in the content area, for instance in term of mathematics teachers need to recognize that the vocabulary of mathematics poses special challenges for students.

The term of literacy of language, mathematics, and science are interrelated. Internationally, these three aspects are the benchmark of high or low quality of education, as responded by The Program for International Student Assessment (PISA) which consists of developed industrial countries (the Organization for Economic Cooperation and Development, OECD). Assesed periodically every 3 years, Indonesia belongs to these countries.

Students become literate as they develop the knowledge, skills and dispositions to interpret and use language confidently for learning and communicating in and out of school and for participating effectively in society. Literacy involves students in listening to, reading, viewing, speaking, writing and creating oral, print, visual and digital texts, and using and modifying language for different purposes in a range of contexts.

Both are important aspects of mathematics and literacy. Through language literacy, students develop mathematics skills as they learn vocabulary related to number, space, measurement and mathematical concepts and processes. At a higher level, this vocabulary includes synonyms, technical terminology, passive voice and common words with specific meanings in a mathematical context. However, in the case of young learners, the level is in basic terminology. In this context, students learn the principle of numeracy: count, subtraction and addition. Students use this language and mathematical literacy to understand and interpret problems and instructions which have special language characteristics of mathematics. This knowledge will allow students to use their literacy to ask and answer questions, solve mathematical problems and to debate, develop and explain solutions (Harper & Jong: 2004).

Based on the facts mentioned, this research aims to propose a preliminary project to be introduced to children – integrating the two subjects in one package: the use of english counting song to learn the two: English and Mathematics (Numeracy).

1.2. Statement of Problem Limitation

Considering that the focus of English songs is broad topic of Teaching English for Young Learners therefore our theme was related to two themes: English and Numeracy. The participants of the research were young learners in 2nd grade in Batang Regency. Again, the research aims to answer two problems:

- How teacher presents the integrated Mathematics and English songs to young learner aged students?
- What blocks the learning and how to overcome it?

1.3. Significance of the Problem

So far, little is known about young learners interact with song to learn English and mathematics. Many of the published articles concern and emphasize only on one aspect (language or mathematics) without integrating the two. The aim of this research is to explore an alternative perspective that prioritizes and concerns to children. Additionally, very little research has been undertaken to investigate the potential benefits of song to language and mathematics learning.

The integrated theme in EYL setting is expected to be beneficial as supplementary ideas for teachers of English to broaden the perspective of thoughts, that teaching English does not solely exploit students to accomplish tasks, nor finish text-book task-oriented. In accomplishing meaning-making learning, considering that teachers must provide students a learning chance to develop students' engagement and critical thinking is a must. This relates to tailoring the English materials to learner's character in this case is young learners.

For the young learners, this learning experience will facilitate them to undergo different learning stages. This is important to build their confidence, that learning language and mathematics can be integrated in a fun way.

1.4. Previous Research

Hepner (2007) conducted a study entitled "Integrating Math and Language Arts in the Classroom: A Study on the Effectiveness of Math Journals on Language Skills Needed to Solve Word Problems for Third Graders Learning English as a Second Language." He emphasised the children's mastery in language arts and mathematics at the

elementary level as outlined by the no Child Left Behind Act. Having positive result on the integration of math word problems and writing skills from five-weeks intervention of math journaling in a third grade classroom, there was a chance of future research in the use of English songs to learn numeracy.

Kelley & Knowles (2016) in their study mentioned that due to the need of improvement, STEM education is driven by environmental and social impacts of the twenty first century. Though this was to answer the challenges the USA experienced massive STEM educational reforms in the last two decades, based on the result of the study, in practice, STEM educators lacked cohesive understanding of STEM education. The process of integrating science, technology, engineering, and mathematics in authentic contexts can be as complex as the global challenges that demand a new generation of STEM experts. Educational researchers indicate that teachers struggle to make connections across the STEM disciplines. Consequently, students are often disinterested in science and math when they learn in an isolated and disjointed manner missing connections to crosscutting concepts and real-world applications. This gave a research gap on the need of integrating different elements in education, for instance: mathematics and language aspect.

Fantuzzo, Gadsden, McDermott (2011) reported on the development and field trial of an integrated Head Start curriculum (Evidence-Based Program for Integrated Curricula [EPIC]) that focuses on comprehensive mathematics, language, and literacy skills. Seventy Head Start classrooms (N = 1,415 children) were randomly assigned to one of two curriculum programs: EPIC or the Developmental Learning Materials Early Childhood Express, with curricula implemented as standalone programs. EPIC included instruction in mathematics, language, literacy, and approaches to learning skills; formative assessment; and a learning community for teachers. Multilevel growth modeling through four direct assessments revealed significant main effects and growth rates in mathematics and listening comprehension favoring EPIC, controlling for demographics and special needs and language status. The study resulted that both programs produced significant growth rates in literacy.

Prochazkova in 2013 wrote Mathematics for Language, Language for Mathematics indicating that there is mutual influences and benefits of Mathematics and language in Content and Language Integrated Learning (CLIL). This paper encourages teachers to apply it for adult learning context.

Mulwa in 2014 presented “The Role of the Language of Mathematics in Students’ Understanding of Number Concepts in Eldoret Municipality, Kenya.” The paper was conducted on the same background, a poor result of students’ understanding in mathematics, and the objective of the study is to investigate the extent to which meanings of some mathematical terms are understood and/or confused by students for whom English is a second language in Eldoret Municipality, Kenya. The difference is that no song is used in the research, and the participants are not young learners but grown ups.

Trinick et al in 2016 conducted a research “More than Counting Beats: Connecting Music and Mathematics in the Primary Classroom.” Their research is based on the fact that the use of songs and chants as aids for memorising information such as number patterns and names of geometrical shapes is common practice in early childhood centres and primary classrooms. In their research they examined the thinking processes involved in music and mathematics learning, there are more profound connections between the two domains that could enhance mathematical learning, in this case the combination of music and mathematics and the analogous concept development may arise equates to more than a sum of the constituent parts.

Fullan and Campbell (2006) in their research entitled “Improving Student Achievement in Literacy and Numeracy: Job-Embedded Professional Learning” reported that there is a need for teachers to develop a deep knowledge of literacy and mathematics pedagogy in order to understand and develop effective work when dealing to various students.

CHAPTER II

REVIEW OF LITERATURE

2.1. Literacy of Language & Numeracy

The idea of using song was based on the early childhood literacy and numeracy of Australian governments: Building Good Practice. As the theoretical basis and direction of operations, Vygotsky's fundamental theory of the ZPD and Scaffolding was used by two methods, adult supervision and parental regulation. All types of events have been registered and used as information to resolve these research issues. Vygotsky zone Proximal underground development in children at the cognitive level. The capacity of children is assumed to be impaired by the solution of external and internal issues, including "parent supervision" and more competent people in the provision of childcare and support. Proximal development zone (PDZ) is what the child can do independently without help (the ability the child can demonstrate), and what he can do with or after another person's careful guidance (teacher, parent, peer). Scaffolding is a specific type of help that the teacher offers the child in the SPD, characterized by joint participation in, negotiations and involvement in an activity, along with the monitoring and maximisation of child participation by carefully modulating the type of assistance provided and withdrawing the amount of adult aid carefully provided to keep the child in the ZPD (Winsler, 2003).

2.2. Song as a Media of Learning Literacy of Language and Numeracy

Teachers and students engaged in practical activity need mathematics and language teaching not only separately, but both memorize the two without the skills necessary for responding to an extensive question. This is in line with Halliday's (1988) who found out that learning language means learning to say. Mathematics and language in this context means that the language of mathematics involves learning how to use a language that is more than just understanding and responding to words in solitary trust, and how to render and express the same mathematical meanings (Mulwa, 2014). Language exists along with math, as it takes more than words and symbols to be conveyed if a person learns Mathematics. Voicing math is a compatible language for the person.

In relation to song, research on song and students' engagement has received large attention among scholars. Song has been reported to be not only an efficient learning tool, but also an exciting learning experience for participants and that song lyrics can be used to carry information, music can elicit memories, and melodies can activate recall of thoughts and ideas (Jensen, 2000; Jourdain, 1997; Governor, Hall & Jackson (2013). Their memories and melodies activate thoughts and ideas. In some study, such as Governor Hall & Jackson (2013), the value of incorporating song in related subjects has been expressed in finding that integrating the song into other topics increases and accelerates learners' comprehension.

The study showed that the use of a song helps to better understand concepts and the comprehension of students through better content-based speech, presenting students with alternative examples and concepts and helping them to build concepts. While the subjects are not mathematics but science. The use of targeted songs involved students in the provision of situational and personal interests and provided a mnemonic device that recalls key content concepts. The use of songs has significance as they have been used to help students establish meaning; from a socio-cultural point of view, they reflect the source of student involvement; and from a cognitive point of view. Teachers who are in a position to make enjoyable learning can consider the use of song to make abstraction or theoretical material more understandable, not just in engaging the students in the content. It can also be of particular benefit to encourage discussion on the topics presented in a story.

The structure linguistic and musical offers a first-hand training of listening skills and linguistic facilities, responding to Howle (1989), by recalling children's mental rehearsals, in which the words they hear but still do not understand are rather lullabies than kiddie songs. These are made insightful by the flow of words while the child learned prosaic vocabulary. In the context of the literacy and numeracy campaign, special subjects for songs related to the allied topic were thus decided.

2.3. Guidelines in Classroom Implementation

The process of intervention here are not solely based on the criteria of introduction, implementation, and evaluation, but following the concepts of Action Research of Kemmis and Taggard (1988). The difference here as it does not solely on cycles only but it is the modification of the work of Stringer, Christensen & Baldwin (2010) as our research foundation; that the approach to action research as

applied to teaching is based on a simple LOOK > THINK > ACT heuristic that frames both the instructional work of the teacher and student learning activities. The three components act as a compass or map that guides teachers through the systematic steps of a process of inquiry. There are three stages covering Observe – Reflect – Think – Act - Reflect, Act – Observe – Reflect – Think – Act – Reflect repeated orderly.

In the Observe stage, the teacher should find out what problems hamper the students and s/he will find a way to answer their need. We call this as an intervention aiming on how to bring solution for students.

CHAPTER III

RESEARCH METHODOLOGY

3.1. Research Context

The site of this study is an Islamic Elementary School located in Pekalongan, Central Java, Indonesia. The school has a population of more than 200 students with different socio cultural backgrounds. Most of the students are bilingual (e.g. Bahasa Indonesia and Javanese). This study covered for two months from June to September 2019.

3.2. Participants

20 students participated in this study. They are both boys and girls, having homogenous age and similar social background.

3.3. Research Instruments

Several data collection methods were employed in the research, including observations, informal conversations with students and interviews with experts regarding learning materials and engagement theory to collect in-depth information.

3.4. Class observation

Observation is one of the main instruments for the evaluation in this research. The prime aim of observations is to identify difficulties which students encountered in the learning process.

3.5. Informal interview

An informal interview was conducted during the learning process, as well as before / after the class session. Each conversation lasted for 15 - 30 minutes. The interview was conducted in the mix of Bahasa Indonesia and English, depending on students' ability and comfort in using it. This was a reflective process, as an evaluation for the next stage, and this is able to inform students' attitudes about the newly developed materials.

3.6. Triangulation

This is done to cross check the data to the research participants in order to avoid the massive bias and subjectivity.

3.7. *Research Design*

As a descriptive research and in accordance to ethical research procedures we asked permission to the parents in advance in conducting the research. In a study that lasted for two months, we visited the school for six times, observed the activities, and during this fieldwork we took position as the insider and outsider to bridge the gap between research subjects with us, as researchers (Bruce et al. 2011). The researchers actively involved in the learning process as the learning initiator and conceptor. This was done as the teacher in the class is not from English background, hence one researcher actively helped the design of learning, from the selection of material to the implementation of the project.

The project covered two data collection methods: observations and informal conversations with students. The prime aim of observations was to identify difficulties, which students encountered in the learning process. All process was recorded and pictured to be narrated as the research data. Informal interview was conducted with students before / after the class session. The interview was conducted in Bahasa Indonesia and Bahasa Jawa, depending on students' ability and comfort in using it. This was functioned as a reflective process, as an evaluation for the next stage, and this brought positive contribution on problems hampered by students about the materials used.

CHAPTER IV

RESULTS AND DISCUSSIONS

4.1. Stages in Conducting the Research

A preliminary step was coming to school to deal with the school's collaboration permit. The researchers confirmed for any support from the school: the headmaster, students, teacher, and parents as one ethique in research dealing with young learners.



Picture 1

Building Communication to Schools

In this stage, the researcher communicated to some teachers, asking whether English was still taught in the Elementary or not, and the result found was the subject was no longer taken for core subject but in *mulok* term (additional hours). This motivated us to implement some interventions to bring positive impact to these young learners as the effect of the removed English from Elementary School curriculum.

A further discussion initiated from a dialogue among two researchers, two young elementary school and seven volunteers resulted to a design of intervention to help young learners to know English vocabulary more in different format: English integrated with Math aspects. We agreed that some songs would be taken into the consideration that songs are powerful media to learn. Songs are effective for the development of language, cultural and entertaining features as they can be used to teach and develop every aspect of a language (Dzanic & Pejic, 2016). In the use of literacy of language and numeracy, song can help learners. Another evidence of the need to learn mathematical vocabulary is evidenced through some research suggesting that there is a link between language and mathematical development that students with both a math and reading disability are less adept at solving complex story problems and had a poorer understanding of key conceptual

principles in computation than students with a mathematics disability only (Thomas and friends). Another support is that vocabulary understanding is a must as it is a major contributor to overall comprehension in many content areas, including mathematics. Effective methods for teaching vocabulary in all content areas are diverse and long standing. Teaching and learning the language of mathematics is vital for the development of mathematical proficiency. Students' mathematical vocabulary learning is a very important part of their language development and ultimately mathematical proficiency (Riccomini, et al).

The first stage to conduct was Observe – Reflect – Think – Act – Reflect. As we would deal with English for young learners' class, we decided to start with easy level material. In class 5 and 6 some teachers introduce English through Modules, stressing most of in English structure; hence we would take different approach. As the target would be on the use of numbers in English, hence the teacher suggested to implement per individual. Sometimes, the teacher would have these young students grouped when needed.

The researchers along with the teacher of the class discussed the materials to be introduced to the students. Selecting material relevant to students age is crucial as the aim of the project aims to help students gaining literacy in numeracy as well as language literacy. In this stage we collaborated with some students when we selected the songs: Five Little Ducks, Ten Little Indians, and Five Little Monkeys. Among several videos in youtube, Cocomelon's Songs were chosen as the video is rich of colors. The students selected Five Little Ducks to be then implemented by the teacher in the following meetings, considering that the characters Indians are difficult for them to cope with. The theme of the songs were "duckies." To cope with the difficulties in drawing, we intervened the activities by using certain printed media.

In the collaboration, then the researchers analyzed the youtube video as the learning material. As the young learners in the school has not learned English, we committed to help them by adjusting to their level competency: beginner simple English. From various angles of videos, we analyzed the chances of using the pictures to be integrated into basic mathematics: numeracy.



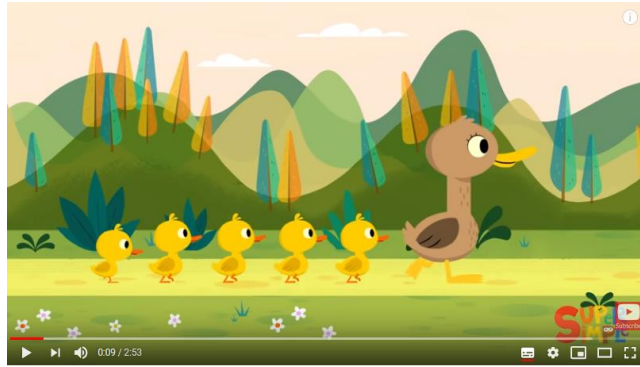
Picture 2

Youtube for Material Shopping

In Picture 1, the teacher will introduce some vocabularies: duck, yellow, one, two, three, four, five, big, small, mother duck, duckies, up, down, swim, etc. From angles to angles, we carefully selected the pattern of questions would be delivered to the children. We followed the criteria, simple questions for their level. Based on the discussions, the lists of questions covered minimal wh-questions such as:

1. What do you see?
2. How many ducks are there?
3. What are their color?
4. What happen to the ducks?
5. How many ducks are there?

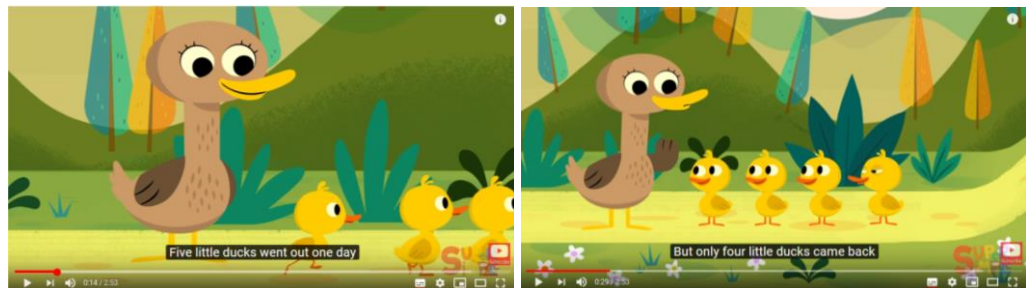
Again, the wh-questions were based on the flow of the songs. Basically, the questions would be based from the video, on what angles and points children might learn the two literacy. As seen in 0:09 it would be used for the opening. The teacher would introduce to the children about the words of mother, family, and ducklins. She might also introduced counting numbers orderly (one, two, three, four, five). In this point the researchers suggested the teacher to introduce a familiar sentence to children: “This is mother duck’s family.”



Picture 3

The Introduction of the Video

The next image could be cut in 0:14, for the chronological order of reduction. This would be started when the mother is left by the duckies to the hill. Five little ducks went out one day, over the hills and far away. In the lyric “Mother duck said quack quack quack, but only for little duck came back” the teacher would introduce the children to the $5-1 = 4$ through the visual image of 5 duckies minus one duck is equal to four duckies.



Picture 4

An Idea to Implement the Numeracy Literacy

These series of cutting the angle and used for the teaching material would be repeated until the minute 1:52 for the subtraction. $5-1 = 4$; $4-1 = 3$; $3-1=2$; $2-1=1$; $1-1=0$. This would be seen in “but none of the little ducks came back.”



Picture 5

In minute 2:16, the teacher would lead the students to learn “addition”, when in 2:12 a duck appeared, to minute 2”16 when all duckies gathered to the mother duck. In this, the children would experience $1+1=2$; $2+1=3$; $3+1=4$; $4+1 = 5$. Again, the notion of Integrated literary education is the cornerstone of the work because it is generally established to include reading, writing, math and social skills in order to obtain instruments of literacy. This definition of literacy reflects the opinion of teachers that success outside of school depends more on reading and writing than on mathematical capacity (Monroe & Eula 2010).



Picture 6

The idea of duck was applied also in the song of “Little Indian”, “Jumping Monkey” as they represented the similar plot of idea. Combination of learning media would be selected, from printed puppet, toys, drawing, and other game to accompany the song taught for children.

In the communication to teachers dealing to English learning, as agreed from the prior discussion, the researchers helped the teacher but not in the teaching process to reduce the children’s distraction. Hence, this was a collaborative work of the researchers and the teacher in learning media. In this stage, after preparing the material to be displayed

in front of students, the teacher communicated to the students that they would learn English for 2 months, that it would be different to the previous method as there would be songs in the learning process.

In this stage the teacher asked the students whether they wanted to learn English through song, and whether they wanted to learn numbers in English in the first meeting. In the process the children were enthusiastic to be involved in the program. However, some were shy to participate. From this, the teacher did a reflection, what should be done, and what could solve the problem. The shy students were not forced in the program. However, they were still involved. For the pronunciation of vocabulary in language aspect, what reflected from the process was that not all students were able to sing in English, therefore any pronunciation is accepted.

The second stage: Act – Observe – Reflect – Think – Act – Reflect. The students were introduced in visual reading stage. Several lists of questions were written on the board to build students' critical thinking.

Some questions in English were taken for the basis of data exploration, however these questions were translated into Bahasa Indonesia.

1. What do you see? *Lihat apa ya?*
2. Are the ducks big or small? *Bebeknya besar atau kecil?*
3. What are their color? *Warnanya apa ya?*
4. How many ducks are there? *Bebeknya berapa yang di video?*
5. What happen to the ducks? *Bebek – bebeknya kenapa ya?*

The visual reading stage was started by children observed the picture in the song. Some research assistants acted as co-teachers to help the young learners during the process. They helped these young learners to understand the text through the context of song. In Picture 7, the co teacher demonstrated vocabulary building in relation to nouns. She explained “sad” when the video displayed mother duck who lost the ducklings. Regarding the mathematics vocabulary, another co-teacher helped the young learners to cope with numbers and logical order in math. The focus was not solely in memorizing numbers but how to build the logic behind the calculation through the integration and enactment in social interaction. So far, in recent years, researchers have paid increasing attention to the role of language and social interaction in the learning and pursuit of mathematics as this interest relates to the function of language in both teacher–student encounters and in peer group activities. In some research, every instruction in mathematics

was replaced in a primary classroom by problem solving in small groups. It showed that the group activities provided useful possibilities for children to create their own ideas (Mercer & Sam, 2006).



Picture 7

Listening the Song and Watching Youtube Video

During listening the video, some gestures were taken into granted, for example in explaining numbers, the co-teachers role model to the students, one, to, three, etc by using fingers. Students did not only memorize the numbers, but they resulted in physical respond whenever they hear the numbers. Total Physical Response (TPR) is an understanding approach that students will respond to teacher instruction while students react to it through physical action (Savic, 2014). This listening and responding with action serves to understand meaning in the target language.

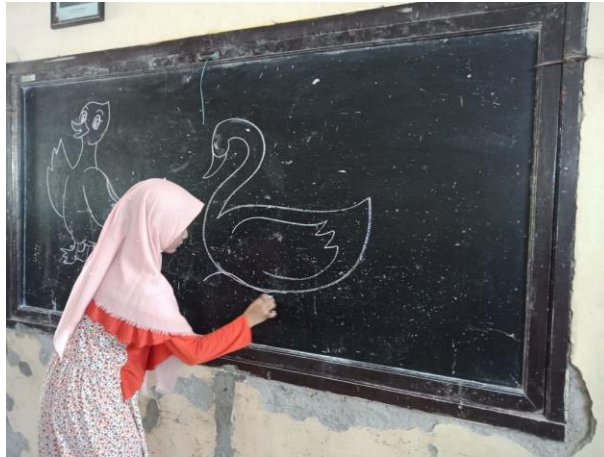


Picture 8

Students respond through total physical responses

The potential of TPR is that it enables young learners develop language skills and knowledge. It responds favourably to the children's need to be physically active, to learn language in a meaningful communicative contexts and stress-free atmosphere (Savic, 2014).). Picture 8 and 11 are the example of the implementation of TPR in the classroom learning. In picture 8 the image describes a co-teacher invited students to answer a question, while the students were eagerly answered to it. The reflection from the process was that the young learners were enthusiastically respond if the media of learning answers their needs. This is as suggested by Thissesn (2019) that emotion comes, after that comes cognition. This emanates that positive emotions tend to help people remember more complex things. Observed through the picture, although not all students reacted eagerly, most of the students enthusiastically responded to co-teacher's instruction when she asked them "who can list the number orderly". This was the reflection from a previous problem where teacher only listed several vocabularies traditionally in previous meeting. The teacher in the previous meeting helped these children by writing several vocabularies into the board. She helped them to pronounce the word one by one and repeated by the children. However, there was problem in the process. The reflection was that students were not all motivated in learning the target of learning. Baldi mentioned that "I don't know how to read," hence this became our decision to apply another act in the following stages. The focus was on the use of media learning to accompany the process.

The reflection of previous meetings was that as English is not taught as main subjects, students are not accustomed in it. Some were silent when they were taught to learn some vocabularies, hence the co-teachers must equip themselves with some other alternatives whenever the plan did not work well. Most of the activities cover were based on the TPR, in which the teacher or co-teachers gave command, introduced gradually and repeated until internalised by the class. In these series of project, we scaffold the young learners based on a sociocultural approach to literacy. Young children in this context are meaning-makers through their active participation in everyday literacy practices. In this term, teachers should also consider how to make sense of children's drawings and other non-verbal modes embedded in literacy practices. Hence, this became our idea to engage them in drawing, as a reflective aspect whether they understood the content or any instruction or not.



Picture 9

Co-Teacher Scaffolded Drawing

An example of scaffolding process was given when a co-teacher gave example for the young learners on how to do drawing. She motivated them to be confident, to draw any character they like from the song. “You need to be confident” became magic words to motivate the students although the

The theory was based on Clays Theory of Emergent Literacy (1975) in addition to ZPD from Vigotsky. The focus has been on the role of supportive social contexts to promote young children's literacy development from newborns to pre-schoolers before formal schooling begins. She argued that traditional literacy approaches (e.g. readability), lacked continuity in the development of literacy among children (1) between early literacy behavior (e.g. reading using books, graphics) and conventional literacy skills and (2) between reading and writing. According to Clay, development in literacy begins before children begin to receive formal primary education and, instead of sequentially, young kids develop their reading and writing simultaneously and interrelatedly. This concept of new forms of meditation by means of semithetical tools can be understood as transformation of children's development through social interaction with important persons (Clay & Cazden, 1990).

The theory of human development and learning by Vygotsky shows that literacy is a social process through which the fundamental, given or bio-determined processes of learners can be traced compared to many previous literacy studies, with discreet cognitive skills as identified through particular psychological structures that are increasing and changing during child development.. In addition to learning to read and write, the development of literacy means being able to use and create semiotic instruments (e.g.

gestures, drawings, language(s), mathematics, technologies) for communication and participation in a particular socio-cultural practice.



Picture 10

Engaging in Drawing & Coloring Activities

Another research supporting the use of drawing as meaning making literacy process is Kim (2011). He revealed that drawing helped these young learners in excelling literacy. In our project, these young learners were requested to draw anything that brought their interested. Some drew ducks, monkey, and Indians. They learned colors in color selection and through their narrative we found out that introducing vocabulary through song was a right choice as psychologically, they were happy in the learning process. In keeping with the notion of psychologic tools, Vygotsky's main objective seems to be to incorporate literacy growth into cycles of analysis and cognitive learning through Vygotsky's approaches for young children with diverse cultural and linguistic dimensions. Vygotsky combined thought and speech processes into the systemic, integrated phenomenon of verbal contemplation, taking into account interrelations between psychic systems with the aim of understanding humans. Rather than focusing on the autonomous development of single mental functions, he explored the dynamic and systematic interrelationship among psychological processes drawing upon the dialectical methodological approach. In this respect, although Vygotsky used 'word meaning' as the unit of verbal thought, he acknowledged all sorts of sign operations such as mnemonic techniques, works of art, various systems for counting, schemes, diagrams, maps, music and drawings beyond language itself. Therefore, literacy does not mean simply knowing how to read and write a particular language(s) instead it is embedded in socioculturally constructed authentic activities in which even young children, including young culturally

and linguistically diverse children, as active meaning-makers, negotiate, construct and create meanings using various semiotic tools with specific purposes and goals.

In the following project, we engaged these young learners in TPR based learning process. Some young learners were invited to join the puppet activity, combining two kinds of literacy: language and numeracy. In this process, the co-teacher commanded the young learners to hold puppets they like. She instructed based on the song. In “Five little ducks went swimming, only four went home” for example the students pointed how many ducks left. At first the students did not catch the instruction, but she patiently translate into Bahasa Indonesia. She practiced commands without performing the actions, and the students responded, demonstrated their understanding, and practiced together. After checking their understanding, the co-teacher gave the first command (*show the ducks*) to the class, and after the students showed their comprehension, the teacher commanded with series of instructions. In this process, the co-teacher introduced certain vocabularies to the students. Translation was not avoided to help the learners.

Some following instructions used by co-teacher in building communications with the students to check the numeracy vocabulary scaffolding and logical thinking were: “How many ducks?”, “show the ducks left”, “point the ducks”, “show your friends the ducks, please”, etc. This is in line with Bechler (2019) that most researchers agree that explicit vocabulary instruction is an essential piece in addressing low achievement on mathematics assessments. Here we conducted the project based on the belief that numeracy is not for memorization, but there should be well understanding behind it. Students would not only know numbers, but they would be able to relate why the song was “five ducks”, “four ducks”, “three ducks”, etc.

Sturgeon’s research in 2018 supported the idea that the concern of combining the two has called attention from the background that certain students often get distraction in memorizing or understanding mathematics. Hence this can be alleviated through interdisciplinary instruction and the benefits of pairing math and literacy abound. When merged, lessons incorporating both subjects spark interest. They are memorable and serve as a refreshing change of pace that involve children in innovative ways, thereby potentially enhancing learning as a result of increased engagement. Using literacy to present and review mathematical terminology and concepts has the added bonus of increasing the accessibility for verbal students (and teachers) who don’t consider themselves ‘mathematically-minded’. In addition to aiding instruction, literacy can also help teachers assess learning. Writing about math necessitates reflection, requiring students to organize

and consolidate their understanding. As such, it can serve as a powerful assessment, capable of discerning between rote memorization and true comprehension. In Sturgeon's experience teaching prekindergarten through grade one mathematics and language arts, poetry was reported effectively highlight the complementary nature of literature and math and can be an efficient teaching aid capable of successfully maintaining the integrity of both subjects. It was reported that she was able to adapt the previous lesson into a review of subtraction by working with her daughter to create a 10-line poem beginning with 10 words and ending with 1. This was challenging for her and did require more assistance than the previous lesson, not necessarily owing to challenging math, but because it is difficult to formulate thoughts that are progressively restricted. This proved that mathematics is inside any text, depending on the teacher's creativity. In sum, numeracy is along with literacy.



Picture 11

Engaging in Puppet Creation Activities

Engaging children in the text creation was the explanation from Picture 11. The children were given options to execute the next phase: puppet creation. They might choose to create it from the printed version, or their previous work. We prepared the tools: scissor, glue, straw, paper and stick. This was purposed to provide enjoyable learning. The pre-school education curriculum is play-based because learning through play is fundamental to young children in education. It helps them develop the necessary skills in life. For example, puppets provide an essential link between learning and play which makes them wonderful teaching tools for at home, pre-school, classroom and in the wider community. Puppetry is a teaching aid, rather than a teaching method. The use of puppets should be coordinated with the curriculum and the syllabus to work well for the children language

learning. There are many benefits of using puppets in the classroom. Puppets are an aspect of our history and everyday lives. They are valuable educational tools which can be used both for adult and young learners. As puppetry is primarily a visual art, it can communicate to people who are not literate or who do not understand spoken language and it has been used in this way for thousands of years. According to Jean Piaget's theory, puppets play helps young children develop creative and cognitive skills by forcing them to use their imagination. They make up the roles, the rules, the situations, and the solutions. It is through imaginative play that children come to understand the differences between fantasy and reality. The real world becomes more real to children who have opportunities to pretend. Firstly, the puppets can be used as a teaching tool in language classrooms (Çağanağa & Kalmıs, 2015). Puppets are not only entertaining but also captivating. Young children believe and relate to the puppets. In this, after creating the puppets representing ducks, Indian, monkey, the children continued to the use of it in building logic in mathematics. The co-teacher instructed "show me the ducks left now" and the children would point the numbers. By learning through this method children would know for example that number 1 is the result of 5 minus 4, not by memorizing only. This entertaining learning is believed able to bring positive learning impact to children as in the level of young learners, mathematical activities need to be embedded in everyday situations (Gross and Rossbach 2011) or that early learning needs to be based on play, even though the understanding of play itself varies (Gasteiger 2015). Furthermore, teachers might use a training programme for mathematics, to ensure that mathematical competencies are explicitly fostered. Ever since Friedrich Fröbel (1862) invented the kindergarten, mathematics has been a part of early childhood pedagogy. Fröbel was aware of the educational potential in play and games and developed his 'Spielgaben' (German = play gifts, in English called Froebel Gifts) – toys that embody mathematical ideas such as symmetry, shape, and number (Fröbel and Lilley 1967; von Marenholtz-Bülow 1887). He knew that mathematics is an important part of every child's daily life which helps them to understand the world around them. Moreover, in the twentieth century, working with mathematics in early childhood was mostly play based and rather implicit, and learning occurred incidentally. This is in line with what we offered to the integrated lesson.



Picture 12

The Use of Puppet in Song Games

Picture 12 described an activity through the use of puppet. The co-teacher invited the children to do sing stop motion games in Little Ducks Song. They turned around by listening to her instruction. For instance “Five little ducks went swimming one day, over the hills and far away, but only four little ducks came back.” By this, one student would stop and moved from the circle. This gave them information that $5-1$ is equal to four. The co-teacher helped them by giving the hand signal indicating 4. The combination of puppet was to let children experienced the imagination process of becoming the character of duck.

Therefore they respond to the children’s individual learning visually, aurally and kinesthetically. Peyton adds that puppets are beneficial for the students who learn the language kinesthetically. Moreover, they are teaching tools, which make lessons more fun than the tra-ditional classrooms. They make the lessons more active and lively and bring fun not only for children but also for the teachers who use puppets in their classrooms. Mishina and Wallace indicate that the puppets destroy the barriers between the teachers and students in the classroom. The teachers who try to keep themselves with a strict distance in the classroom become friendlier to the children with the help of puppets. This entertaining atmosphere in the classroom, which puppets create, makes the teacher to act more candid to the students. More-over the teacher’s strict looking in the classroom is

diminished. By this way, the barriers between the teacher and the students can be broken down and easier communication in the classroom is achieved via puppets. Then, both the teacher and the students in the classroom have fun in their learning and teaching processes.

While in Picture 13, the co-teacher motivated one of the young learners to be confident. Integrated mathematics and literacy is aimed in building learner's self-confidence as if the child experience negative learning atmospeher then it would impact on his/her keen to the subject in the future. The fact has shown that nowadays, early childhood mathematics is in the international spotlight. Partly this is the result of a myriad of studies that seem to show that early childhood mathematics achievement is a strong predictor of success or otherwise in future school mathematics, other school subjects and life itself (Perry & Dockett, 2008).



Picture 13

Engaging in Drawing & Coloring Activities

The introduction of vocabulary tailored to the context is very crucial as integrative vocabulary, that is the integration of word-recognition vocabulary and word-meaning vocabulary, significantly effects not only an individual's reading achievement but also his or her ability to fully participate in both social and academic learning routines. There are many facts stating that many scholars put language and Mathematics in different priority, some consider English subject as their least priority in academic because most of them are inclined to Sciences and Mathematics since their priority degree courses are along engineering, arts, and sciences. A research undergone by Frutas (2019) suggested that the scholars gained holistic development of their academic capabilities because they are not only good in their subjects of interest but they are also good in language. THis means that there should be no dichotomy between the two literacy:

mathematics and language. A support of Genlott & Gronlund (2016) also supported the fact that literacy and mathematics are necessary skills that for different reasons unfortunately not everybody acquires sufficiently. Through a continuous social interaction, drawn in the context of socio-cultural theory enable students to learn both literacy and mathematics thus they were able to interact with peers and teacher.

Tucker (2011) mentioned that learning to count proficiently involves the acquisition of skills through involvement in key experiences using the language of number and comparison. In this case, children need to learn number names in order, count objects by touching them, understand that the last number they say is the total number of objects in the group, transfer these skills effectively from one context to the next, and move competently from counting concrete objects to counting abstractly. Tucker stated that professionals also face frequent questions from preschool and primary teachers about effective mathematics curriculum and methodology for the younger set. Relevant methods that enable to encourage a deep and healthy interest in numeracy among very young children is highly needed to arouse their attention. Tucker (2011) revealed a fact that parents with formal approach tend to push children with memorization which will end children in trauma feeling as they don't encourage mathematical thinking. As a result, it is teachers' responsibility to guide parents to see that mathematics can be learned through fun, creative and interactive play. To avoid negative beliefs, such as the one portraying mathematics as difficult and boring, young children must experience (and adults must facilitate) positivity and enjoyment around instruction. Tucker offers effective suggestions that play potentially contributes significantly to the transformation from tedious to enjoyable. The first chapter of the book outlines why play and creativity are important in early education, that mathematics instruction can be organised around play-based activities. Tucker explained counting skills and the use of number lines can be provided by a variety of creative designs; as well as the use of many patterns that can be used in mathematics: mathematics can occur in art, the natural world, music and poetry and through information communications technology (ICT).



Picture 14

Counting Games through Realia of Ducks

Picture 14 is an example of the use of realia and game in learning math. The co-teacher instructed the children to do counting based on the song. It was not only 1 to 10, but the number was expanded to 15. Children were introduced to know the logic of mathematics in numerical order by learning it through song. Thus, they knew numbers as well as the English vocabulary also. Based on the interview these children were happy to learn in the different context. They play in the same time, they also learn without any threatening feel. This is explained by Tucker (2011) that it is very important to help develop a positive ‘can do’ attitude that encourages rather than discourages children. The play-based activities link mathematics with the daily life and potentially render mathematics exciting for young people.

CHAPTER V

CONCLUSIONS

Teachers present the integration of Mathematics (numeracy) and English literacy through the use of related songs based on the stages of LOOK > THINK > ACT heuristic that frames both the instructional work of the teacher and student learning activities. Some stages covered Observe – Reflect – Think – Act - Reflect, Act – Observe – Reflect – Think – Act – Reflect to ensure that the young learners learned in the expected target as our main concern was to empower these children in the learning process.

Reflection was conducted by teacher, co-teachers and researchers based on the observations in the class. This was taken as the road map to bettering the result of learning. The first reflection was that considering English is not taught in Elementary level, but introduced in class 5 and 6 through Modules and English structure; then the certain songs reflected the target were used. The second reflection was that teacher's help in introducing certain vocabulary in building literacy of English language had not received positive respond from certain students as they preferred to the use of visual aid. This was resulted that the use of projectors in the school was very minimum, hence the intervention of learning was responded enthusiastically. The third reflection was that song was used, however the teacher and co-teachers implemented the application heterogeneously to eliminate children's boredom. Including this were the use of TPR, game, realia, and some other methods of learning. To sum up, song has facilitated the learning of the two literacies. However, in relation to the blocks of the learning and how to overcome it one reflection was from the availability of internet connection in the school and projector. There were two facts: as students' boredom in learning we had to anticipate with the ready songs to switch. The co teachers and teacher might store the videos, however, three months duration to learn needed enormous plan to execute. Video from mobile phone internet connection through the use of personal gadget with personal data support was a must in this learning context. If not, the teacher should be equipped with downloaded video based on the previous reflection in the classroom.

Dealing with the availability of projector, as it is an expensive property, we had to provide independent learning media. A projector was a must especially when the co

teachers and teacher wanted to introduce certain vocabulary and the concept of mathematics logic.

Another problems hampering were students' motivation and teacher's awareness to be a long life learners. Dealing with students' motivation to practice English, some were still shy. When some students had initiated to practice English, some others bullied them as English is regarded as "non native language" of Indonesian society. Shyness was the major problem dominating the students' other problem. Co teachers' efforts to motivate them was an initiation to nurture the confidence. The shyness was affected also by the less motivating learning atmosphere in the classroom as in Indonesian's context, making mistakes is also a shameful thing and students tended to avoid making mistakes.

Another reflection was from teacher's background in which most of them are not from English Department. Government's policy has shifted to the elimination of English subjects as students were not expected to lose their identity by learning foreign language and forget their origin. This triggered English as an unimportant subject in schools. Another factor was that for schools providing English, the system of learning was solely in accomplishing the course book or module.

The last problem to consider was the range of songs options. Certain songs dealing to subtraction and addition were available but there were limited numbers of songs as the integration of two literacies, especially dealing with multiply and divide fractions.

REFERENCES

- Annika AgéliiGenlottÅkeGrönlund. Closing the gaps – Improving literacy and mathematics by ict-enhanced collaboration.
<https://www.sciencedirect.com/science/article/pii/S0360131516300859>
- Boaler J (2016) *Mathematical mindsets: Unleashing students’ potential through creative math, inspiring messages and innovative teaching*, San Francisco: Jossey-Bass in http://www.gaweastps.sa.edu.au/docs/DECD_BEST-ADVICE_1.0_Beliefs-and-attitudes-about-mathematics_v12.pdf
- Calvert, Sandra L & Tart, Maureen. 1993. Song versus verbal forms for very-long-term, long-term, and short-term verbatim recall. *Journal of Applied Developmental Psychology*. 1993.
- Clay, M.M., and C.B. Cazden. 1990. A Vygotskian interpretation of reading recovery tutoring. In *Vygotsky and education: Instructional implications and applications of sociohistorical psychology*. ed. L. Moll, 206–22. Cambridge: Cambridge University Press.
- Data Base PISA (2012). Results for the 2012 mathematics, reading and science assessments
- Džanić, Nihada Delibegović, & Pejić, Alisa (2016). The Effect of Using Song on Young Learners and Their Motivation to Learn English. *An Interdisciplinary Journal* Volume 1, Issue 2 October 2016 pp. 40-54
- Eula Ewing Monroe & Michelle P. Orme (2002) *Developing Mathematical Vocabulary, Preventing School Failure: Alternative Education for Children and Youth*, 46:3, 139-142, DOI: 10.1080/10459880209603359
- Fantuzzo, John W, Gadsden, Vivian , McDermott, Paul A. (2011). *An Integrated Curriculum to Improve Mathematics, Language, and Literacy for Head Start Children*. *American Educational Research Journal* June 2011, Vol. 48, No. 3, pp. 763–793 DOI: 10.3102/0002831210385446
- Fröbel, F., and I. M. Lilley. 1967. *Friedrich Froebel*. Cambridge: Cambridge University Press.
- Fullan, M and Campbell, Carol (2006). *Improving student achievement in literacy and numeracy : job-embedded professional learning*
- Gasteiger, H. 2015. “Early Mathematics in Play Situations: Continuity of Learning.” In *Mathematics and Transition to School: International Perspectives*, edited by B. Perry, A. Gervasoni, and A. MacDonald, 255–272. Singapore: Springer.
- Governor, D., Hall, J., & Jackson, D. (2013). *Teaching and Learning Science Through Song: Exploring the experiences of students and teachers*.

International Journal of Science Education, 35(18), 3117–3140.
doi:10.1080/09500693.2012.690542

Gross, C., and H. G. Rossbach. 2011. "Frühpädagogik." In *Empirische Bildungsforschung. Gegenstandsbereiche*, edited by H. Reinders, H. Ditton, C. Gräsel, and B. Gniewosz, 75–86. Wiesbaden: VS Verlag für Sozialwissenschaften. Çağda Kıvanç Çağanağa, Ayten Kalmış. The Role of Puppets in Kindergarten Education in Cyprus.
https://www.scirp.org/pdf/OALibJ_2016071810353844.pdf

Harper, Candace & Jong, Ester de (2004). Misconceptions about teaching English-language learners. INTERNATIONAL READING ASSOCIATION (pp. 152–162) doi:10.1598/JAAL.48.2.6

Harper, Candace & Jong, Ester de (2004). Misconceptions about teaching English-language learners. INTERNATIONAL READING ASSOCIATION (pp. 152–162) doi:10.1598/JAAL.48.2.6

Harper, Candace & Jong, Ester de (2004). Misconceptions about teaching English-language learners. INTERNATIONAL READING ASSOCIATION (pp. 152–162) doi:10.1598/JAAL.48.2.6

Hepner, Tamber (2007). Integrating Math and Language Arts in the Classroom: A Study on the Effectiveness of Math Journals on Language Skills Needed to Solve Problems for 3rd Graders Learning English as a Second Language. Department of Curriculum and Instruction and the faculty of the Graduate School of Wichita State University

Howle, M. J. (1989). Twinkle, twinkle little star: It's more than just a nursery song. *Children Today*, 18 (4), 18-22

Jensen, E. (2000). *Music with the brain in mind*. Thousand Oaks, CA: Corwin Press.

Jourdain, R. (1997). *Music, the brain and ecstasy; how music captures our imagination*. New York, NY:Harper Press

Kelley, Todd R. & Knowles, J. Geoff. A conceptual framework for integrated STEM education *International Journal of STEM Education*. DOI 10.1186/s40594-016-0046-z

Kemmis, R. and McTaggart, S. (1988) *The Action Research Planner (3rd edn)*. Geelong, Deakin University Press.

Kemmis, R. and McTaggart, S. (1988) *The Action Research Planner (3rd edn)*. Geelong, Deakin University Press.

Lee, Joon Sun, and Herbert P. Ginsburg. "Early childhood teachers' misconceptions about mathematics education for young children in the United States." *Australasian Journal of Early Childhood*, vol. 34, no. 4,

2009, p. 37+. Academic OneFile, Accessed 13 Sept. 2018.
<https://www.sciencedaily.com/releases/2013/10/131028162057.htm>.

Magda L. Frutas, DME.

<http://manuscript.advancejournals.org/uploads/022ba167856333c99e7d16a9d617aca9e8e08062593ab8f6249c7b7f6d1b4036/Manuscript/5422.pdf>

Mathematical Literacy: The Effects of Mathematics Journals on Student Understanding of Fractions in a Montessori Classroom Eileen Bechler

Mi Song Kim (2011) Play, drawing and writing: a case study of Korean–Canadian young children, *European Early Childhood Education Research Journal*, 19:4, 483-500, DOI: 10.1080/1350293X.2011.623534

Mishina, L. and Wallace, A. (2004) Relations between the Use of Puppetry in the Classroom, Student Attention and Student Involvement. Brooklyn College, Brooklyn

Mulwa, Ednah Chebet (2014). The Role of the Language of Mathematics in Students' Understanding of Number Concepts in Eldoret Municipality, Kenya. *International Journal of Humanities and Social Science*. Vol. 4 No. 3; February 2014

Mulwa, Ednah Chebet. 2014. The Role of the Language of Mathematics in Students' Understanding of Number Concepts in Eldoret Municipality, Kenya. *International Journal of Humanities and Social Science* Vol. 4 No. 3; February 2014

Neil Mercer & Claire Sams (2006) Teaching Children How to Use Language to Solve Maths Problems, *Language and Education*, 20:6, 507-528, DOI: 10.2167/le678.0

Perry, B., and S. Dockett. 2008. "Young Children's Access to Powerful Mathematical Ideas." In *Handbook of International Research in Mathematics Education*. 2nd ed., edited by L. English, 75–108. New York: Routledge.

Peyton, J. (1996) Puppet Language: The Science of Communicative Play.<http://www.puppettools.com/v3/library/pdf/PuppetLanguage.pdf>

Prochazkova, Lenka Tejkalova (2013). Mathematics for language, language for mathematics. *European Journal of Science and Mathematics Education* Vol. 1, No. 1, 201323

Reading Comprehension and Mathematics Problem Solving Proficiency of Filipino ESL Learners: An Imperative for Bridging the Gap

Riccomini, Paul & Smith, Gregory & Hughes, Elizabeth & Fries, Karen. (2015). The Language of Mathematics: The Importance of Teaching and Learning Mathematical Vocabulary. *Reading & Writing Quarterly*. 31. 235-252. 10.1080/10573569.2015.1030995.

- Savic, Vera M. (2014). Total Physical Response (TPR) Activities in Teaching English to Young Learners.
- Southgate, D., & Roscigno, V. (2009). The impact of music on childhood and adolescent achievement. *Social Science Quarterly* (Blackwell Publishing Limited), 90(1), 4-21. doi:10.1111/j.1540-6237.2009.00598.x
- Thomas, Cathy & Van Garderen, Delinda & Scheuermann, Amy & Lee, Eun. (2015). Applying a Universal Design for Learning Framework to Mediate the Language Demands of Mathematics. *Reading & Writing Quarterly*. 31. 207-234. 10.1080/10573569.2015.1030988.
- Trinick, Robyn; Ledger, Gail; Major, Karen; Perger, Pamela (2016). More than Counting Beats: Connecting Music and Mathematics in the Primary Classroom. *International Journal for Mathematics Teaching and Learning*, v17 n3 2016
- Tucker, Kate (2011). [Mathematics Through Play in the Early Years](http://dx.doi.org/10.4135/9781446212417.n5). <http://dx.doi.org/10.4135/9781446212417.n5>
- Winsler, Adam. (2003). Vygotskian Perspectives in Early Childhood Education. *Early Education and Development*. 14. 253-270.